CITY OF NEWPORT BEACH
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August 22, 2018

DELIVERED VIA U.S. MAIL AND EMAILED

Dr. Linda Candelaria, PhD
California Regional Water Quality Control Board
Santa Ana Region 3737 Main Street, Suite 500
Riverside, California 92501-3348

RE: Regional Board Meeting on October 19, 2018 to adopt the Basin Plan Amendments to Incorporate Total Maximum Daily Loads for Copper and Non-TMDL Action Plans for other Metals in Newport Bay

Dear Dr. Candelaria:

The City of Newport Beach ("City") submits these comments in response to the notice we received on July 10, 2018, advising that the California Regional Water Quality Control Board, Santa Ana Region ("Regional Board") will consider adopting Amendments to the Water Quality Control Plan for the Santa Ana Region ("Amendments") to incorporate Total Maximum Daily Loads ("TMDLs") for copper and non-TMDL Action Plans for other metals in Newport Bay.

First, we would like to reiterate our sincere appreciation for the Regional Board's work in improving water quality in the Santa Ana River watershed. The Regional Board has been an important partner with us - and we with you - in these efforts.

However, the pending Amendments continue to have us greatly concerned.

As you know, the City provided written and oral comments to you on July 24, 2015, when staff included Newport Bay Copper/Metals TMDLs as an informational item on the Regional Board's regular agenda. At that time, we advised the Regional Board the City was concerned about the proposal to require the City and others to restrict or ban the use of legally-available copper-based antifouling paints ("AFP") through a new TMDL. In particular, we outlined to the Regional Board that the implementation plan was both unenforceable and a circumvention of the legal role and rights of the Department of Pesticide Regulation ("DPR"), which is the exclusive California regulator of pesticides, including copper AFP. We urged you to confer with the City and engage in a meaningful dialogue about the current copper levels in Newport Bay and the development of meaningful Amendments.

Our comments and concerns were shared by many affected stakeholders and resulted in a significant number of commenters both in writing and in oral testimony. The planned Regional Board meeting to adopt the TMDL in October 28, 2016 was revised to be a workshop because it was acknowledged by all, including then Executive Officer, Kurt Berchtold, and the Regional Board that this TMDL was not ready for adoption. The Regional Board requested staff develop workshops to hear the community's concerns regarding availability of non-toxic AFP alternatives. At the workshop, Mr. Berchtold, and staff assured the Board the comments would be "thoroughly addressed" and two workshops with the stakeholders in the boating community would be provided. It has been 21 months since the October 28, 2016 workshop and there have been no workshops, no outreach to the boating community, no inclusion of named dischargers in the development of the latest draft TMDL. A very general response to comments was provided, but numerous specific technical comments were not addressed or acknowledged. With the release of the notice for adoption of this revised TMDL, you cannot be surprised by the consistency in our concerns, as this revised draft shares most of the same major substantive defects as the previous draft. We are providing the same comment package as the previous draft, as well as additional comments on the new materials.

To date, we do not believe that our concerns about the practical impacts of the proposed implementation plan to our community and Newport Bay have been acknowledged or appreciated. Our original comments and concerns still stand. We believe the proposed Amendments have the following significant problems:

- The Amendments seem to be underdeveloped, in part because they rely on data that is out-of-date, incorrect and overly conservative;
- The Amendments are impractical if not impossible for the City to effectively implement; and
- Considering the above, we believe if the proposed Amendments are adopted as proposed, the Amendments may result in litigation.

Again, this is an important enough issue that we believe we need to approach the full Regional Board with our concerns. Therefore, on October 19, 2018, we will urge the Regional Board to consider our information and take a different action than suggested by staff.

Generally, our request is as follows:

1. Do not adopt the Amendments at this time.
2. Select an additional review period - up to four (4) years - for the Regional Board staff, the City, DPR, and other stakeholders/dischargers to have a meaningful discussion about additional testing and monitoring, education, best management practices, the implementation timeline for DPR's updated AFP regulations, and more, with the goal of coming back to the Regional Board with more robust data and

implementation ideas. This additional monitoring is appropriate and will help determine the effectiveness of the DPR limits on copper leach rate paints.

3. The City commits to participating thoroughly and in good faith in that discussion provided all of the parties do so collaboratively, as has been our collective spirit in the past. To support this request, we developed multiple technical documents to support the needed revisions in the previous draft. The inadequacy of the proposed Amendments span a wide array of legal and technical issues that were summarized in the last comment package, which again, we do not believe has been addressed "thoroughly." Now we are providing another memorandum that summarizes the availably of non-copper AFP and a closer examination of the challenges both Marina del Rey Harbor and Shelter Island have incurred to reduce copper loading.

Again, the City's primary concerns include, but are not limited to, thefollowing:

- The copper TMDL unlawfully attempts to force local agencies to solve a conflict caused by the Regional Board's failure to convince the Legislature or its sister state agencies to ban copper AFP. While DPR has provided additional mitigation measures to reduce copper, these are only recommended, they are not required. DPR still controls the use of pesticides in the state of California. The City cannot control the use of a pesticide.

- The copper TMDL is unlawful because alternatives to copper AFP are not effective or available and may have significant adverse environmental impacts. The State of Washington has realized this issue and new legislation is being considered to delay the ban on the use of copper-based AFP that was under consideration because it is feared the alternatives will cause greater environmental harm.

- The phased implementation schedule is unreasonable, unsupported and would force substantial early investments that may be unnecessary. The Regional Board should let the DPR copper reduction effort take effect so the anticipated reduction in copper loading can be assessed and allow safe alternative paints to be developed and demonstrated.

- The City requests the time be extended to allow the copper reductions from DPR's lower copper AFP leach limits that just started in July of 2018 and the copper brake pad initiative to be implemented over the next 7 years. The brake pad initiative may reduce copper in both the stormwater runoff and in aerial deposition. It would be appropriate for the compliance schedule to be aligned with these two major policy changes. In addition, time is needed for logistical constraints, while the new paint limits for copper are now in effect, it will take time for older paints to phase out and newer paints to be used. For soft-non-biocidal paint alternatives, longer haul out and painting times are needed for those conversions, which will impact boatyard availability to Newport Bay vessels.

- Learn from the challenges ongoing at Marina del Rey Harbor and Shelter Island.
- The copper TMDL imposes unfunded state mandates.
- The substitute environmental document fails to comply with the California Environmental Quality Act ("CEQA") and CEQA's implementing guidelines.
- However well intended, the revised Amendments seem flawed, preempted, give substandard consideration to current conditions and technical analyses, and do not comply with CEQA. Additionally, the information included in the attachments establishes there may in fact not be a copper impairment (either in the water or sediment), and that no implementation plan is necessary at this time.

Again, we are providing this information in recognition of our strong history of collaboration with the Regional Board. Our continued commitment to evaluate and resolve water quality issues of concern is evidenced by our history of voluntary and cooperative efforts in the watershed. Specific to copper, these efforts include, but are not limited to:

- Contracting with (and funding) consultants to provide professional/technical assistance with research/testing/analysis in an effort to better understand and define any potential copper-related issues in Newport Bay.
- Conducting two independent harbor-wide water column sample tests for copper (July 2015 & February 2016).
- Conducting five toxicity tests in areas of higher copper concentrations (all showed no toxicity).
- Conducting boat zone testing to better assess copper bottom paint leachate concentration degradation.
- Visiting, observing and reviewing the experimental vessel skirt/vacuum hull bottom cleaning operation in Santa Cruz, California.
- Meeting with bottom paint applicators and shipyards to better understand available paints, application process, re-application rates, and cost of copper and non- copper AFPs.
- Since 2010, and with your assistance, financing and completing significant dredging efforts to remove sediments/legacy contaminants, and to improve flushing and circulation, thus improving the overall water quality of Newport Bay.
- Developing a web page to educate boat owners and provide updated copper water quality information.

- Currently assisting Regional Board staff with the vessel skirt/vacuum hull bottom cleaning pilot project at Balboa Yacht Basin in Newport Beach

For these and other reasons, and to continue our history of working cooperatively rather than in adversarial proceedings, we again, respectfully request that you and your Regional Board staff colleagues consider our recommendation that the Regional Board not adopt the Amendments on October 19, 2018. Additional time will allow us to further discuss our concerns and our going-forward ideas to return to the Regional Board at a later date with more robust data and a well-thought out implementation plan.

Please know that we appreciate the Regional Board's fine work and we as a community remain willing and ready to discuss the development of Amendments that incorporate a justified and grounded implementation plan to address actual water quality concerns in the Newport Bay.

Sincerely,

Dave Kiff
City Manager
City of Newport Beach

Enclosures:

Attachment 1: City of Newport Beach's October 14, 2016 Comment letter and supporting materials
Attachment 2. Comments for the 2018 version of the Revised Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr) and Substitute Environmental Document
Attachment 3. Response to City's comments for the Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr)
Attachment 4. Attachment 4. Review of Studies Conducted to Evaluate the Availability and Use of Non-copper Antifouling Paints

ATTACHMENT 1

Note: for supporting materials see the City's website:

http://www.newportbeachca.gov/government/departments/public-works/ocean-water-quality/newport-bay-copper

CITY OF NEWPORT BEACH
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October 14, 2016

Dr. Linda Candelaria, PhD
California Regional Water Quality Control Board, Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3348

RE: Regional Board Meeting- October 28, 2016

Basin Plan Amendments to Incorporate Total Maximum Daily Loads for Copper and Non-TMDL Action Plans for other Metals in Newport Bay

Dear Dr. Candelaria:

These comments are in response to the notice we received on August 25, 2016, advising that the California Regional Water Quality Control Board, Santa Ana Region ("Regional Board") will consider adopting Amendments to the Water Quality Control Plan for the Santa Ana River Basin ("Amendments") to incorporate Total Maximum Daily Loads ("TDMLs") for copper and non-TDML Action Plans for other metals in Newport Bay.

First, let me reiterate our sincere appreciation for the Regional Board's work in improving water quality in the Santa Ana River watershed. You have been an important partner with us – and we with you – in these efforts.

However, the pending Copper TMDL has us greatly concerned.

As you know, the City of Newport Beach ("City") provided written and oral comments to you on July 24, 2015, when staff included Newport Bay Copper/Metals TDMLs as an informational item on the Regional Board's regular agenda. At that time, we advised the Regional Board the City was concerned about the proposal to require the City and others to restrict or ban the use of *legally-available* copper-based antifouling paints (AFP) through a new TMDL. In particular, we outlined to the Board that the implementation plan was both unenforceable and a circumvention of the legal role and rights of the Department of Pesticide Regulation ("DPR"), which is the exclusive regulator of pesticides, including copper AFP. We urged you to confer with the City and engage in a meaningful dialogue about the current copper levels in Newport Bay and the development of meaningful Amendments.

Respectfully, we do not believe that this consultation about the practical impacts of the proposed implementation plan to our community and our harbor was robust or meaningful.

We have since conferred with DPR's Pesticide Registration Branch. While we are paraphrasing our discussion, they confirmed DPR's status as the exclusive regulator of pesticides in California. Specifically, Environmental Scientist Carlos Gutierrez with the Pesticide Registration Branch explained that DPR is required to investigate actual or potential significant adverse effects to people *or the environment* resulting from the use of pesticides. Mr. Gutierrez shared our concern that the Regional Board appeared to be poised to take an action to regulate AFP, and that it was doing so on a piecemeal basis as opposed to working with DPR on a unified approach that could be implemented on a state-wide basis. Finally, Mr. Gutierrez confirmed that DPR has determined that establishing a maximum allowable leach rate of 9.5 $\mu g/cm^2/day$ may be the most effective way to reduce copper in California waters. (*See also,* Department of Pesticide Regulation Memorandum dated September 12, 2016.)

We believe that the proposed Amendments have the following significant problems:

- The Amendments seem to be underdeveloped, in part because they rely on data that is out-of-date, incorrect and overly conservative;

- The Amendments are impractical if not impossible for the City to effectively implement; and

- In light of the above, we believe if the proposed Amendments are adopted as proposed, the action may be the subject of litigation.

This is important enough that we believe we need to approach the full Regional Board with our concerns. Therefore, on October 28, 2016, we will urge the Board to consider our information and take a different action than suggested by staff.

Generally, our request will be as follows:

1. Do not adopt the TMDL at this time.

2. Select an additional review period – up to four (4) years – for the Board staff, the City, DPR, and other stakeholders/dischargers to have a meaningful discussion about additional testing and monitoring, education, best management practices, the implementation timeline for DPR's updated AFP regulations, and more, with the goal of coming back to the Regional Board with more robust data and implementation ideas.

The City commits to participating thoroughly in that discussion provided that all of the parties do so collaboratively, as has been our collective spirit in the past.

To support this request, we have attached memorandums identifying the deficiencies in the proposed Amendments. To briefly summarize, the inadequacy of the proposed Basin Plan Amendments span a wide array of legal and technical issues, including but not limited to the following:

- The Copper TMDL unlawfully attempts to force local agencies to solve a conflict caused by the Regional Board's failure to convince the Legislature or its sister state agencies to ban copper AFP.
- The Copper TMDL is unlawful because alternatives to copper AFP are not effective or available.
- The margin of safety is too large and unsupported and the data relied upon is inadequate.
- The phased implementation schedule is unreasonable, unsupported and would force substantial early investments that may be unnecessary.
- The Copper TMDL imposes unfunded state mandates.
- It is improper to promulgate a TMDL for the entire bay when only certain areas within the bay may be even arguably impaired.
- The substitute environmental document fails to comply with the California Environmental Quality Act ("CEQA") and CEQA's implementing guidelines.

However well intended, the Amendments seem flawed, preempted, give substandard consideration to current conditions and technical analyses, and violate CEQA. Among other things, the information included in the attachments establishes there may in fact not be a copper impairment (either in the water or sediment), and that no implementation plan is necessary at this time.

Again, we are providing this information in recognition of our strong history of collaboration with the Regional Board. Our continued commitment to evaluate and resolve water quality issues of concern is evidenced by our history of voluntary and cooperative efforts in the watershed. Specific to copper, these efforts include, but are not limited to:

- Contracting with (and funding) Anchor QEA Consultants to provide professional/technical assistance with research/testing/analysis in an effort to better understand and define any potential copper-related issues in Newport Bay.
- Conducting two independent harbor-wide water column sample tests for Copper (July 2015 & February 2016).

- Conducting five toxicity tests in areas of higher copper concentrations (all showed no toxicity).
- Conducting boat zone testing to better assess copper bottom paint leachate concentration degradation.
- Visiting, observing and reviewing the experimental vessel skirt/vacuum hull bottom cleaning operation in Santa Cruz, CA.
- Meeting with bottom paint applicators and shipyards to better understand available paints, application process, re-application rates, and cost of copper and non-copper AFPs.
- Since 2010, and with your assistance, financing and completing significant dredging efforts to remove sediments/legacy contaminants, and to improve flushing and circulation, thus improving the overall water quality of Newport Bay.
- Developing a web page to educate boat owners and provide updated copper water quality information.

For these and other reasons, and to continue our history of working cooperatively rather than in adversarial proceedings, we respectfully request that you and your Board staff colleagues consider our recommendation that the Regional Board not adopt the Amendments on October 28, 2016. Additional time will allow us to further discuss our concerns and our going-forward ideas to return to the Regional Board at a later date with more robust data and a well-thought out implementation plan.

Please know that we appreciate the Board's fine work and we as a community remain willing and ready to discuss the development of Amendments that incorporate a justified and grounded implementation plan to address actual water quality concerns in the Newport Bay.

Sincerely,

Dave Kiff
City Manager
City of Newport Beach

Enclosures:

Attachment 1:	Anchor QEA, TDML Loading Calculations, October12, 2016
Attachment 2:	Anchor QEA, TDMLs and Non-TDML Action Plans, October 13, 2016
Attachment 3:	Anchor QEA, Current Sediment, Water and Tissue Data, October 13, 2016
Attachment 4:	Anchor QEA, Random Sample Points Methodology, July 10, 2015
Attachment 5:	Anchor QEA, Newport Bay Copper Study: Winter 2016
Attachment 6:	Anchor QEA, Technical Comments, October 14, 2016
Attachment 7:	Greg Newmark, Meyers Nave, October 14, 2016
Attachment 8:	Declaration of Chris Miller
Attachment 9:	City of Newport Beach Letter to US EPA, September 16, 2016
Attachment 10:	Department of Pesticide Regulation, Memorandum, September 12, 2016

Cc: Kurt V. Berchtold, Executive Director
Terri Reeder, Chief Coastal Waters Planning Section
Joanne Schneider, Assistance Director
Mayor and City Councilmembers
Aaron C. Harp, City Attorney
David A. Webb, Public Works Director
Amanda Carr, Deputy Director, OC Environmental Resources

ATTACHMENT 2

LATITUDE ENVIRONMENTAL

MEMORANDUM

Date: August 20, 2018

To: Mark Vukojevic and John Kappeler, City of Newport Beach

From: Shelly Anghera, Ph.D.

Re: Comments for the 2018 version of the Revised Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr) and Substitute Environmental Document

The Regional Board issued a Supplemental Staff Report and Substitute Environmental Document (SED) for the Copper Total Maximum Daily Loads (TMDLs) and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic, and Chromium (Supplemental Staff Report; RWQCB Santa Ana 2018). The City has developed new comments for the Supplemental Staff Report and SED.

Comment	Location	Comment
1	Supplemental Staff Report, Key Points, Finding 3	The City provided many comments regarding the data and methods applied in the Staff's impairment assessment. The City provided thorough data summaries to provide a more accurate impairment assessment. After 21 months, it does not appear that any of that information was used. However, response to Key Comment #3 implies that newer information would be evaluated in future refinements to the proposed TMDLs. What is the timing for updates to the Impairment Assessment?
2	Supplemental Staff Report, Key Points, Finding 7	The statement has conflicting guidance in Section 7.1. *"Non-Cu AFPs (other biocides) may also be considered, provided it is demonstrated that the use of these paints would not have a significant adverse environmental impact. Non-Cu AFPs that contain other biocides should not be applied to new boats."* What is the rational for new boats using different paints? How would that be enforced? Is this something the Regional Board can enforce?
3	Supplemental Staff Report, Key Points, Finding 7	Section 7 states "a number of the tasks listed above are included in the mitigation strategies required for the implementation of DPR's leach rate". However, DPR's guidance only provides "Recommendations for Mitigation". It should be noted that none of the mitigation strategies are required. The only required activities that DPR has imposed associated with the use of reduced leach rate copper paints is the use of soft-pile carpet and limiting cleaning to once per month for paints that leach copper at a rate of 9.5 µg/cm2/day. Lower leach rate paints do not require the use of soft-pile carpet and limited cleaning frequency.

Comment	Location	Comment
4	Supplemental Staff Report, Key Points, Finding 10	The Supplemental Staff report states the Regional Board's implementation plan for the action plan is for the City and County to develop their own implementation plan for the action plan. It appears that the required actions are to conduct monitoring and assessment. Doesn't the Regional Board's 13267 investigative order already cover this? The order discusses both organics and metals in sediment and tissue following the State's Enclosed Bay and Estuaries Plan (i.e. Sediment Quality Objectives). The only difference is the inclusion of fish and mussel tissue impacts from metals, in which the comments provided in October 2016 illustrated a lack of any impairment in tissue.
5	Supplemental Staff Report, Key Comments, Comment 1	Regional Board recommends the City or County incentivize boaters to convert paints. What incentives does the Regional Board believe would be effective to incentivize boaters to convert from copper paint to non-copper alternative boat paints? Text implies the use of BMPs is required by DPR: "*In fact, the implementation strategies of the Cu TMDLs include strategies outlined in DPR's letter of determination which states that BMPs must be used when using Cu AFPs with leach rates of 9.5 µg/cm2/d to achieve compliance with the dissolved Cu CTR criterion*". The only required BMPs for using paints at 9.5 µg/cm2/d leach rates is the use of soft clothes for cleaning and a cleaning frequency of once a month. The Supplemental Staff Report text implies that the requirement of BMPs is at the direction of DPR, but DPR has been very clear that they only recommend BMPs, not require them. It is the Regional Board's implementation strategy that requires them.
6	Supplemental Staff Report, Key Comments, Comment 2	The City does not believe non-toxic alternative paints are readily available to recreational boaters. The City has conducted a literature review to examine the availability of non-toxic alternatives. Please see attachment 4 to this comment package. Staff claim the alternative boat paints have been investigated in the State of Washington. In the latest alternatives assessment study conducted in 2017 in the State of Washington, the stakeholder team assessed 17 AFP coatings for boats, including 13 biocidal and four non-biocidal coatings (Coval Marine and Hull Coat, CeRam-Kote 54 SST, Aurora Marine VS721, and ePaint EP-21). The alternatives assessment considered hazards to human and environmental health impacts, exposure to workers (do-it-yourself boat maintenance) and exposure to marine environment, paint performance (the likelihood it will be used by boaters) and the cost and availability of the paints. The alternatives assessment confirmed that less hazardous alternatives to copper AFPs are available, but the report does not recommend any particular paint because of the diversity of boater needs. Of the 4 non-biocidal coatings evaluated, sufficient information was not available to confirm performance of these four

Comment	Location	Comment
		paints; the findings were determined to be a data gap. The four best performing paints were biocidal. Most importantly, the findings of this study supported recommendations from Ecology to delay the halting of copper-based AFP because the currently available alternatives may provide greater environmental harm. Further, Ecology acknowledged that of the few available non-biocidal AFP, there is little data to show how these paints affect aquatic life or water quality. The legislative report can be found here: https://fortress.wa.gov/ecy/publications/documents/1704039.pdf In summary, the information in Attachment 4 to this comment package makes the following claims: 1) One paint does not fit all vessel types, all environments, and all boat owner needs/uses. 2) Nontoxic (non-biocidal) AFP testing has not been conducted long enough to gain the confidence of the boaters. The earliest paint conversion studies in Southern California began less than 10 years ago. 3) AFP brands and formulations are constantly changing which contributes to the difficulty in gaining boater confidence in alternative AFPs. Not only are the formulas constantly changing, new paints are added to the market and old paints are discontinued. For the studies summarized in Attachment 4, over half of the paints evaluated have been discontinued and most of the ingredients (formulations) have changed. 4) All APF contain hazardous chemicals and their safety to human health or other receptors in the environment should be confirmed prior to forcing the boaters to change to potentially more hazardous alternatives. 5) The most supported non-biocidal paints (soft-non-biocidal) were developed for commercial vessels. These paints use water motion to remove organisms and require specific speeds at certain durations and frequency to sluff off fouling organisms. They now include slime resistant coating composed of fluoropolymers. Intersleek 900 (now Intersleek 1100) and Hempasil X3 are examples of soft-non-biocidal AFP. These paints are expensive to apply, requiring hull to be completely stripped and the product must be applied by professionals. This commercial product may not be cost effective for all recreational boaters. Further, some paints may include slime resistant coatings composed of

Comment	Location	Comment
		fluoropolymers (e.g., Intersleek 1100). Fluorocarbon is a general term for a family of substances that are being examined as contaminants of emerging concern (e.g., Teflon). These paints are not regulated as biocides and therefore, have not been tested to determine if high usage of these paints in enclosed waterbodies would result in environmental impacts.
7	Basin Plan Amendment, Page 2	Staff have revised text in the BPA, currently the sediment toxicity assessment states "In addition, sediment toxicity was present in areas where the ERMs were exceeded." We request this statement be removed from BPA because it is misleading. The City provided information that demonstrated sediment toxicity was not occurring in samples with elevated metals. Based on the SLP, sediment toxicity should be delisted.
8	Basin Plan Amendment, Page 2	The use of the Coastkeeper and Candelaria 2007 study is not appropriate in the impairment assessment result section. The data are too old to be relevant and informative for action plans. The City provided numerous paired sediment chemistry/toxicity tests that demonstrate sediment toxicity is not associated with sediment contaminant concentrations of metals. Please revise statement to say "Further monitoring of sediments is warranted due to sediment quality following the State Enclosed Bay and Estuaries assessment methods"
9	Basin Plan Amendment, Page 3	The City provided an extensive review of the load allocations calculations. Boat count was only one of multiple errors applied. Staff have not provided any justification for the continued use of incorrect assumptions and formulas. Please revise dissolved Cu loading from boats to 12,000 lbs/yr.
10	Basin Plan Amendment, Page 8	The BPA states *"Compliance with the numeric target for dissolved Cu will be considered to be achieved if the dissolved Cu CTR criterion of 3.1 µg/L is consistently achieved"*. Under 40 C.F.R. § 131.38(b)(1), guidance states that "Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects". Please provide clear guidance for the definition of "consistently achieved" and its applicability to the use of CTR values. There is no evidence in the record showing any 4 day period when the CCC was exceeded.
11	Basin Plan Amendment, Page 9	The City requests the time be extended to allow the copper reductions from DPR's copper leach limits that just started in July of 2018 and the copper brake pad initiative to be implemented over the next 7 years. The brake pad initiative may reduce copper in both the stormwater runoff and in areal deposition. It would be appropriate for the compliance schedule to be aligned with these two major policy changes. In addition, time is needed for logistical constraints; while the new paint limits for copper are now in effect, boat shops can still sell high copper paints til July 2020; therefore, it will take time for older paints to phase out and newer paints to be used. For soft non-biocidal paint alternatives, longer haul out and painting times are needed for those conversions which will

Comment	Location	Comment
		impact boatyard availability to Newport Bay vessels. The City is requesting the TMDL be extended.
12	Basin Plan Amendment	Please explain why the State Lands Commission was removed as a named discharger?
13	SED, Page 11	**Text States:** An Implementation Plan(s) (tasks and schedules) through which the numeric targets are expected to be achieved. The Implementation Plan includes requirements for the dischargers to develop and implement, upon approval, their own implementation plan to achieve the TMDLs, and to continue to monitor and evaluate water and sediments; **Comment:** But there is no TMDLs for these compounds. Perhaps reword to say "achieve other TMDLs"
14	SED, Page 18	**Text States:** "...the conversion of Cu AFPs on vessels to alternative AFPs; requirements for the use of Best Management Practices (BMPs) during hull cleaning and establishment of a diver certification program for underwater hull cleaning; and, review and improvement of relevant educational programs. **Comment:** Please confirm these are required actions the Regional Board states will be included in the Implementation Plans.
15	SED, Page 18	**Text States:** The Implementation Plans also specify that special investigations may be necessary. The dischargers would be required to implement such investigations upon direction to do so by the Regional Board Executive Officer, likely pursuant to an order issued under Water Code Section 13267. **Comment:** Is this a requirement? The Implementation plans must include special studies?
16	SED, Page 18	**Text States:** Nontoxic alternatives to Cu AFPs are available and cost-effective, and nontoxic AFPs, along with lower leach rate Cu AFPs, are the preferred option to non-Cu AFPs (other biocides). **Comment:** The City does not believe non-toxic alternative paints are readily available to recreational boaters. The City has conducted a literature review to examine the availability of non-toxic alternatives. Please see attachment 4.
17	SED, Page 19	**Text States:** *(The conversion of Cu AFPs to non-Cu AFPs (other biocides) may be considered only if no significant adverse environmental impacts associated with their use is demonstrated.)* **Comment:** Please explain the process in which the use of non-Cu AFP may be considered? What are the bounds of a demonstration project that an individual boater, marina operator, City, or County would have to undertake to be permitted to use a non-Cu AFP? Also please confirm the Regional Board asserts jurisdiction to prohibit the use of non-Cu AFPs, which are registered pesticides.
18	SED, Page 21	**Text States**: staff's analysis takes into consideration the following: The specific location and nature of all projects and tasks necessary to address impairment due to Cu, and Zn, Hg, As and Cr exceedances of guidelines, cannot be determined at this time; therefore, the evaluation of the potential environmental effects of the implementation of reasonably

Comment	Location	Comment
		foreseeable methods of compliance is conducted at a programmatic level. As specific projects are proposed, the local lead agency (ies) need to complete requisite CEQA analysis and certification at the project level. **Comment** (1): What if the proposed management action does not meet CEQA? Is it the burden of the dischargers to do a CEQA evaluation as part of the Implementation Plan? **Comment (2)**: What if the discharger implementing the action is a private entity, such as boat owners, not subject to CEQA? Will there be no CEQA review of the potential environmental impacts of the actions required by the Regional Board's TMDL? **Comment** (3): In regard to: "address impairments due to ... exceedances of guidelines", does the exceedance of guidelines infer there is an impairment?
19	SED, Page 60	**The No Action alternative:** The Regional Board would not adopt the revised TMDL and action plan, which leaves the USEPA TMDL in place. It states the Regional Board would be required to implement regulatory actions. These actions would "likely have more environmental impacts" than the revised TMDL and Action plans because the EPA TMDL requires more boats to be converted and dredging of sediments which increases emissions". This argument is confusing. In regard to boat conversions, the EPA TMDL requires attainment of the CTR, regardless of the number of boat conversions, similar to the revised TMDL being considered. In regard to sediment remediation, the same monitoring and data evaluation is needed to determine the need for managing the sediments, for both the EPA TMDL and revised TMDL. Therefore, it appears the No Action alternative has the same impacts as implementing the revised TMDL.
20	SED, Page 61	3rd paragraph, correction needed: ERL values the sediment guidelines, not TEL values
21	SED, Page 61	**Text States:** As discussed in 5.1 above, the environmental effects of the reasonably feasible methods of compliance with the proposed TMDLs and Action Plans are expected to have no impact or less than significant impact when standard, available mitigation measures are required and implemented. **Comment:** How can this statement be made when the impacts cannot be determined until the dischargers have designed their implementation plans?
22	SED, Page 62 Paragraph 2	**Text States:** Reliance on USEPA's Cu, Cd, Zn and Pb TMDLs is no longer scientifically defensible and has the potential to result in unnecessary implementation of tasks and schedules that will use limited resources to achieve unnecessary requirements. This is not in the public interest. **Comment**: What specific required actions are named in the EPAs TMDL that are not scientifically defensible compared to the revised TMDL?
23	SED, Page 63	**Text States:** The City of Newport Beach provided cost information for the implementation of various Cu TMDLs tasks. The costs presented were provided by a consultant to the City. It is not clear whether and to what extent the costs identified reflect consideration of the potential for coordination with other responsible dischargers (e.g., the County of Orange) or integration of activities (e.g., monitoring and evaluation) with other ongoing or proposed activities. **Comment:** The costs provided were to be compliant with the designed monitoring program. None of those monitoring activities relieve the MS4 permitees of their monitoring obligations.

Comment	Location	Comment
24	SED, Page 65	**Text States:** The development of a diver certification program would entail an additional cost; however, this cost could be minimized if developed and implemented by City/County staff. The cost may be higher if developed by a contractor. The cost of this program could possibly be offset by certification fees charged to divers. **Comment:** The City is concerned that the SED assumes hiring of new City/County staff to implement this program somehow mitigates the costs of implementing this program. Further, charging fees for certification programs is equivalent to developing a new tax. The fee would likely be a significant cost if it is expected to absorb the costs to implement this type of action.
25	SED, Page 66 Paragraph 2	**Comment:** The Regional Board underestimates the costs to evaluate sediment in marinas. The actual costs are expected to be $400,000 a year to implement the monitoring and special studies that were identified in the last draft of the TMDL. This text suggests only $200K for all monitoring. This is not an accurate assessment of effort to be responsive to their data requests.
26	SED, Page 67 Paragraph 1	**Comment:** Staff overestimate the value of efficiencies gained by combining monitoring programs. Staff state that monitoring requirements can be easily combined with other monitoring programs. As stated before, the MS4 monitoring program provides no overlap with the requirements proposed in the revised TMDL. That program cannot be changed to match the TMDL monitoring needs until the permit is revised. The sediment monitoring can be combined with the current sediment investigative order. But water column and fish monitoring are not part of that order at this time.

ATTACHMENT 3

LATITUDE ENVIRONMENTAL

MEMORANDUM

Date: July 23, 2018

To: Mark Vukojevic and John Kappeler, City of Newport Beach

From: Shelly Anghera, Ph.D., Latitude Environmental

Re: Response to City's comments for the Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr)

This memorandum summarizes the Regional Board's response to the technical comments on the Staff Report for Basin Plan Amendments for Copper Total Maximum Daily Loads (TMDLs) and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic, and Chromium in Newport Bay, California (Staff Report; RWQCB Santa Ana 2016). The City's comments were provided on October 14, 2016. The Regional Board's response was provided to the City on July 10, 2018. Based on text provided, it appears the Regional Board staff have a detailed response to the comments that will be provided in "Response to Comments document (reference 7)" prior to the hearing. Staff have provided a summary of the key comments received in a "summarized response" in the Supplemental Staff Report. Comments on the revised materials are due by August 24, 2018. Since the detailed response to comments will not be provided before August 24, 2018, this document was developed to help City staff determine if the original comments were addressed through the "key comments" as they were defined in the Supplemental Staff Report. If the comments are not believed to be addressed thoroughly, then the comments may need to be reissued to keep the unresolved issues or concerns at the forefront of ongoing discussions.

Comment	Location	Comment	Regional Board's Response	Addressed
1	1.1	Rhine Channel is included as part of the Lower Newport Bay; however, the U.S. Environmental Protection Agency's (EPA's) 2002 Total Maximum Daily Load (TMDL) identifies it as its own waterbody. Resolution No. R8-2011-0037 states that Rhine Channel TMDLS are not included in organochlorine compound TMDLs because the impairment will be addressed through dredging. The City of Newport (City) has already dredged more than 90,000 cubic yards (cy). See the TMDL Current Data memorandum dated October 13, 2016. The City requests Rhine Channel continue to be managed separately from this metals TMDL.	Based on response to Key Comment 3, it appears the Regional Board agrees the Rhine is not included in the Copper TMDL.	Assumed, yes. However, staff report was not modified. Text includes Rhine as part of Lower Newport Bay
2	3.3 State Board Data Assessment 2006	A review was conducted that concluded that general metals should be delisted and only copper is recommended for listing in Upper and Lower Newport Bay. We believe data that characterize the current conditions support lack of listing for all metals in sediment, tissue, and water with the exception of copper in the water column. We request the Regional Water Quality Control Board (RWQCB) staff correct errors and delist general metal categories for Upper Newport Bay.	Key Comments 5 and 6 discuss sediments and fish tissue data. Regional Board believes it is "pre-mature to make a finding of sediment impairment at this time". The actions require monitoring to determine impairment with the SQO assessment tool and to confirm sediments are not further degrading. If impairments are found, then sediments they are to be remediated.	No, the analyses in the staff report were not revised and metals in sediments were not delisted. However, the outcome may be sufficient for the City. Sediments are not listed as impaired.
3	Section 3.4 Current 303(d) listing and decisions Table 3.2	We believe sufficient data are available to remove sediment toxicity in Upper Newport Bay and Lower Newport Bay waterbodies with the association of metals. See the TMDL Current Data memorandum dated October 13, 2016. Sediment toxicity is listed with organochlorine; compliance with copper TMDL should not be dependent on sediment toxicity because there is no linkage between copper concentrations and the presence of sediment toxicity.	Not addressed, revisions not made	No

Comment	Location	Comment	Regional Board's Response	Addressed
		We request the RWQCB staff correct errors and delist general metal categories for Upper Newport Bay. We believe sufficient data are available to remove sediment toxicity in Upper Newport Bay with the association of metals. See the TMDL Current Data memorandum dated October 13, 2016. A TMDL listing for sediment toxicity is included with the organochlorine TMDL.		
4	4.1.2	The use of the California Toxic Rule (CTR) copper value is overly conservative as a tool for predicting adverse impacts to marine organisms within Newport Bay. We believe a site-specific numeric target should be developed for use in the TMDL. The use of CTR values is widely recognized within the scientific community to be overly conservative for use in a regulatory order and does not appear to be directly linked in any way to potential impacts in Newport Bay. The use of site-specific numeric criteria for metals will allow a clearer and more definitive demonstration of appropriate numeric standards. The use of strong science to demonstrate the linkage between boat paint and marine quality is necessary and required within the TMDL policy. Furthermore, EPA recommends the use of water-effects ratios (WERs) specifically for copper in marine environments when dissolved organic carbon is present. "When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate." See EPA's Aquatic Life Criteria Table for copper footnote: http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#cc. We believe the CTR is not being applied appropriately. From the CTR guidance, the 3.1 micrograms per liter (µg/L) value should not be used until a WER is established. Where, as here, the use of the default WER leads to impairment findings that conflict with available toxicity data from the site, it is improper to use the default WER when evidence indicates it is incorrect. (See comments for Section 4.2.4.).	Comments not directly addressed. Regional Board continues to support use of CTR as the appropriate criteria and uses other TMDLs in Southern California to justify criterion. The Regional Board does acknowledge the dischargers may develop a revised criterion through a WER or an EPA approved biotic-ligand model.	Comment is not likely to be resolved with Regional Board, but fails to acknowledge it is the Regional Board's obligation to do so before implementing EPA's CTR

Comment	Location	Comment	Regional Board's Response	Addressed
		Moreover, though the copper TMDL purports to apply the CTR Criteria Continuous Concentration, it fails to accurately apply the regulation as written and adopted by EPA. Specifically, footnoted to the table set forth under 40 C.F.R. § 131.38(b)(1) provides that "Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects." There is no evidence that the RWQCB considered whether locations where instantaneous grab samples exceeded the (unadjusted) CTR CCC would actually exceed the CTR value over a 4-day average. This failure to consider the 4-day averaging period is especially significant because samples taken during different tidal events show variation at numerous locations.		
5	4.1.5	The Staff Report provides a discussion regarding federal revisions to the copper water quality objectives. The City submitted comments to EPA and extended those comments to the RWQCB for consideration in potential revisions to the copper water quality objectives. See the Revised Federal Copper Criteria Standard letter from City of Newport Beach, September 16, 2016.	No acknowledgement	No
6	4.1.5	As stated in the Staff Report, "The CTR criteria for dissolved Cu are expressed as a function of the WER. The WER is generally computed as the acute or chronic toxicity value for a pollutant measured in the affected receiving water, divided by the respective acute or chronic toxicity value in laboratory dilution water. A default WER of one (1) is assumed for the purposes of determining the applicable numeric objectives. This means that the numeric values identified in the CTR for dissolved Cu apply, unless an alternative, scientifically defensible WER is developed, approved and applied to modify the numeric value of the objective. If approved, the revised objectives form the basis for discharge requirements and other regulatory actions." CCC criterion continuous concentration is based on the assumption that it is multiplied by the WER for site-specific impairment. CTR is not accurately applied as intended with consideration of site-specific	See comment 4.	Comment is not likely to be resolved with Regional Board

Comment	Location	Comment	Regional Board's Response	Addressed
		conditions, and the RWQCB has not demonstrated the CTR value without adjustment from a WER is not overly conservative. We believe the CTR is not being applied appropriately. From the CTR guidance, the 3.1 µg/L value should not be used until a WER is established.		
7	Section 4.2.1	Sediment impairment should be removed from the TMDL. Sediment evaluations require the inclusions of all potential contaminants of concern to be managed appropriately. The State developed guidance for assessing sediment quality and RWQCB staff did not follow state guidance. The preponderance of relevant data does not provide any evidence of a linkage between sediment impairment and metals concentrations. Sediment impairment should not be included in a metals TMDL for Newport Bay.	Sediment impairment removed	Yes
8	Section 4.2.1 Fish/ Mussel Tissue data	Wildlife and human health screening levels used in the Staff Report are not appropriate because they are: (1) not standardized and therefore in some cases were derived differently using different assumptions, depending on the chemical; and (2) not based on recommended screening levels for wildlife and human health screening level evaluations in California. • Wildlife screening should be based on a comparison of the total daily intake of contaminated fish by wildlife receptors relative to dose-based toxicity reference values (i.e., Ecological Soil Screening Levels; see *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, EPA 540-R-97-006, 1997). Background concentrations in mussels and fish collected off the coast of Orange County (as part of regional monitoring programs such as Surface Water Ambient Monitoring Program [SWAMP] and California State Mussel Watch programs) should also be evaluated to determine if tissues from Newport Bay are statistically elevated relative to background concentrations. See the TMDL Current Data memorandum dated October 13, 2016. The fish in Newport Bay are equal to or less than the fish located	Not addressed	No

Comment	Location	Comment	Regional Board's Response	Addressed
		outside of Newport Harbor during 2009 to 2011 monitoring efforts. Many of the fish evaluated in the Staff Report are not residential and are therefore exposed across a wide area; their exposures can be assumed to be coming from regional sources that are not related to Newport Bay. • Human health screening levels were not correctly applied. Screening levels should be based on regional (California) risk-based screening levels that are available through the EPA Region 9 website, as well as appropriate site-specific information. • For evaluation of data for listing purposes, inorganic arsenic in tissue should be measured directly and not estimated when data are being used in a listing determination. The assumption that inorganic arsenic makes up 10% of total arsenic is overly conservative and inappropriate. As indicated by the literature cited in the Staff Report and in many other studies, inorganic arsenic often makes up much less than 10% of the total arsenic. Because inorganic arsenic can be analyzed and quantified, it is imperative that tissue data are collected and analyzed for this arsenic species prior to comparison to screening levels and listing determination.		
9	Section 4.2.2	Staff did not accurately characterize current condition in Newport Bay. For a detailed review of relevant data, see the TMDL Current Data memorandum dated October 13, 2016. Studies older than 5 years should be removed from determining current conditions. In fact, all data presented in the Staff Report with the exception of OC Coastkeeper & Candelaria (2014) should be removed from the analysis of current condition. More recent data are available and should have been included. A summary of the rationale for removing the studies related to water and sediment quality as descriptors of current condition is summarized below. • Copper Metals Marina Study (2007)	Key Comment 3 addresses current condition summary. Regional Board did not revise their analyses. The tables in Section 4 are still incorrect. The City provided a detailed current condition report and the Regional Board had over 18 months to revise Section 4 of the Staff Report.	No

Comment	Location	Comment	Regional Board's Response	Addressed
		– Data are too old and not relevant to current condition. This study should not be included for determining current sediment condition. • Water – Water condition changes constantly; only the most currently available data should be used to evaluate water condition. The City has dissolved copper data less than 18 months old. The Orange County (OC) Monitoring Program currently collects quarterly dissolved copper data from multiple locations in Upper and Lower Newport Bay. • Sediment – Sediment condition has changed. Significant dredging has occurred in both Upper and Lower Newport Bay. Sediment quality has changed over time, which is evident through the recent evaluations summarized in the TMDL Current Data memorandum dated October 13, 2016. Current data are available for the Turning Basin area and Marina sites; therefore, additional data are not required. • OC Stormwater Monitoring Data (2006 – 2009) – Data from 2006 to 2009 are not reflective of current conditions. Therefore, data presented in the Staff Report should be amended to only include the last 5 years of monitoring data that are readily available. – Older data can be used to support trends but should not infer current condition. • Copper Reduction in Lower Newport Bay (2013) – Data were summarized from the OC Monitoring Program for 2009 to 2011, limiting assessment to these years is not reflective of current conditions. Therefore, data presented in the Staff Report should be amended	Staff state they do not have to exclude old data, they state it is staff's judgment. This is inconsistent with the scientific understanding of chemical fate and effects in sediment, tissue, and water.	

Comment	Location	Comment	Regional Board's Response	Addressed
		to include only data after 2011. Current monitoring data are readily available. • Sediment Evaluation for Lower Newport Bay Study (Newfields 2009) – Dredge characterization data are not appropriate for defining surficial sediment condition. This study should not be included for determining current sediment condition. Dredge characterization studies characterize sediment cores that do not accurately assess the surface condition. Further, multiple dredge characterization studies have been implemented throughout the harbor; it is not clear why the Staff Report chooses to only present this evaluation. • Newport Bay Sediment Toxicity study (SCCWRP 2004) – Data are not reflective of current condition. This study should not be included for determining current sediment condition. Sediment condition has changed. Significant dredging has occurred in both Upper and Lower Newport Bay. Sediment quality has changed over time, which is detailed in the TMDL Current Data memorandum dated October 13, 2016. • Newport Bay and San Diego Creek Chemistry Study (SCCWRP 2003). – Data are not reflective of current condition. This study should not be included for determining current sediment condition. Sediment condition has changed. Significant dredging has occurred in both Upper and Lower Newport Bay. Sediment quality has changed over time, which is detailed in the TMDL Current Data memorandum dated October 13, 2016.		
10	Section 4.2.2	OC Coastkeeper & Candelaria (2014) support the lack of metals impairment to sediments.	Not addressed	No

Comment	Location	Comment	Regional Board's Response	Addressed
		• Staff did not accurately summarize the toxicity results for OC Coastkeeper & Candelaria (2014) in Table 4-10 (page 46). Table 4-10 should include the six amphipod toxicity tests that were conducted with no observed toxicity. • The lack of sediment toxicity to amphipods supports the lack of benthic impairment caused by metals. As stated in Section 4.2.1, sediment impairment is determined when there is an exceedance of effects range medians (ERMs) along with sediment toxicity. Therefore, this study supports the lack of sediment impairment related to metals and negates any actions to support sediment remediation actions (Implementation Task 2), monitoring in sediments (Implementation Task 5), and non-TMDL action plans (Table 6.1 of the Basin Plan Amendment [BPA]).		
11	Section 4.2 Data Analysis	Sediment data presented in the Staff Report are not reflective of current condition. See the TMDL Current Data memorandum dated October 13, 2016. • Data representative of current conditions were not included in the Staff Report and should be include the following studies. These studies (with the exception of Rhine Channel) support the lack of impairment to sediment quality by metals and, therefore, support the removal of non-TMDL action plans for zinc, mercury, arsenic, and chromium, as well as sediment quality evaluations and remediation from copper sources in this copper TMDL. Details of all studies are provided in the TMDL Current Data memorandum dated October 13, 2016, and summarized as follows: ○ OC Monitoring Program – Stormwater and Estuary Programs – 2011 to present (http://ocwatersheds.com/rainrecords/waterqualitydata) ▪ The quarterly program includes 139 samples at seven locations during the last 5 years. There	See Comment 9	No

Comment	Location	Comment	Regional Board's Response	Addressed
		have been no ERM exceedances for copper, zinc, arsenic, or chromium. Only seven ERM exceedances for mercury were found in the Rhine Channel location (LNBRIN). ▪ This monitoring program includes sediment toxicity testing. There have been 96 sediment toxicity tests conducted at seven stations in Lower and Upper Newport Bay in the last 5 years (since January 2011). Stations included LNBHIR, LNBRIN, LNBTUB, UNBCHB, UNBJAM, UNBNSB, and UNBSDC. Each station was tested 15 times, except for LNBRIN (n = 7) and UNBCHB (n = 14). Of those 96, 18 of the tests had a toxic response (i.e., survival less than 80%). Of the 18, two toxic responses occurred in the Rhine Channel (LNBRIN). There has been no toxicity observed in the last three sampling events in the Rhine Channel (LNBRIN), the only location where ERM exceedances of metals are currently found. All other toxic responses occurred in locations where no ERM exceedances of metals were found. ▪ The lack of sediment toxicity to amphipods supports the lack of benthic impairment caused by metals. As stated in Section 4.2.1, sediment impairment is determined when there is an exceedance of ERMs along with sediment toxicity. Therefore, this study supports the lack of sediment impairment related to metals and supports removal of known sediment copper impairment actions (Implementation Task 2), monitoring in sediments (Implementation Task 5), and all the recommended actions within the non-TMDL action plans (Table 6.1 of the BPA).		

Comment	Location	Comment	Regional Board's Response	Addressed
		○ Rhine Channel Post Remediation Study (Anchor QEA 2012) ▪ Twelve sampling locations were included; 8 samples exceeded copper ERM, 12 samples exceeded mercury ERM, and 3 samples exceeded zinc ERMs. No arsenic and chromium ERM exceedances were found. ▪ Sediment ERM exceedances are present in the Rhine Channel with occasional sediment toxicity. This study supports the approach to manage Rhine Channel separately from rest of Newport Bay. ○ Federal Dredging Post Sediment Condition (Anchor QEA 2013) ▪ Eleven sampling locations were included; no copper, arsenic, chromium, or zinc ERM exceedances were found. There was only one mercury ERM exceedance. ▪ This study included both sediment and sediment/water interface toxicity testing. No toxicity was observed. ▪ The lack of toxicity in the sediment/water interface test supports the lack of impairment from copper in sediments to overlying water. Therefore, this study supports the lack of sediment impairment related to metals fluxing from sediments and supports the removal of special studies related to copper loading from sediment (Implementation Task 6.1). ▪ The lack of sediment toxicity to amphipods supports the lack of benthic impairment caused by metals. As stated in Section 4.2.1, sediment impairment is determined when there is an exceedance of ERMs along with sediment		

Comment	Location	Comment	Regional Board's Response	Addressed
		toxicity. Therefore, this study supports the lack of sediment impairment related to metals and supports removal of known sediment copper impairment actions (Implementation Task 2), monitoring in sediments (Implementation Task 5), and all the recommended actions within the non-TMDL action plans (Table 6.1 of the BPA). ○ Bight '13 Regional Monitoring Program, Sediment Quality Objective Assessment (SCCWRP 2015) ▪ The study included sediment chemistry analyses at nine stations. Copper, arsenic, chromium, mercury, and zinc were not detected in concentrations greater than the ERM in any sample. ▪ This study included both sediment and sediment/water interface toxicity testing at nine stations. No toxicity was observed at all stations except three. Moderate toxicity was observed in two samples. High toxicity was observed in one sample; however, subsequent resampling at this station indicated no toxicity. ▪ The lack of toxicity in the sediment/water interface test supports the lack of impairment from copper in sediments to overlying water. Therefore, this study supports the lack of sediment impairment related to metals fluxing from sediments and supports the removal of special studies related to copper loading from sediment (Implementation Task 6.1). ▪ The lack of sediment toxicity to amphipods supports the lack of benthic impairment caused by metals. As stated in Section 4.2.1, sediment impairment is determined when there is an exceedance of ERMs along with sediment		

Comment	Location	Comment	Regional Board's Response	Addressed
		toxicity. Therefore, this study supports the lack of sediment impairment related to metals and supports removal of known sediment copper impairment actions (Implementation Task 2), monitoring in sediments (Implementation Task 5), and all the recommended actions within the non-TMDL action plans (Table 6.1 of the BPA).		
12	Section 4.2.2 Page 29, Table 4-4	The tissue data presented in the Staff Report are too old and not reflective of current condition. • Food Web Study in Fish (Allen et al. 2008) ○ Data presented in the Allen et al. (2008) study were collected in the winter of 2005 and the summer of 2006 and, therefore, are more than 10 years ago and are not representative of current exposures to Newport Bay sediment. • Department of Fish and Game Monitoring Data (Frueh & Ichikawa 2007) ○ Data were collected in July and August 2006 and, therefore, are more than 10 years old and are not representative of current exposures to Newport Bay sediment. • Bioaccumulation Fish Tissue Study (Allen et al. 2004) ○ Data presented in the Allen et al. (2004) study are more than 10 years ago and are not representative of current exposures to Newport Bay sediment. Further, metals, with the exception of mercury, are not known to bioaccumulate or biomagnify to levels of concern in the Southern California Bight. The old data that are presented in the Staff Report do not indicate that copper or other metals were ever elevated to levels of potential concerns within Newport Bay. For more details on the most recently available tissue data, see the TMDL Current Data memorandum dated October 13, 2016. • More recent studies should be used to support TMDL listing actions. Fish and mussel data from Newport Bay collected after	See Comment 9	No

Comment	Location	Comment	Regional Board's Response	Addressed
		2006 are available from the State's database, CEDEN (http://www.ceden.org/), and were collected as part of the Newport Bay Watershed Bio Trend Monitoring Program from 2007 through 2010.		
13	Section 4.2.3 Fish/ Mussel Tissue summary Page 45	Insufficient data are available to support a listing. In accordance with the State's Listing Policy, "A water segment shall be placed on the section 303(d) list if the tissue pollutant levels in organisms exceed a pollutant-specific evaluation guideline (satisfying the requirements of section 6.1.3) using the binomial distribution as described in section 3.1." (SWRCB 2004). In accordance with the binomial approach, a minimum sample size of 16 is required to evaluate whether there are exceedances of pollutant-specific guidelines. There are insufficient mussel and fish data available for human health and wildlife (fish tissue) listing purposes that are representative of exposure to current sediment conditions; all data collection occurred more than 10 years ago and, therefore, are not representative of current exposures to Newport Bay sediment. For human health, there are fewer than ten samples (and all older than 10 years) upon which listing recommendations are being made. Fish tissue listings are inappropriate because there was no consideration of background fish tissue concentrations of metals prior to listing recommendations. This is critical because background concentrations of mercury, arsenic, and cadmium in fish are elevated above the screening levels used in the Staff Report, based on ocean-collected fish data collected as part of the 2009 SWAMP program (see the TMDL Current Data memorandum dated October 13, 2016).	Key Comment 6 discusses fish tissue data support or lack of support for tissue impairment determination. Reginal Board still asserts that fish tissue is impaired for arsenic, chromium, and zinc. The technical comments were not addressed, and the analyses were not revised to include recent data and exclude older data.	No
14	4.2.2	Sufficient sediment and toxicity data are available to assess impairment from metals. • Thirty-nine sediment/water interface toxicity tests with 48-hour Mytilus development tests have been conducted in Upper and Lower Newport Bay in the last 5 years. No toxicity was observed in any of the tests. The lack of toxicity in the sediment/water	See comment 9.	No

Comment	Location	Comment	Regional Board's Response	Addressed
		interface test supports the lack of impairment from copper in sediments to overlying water. Therefore, this study supports the lack of sediment impairment related to metals fluxing from sediments and supports the removal of special studies related to copper loading from sediment (Implementation Task 6.1). • One hundred twenty-two sediment toxicity tests with 10-day amphipod acute tests have been conducted in Upper and Lower Newport Bay in the last 5 years. A toxic response (i.e., survival less than 80%) was detected in 22 samples. However, the toxic response does not co-occur with ERM exceedance in metals, except for two instances in the Rhine Channel where mercury exceeds the ERM. The lack of sediment toxicity to amphipods supports the lack of benthic impairment caused by metals. As stated in Section 4.2.1, sediment impairment is determined when there is an exceedance of ERMs along with sediment toxicity. Therefore, this study supports the lack of sediment impairment related to metals and supports removal of known sediment copper impairment actions (Implementation Task 2), monitoring in sediments (Implementation Task 5), and all the recommended actions within the non-TMDL action plans (Table 6.1 of the BPA). • Wildlife and human health screening levels used in the Staff Report are not appropriate because they are: (1) not standardized and therefore in some cases were derived differently using different assumptions, depending on the chemical; and (2) not based on recommended screening levels for wildlife and human health screening level evaluations in California. A review of available fish tissue does not indicate any accumulation of metals at levels higher than regional concentrations. Therefore, these studies support lack of tissue impairment related to in-bay sources for metals and supports removal of all the recommended actions within the non-TMDL action plans (Table 6.1 of the BPA).		

Comment	Location	Comment	Regional Board's Response	Addressed
		We believe Rhine Channel should be managed outside of a metals TMDL. The entire Section 4 needs to be revised to include only current information.		
15	4.2.4	The data do not demonstrate copper or any other metals are causing impairment in the water, sediment, and tissue in Upper and Lower Newport Bay. 1) Although there have been exceedances of the CTR in localized areas of the harbor, there are no toxic responses to suggest that dissolved copper concentrations are causing impacts to the most sensitive of marine organisms. There are 39 sediment/water interface tests conducted in the last 5 years as well as five water column toxicity tests in the last 6 months. No toxicity to the most sensitive toxicity test (48-hour Mytilus development) has been observed. 2) More than 215 sediment samples that represent the current sediment surface condition were evaluated. There are only two instances of a metal ERM exceedance occurring in the 122 sediment toxicity (10-day amphipod acute) tests. Therefore, the sediment and toxicity data do not support the determination of impairment based on the listing policy. 3) Wildlife and human health screening levels used in the Staff Report are not appropriate because they are: (1) not standardized and therefore in some cases were derived differently using different assumptions, depending on the chemical; and (2) not based on recommended screening levels for wildlife and human health screening level evaluations in California. Tissue does not appear to be elevated above regional concentrations. There is an insufficient number of samples to support a fish tissue listing for wildlife or human health. We believe sufficient data are available to delist sediment toxicity.	Not addressed.	No

Comment	Location	Comment	Regional Board's Response	Addressed
		We believe there is insufficient data to support listing of metals in sediments and tissues for all of Newport Bay.		
16	4.2.4 Table 4-13	Table 4-13 is difficult to follow. It is unclear what actions the RWQCB are taking. Table 4-14 provides a clear understanding of the RWQCB's intent to add new listings to the 303(d) list. The Staff Report does not accurately assess the sediment, water, and tissue impairments related to metals and does not support the RWQCB assessment for listing. ▪ Copper, zinc, and mercury in sediments should not be listed on the 303(d) list for Lower Newport Bay. There are insufficient exceedances of ERMs with the presence of toxicity. Only two instances in the last 5 years have found ERM exceedance of a metal with toxicity; both occurred in the Rhine Channel where multiple organic contaminants are also elevated above their respective ERM values. ▪ There are exceedances of dissolved copper CTR; we recommend keeping dissolved copper on the 303(d) list, but a TMDL is not needed. Evidence suggests the Department of Pesticide Regulation (DPR) guidance and regional improvements in water quality will continue to support a healthy marine habitat and provide significant reductions into the future. Water column toxicity has not been demonstrated to be associated with CTR exceedances; therefore, impairment has not been shown. ▪ Arsenic, zinc, copper, and mercury have no reason to be listed on the 303(d) and should be delisted. ▪ Arsenic, zinc, copper, and mercury for fish tissue in either Upper or Lower Newport Bay should not be listed on the 303(d) list. RWQCB staff have not applied appropriate screening criteria and have not demonstrated any potential sources for these compounds to Newport Bay that do not exist off the coast. Levels in the fish are similar to fish in coastal zones outside the influence of Newport Bay sources.	See comment 9.	No
17	4.3	The Staff Report does not accurately assess the sediment, water, and tissue impairments related to metals and does not support the RWQCB assessment for problem statement.	See comment 9	No

Comment	Location	Comment	Regional Board's Response	Addressed
18	4.3 Table 4-15	Toxicity in water and sediment have not demonstrated impairment and therefore should be removed from table.	Not addressed	No
19	5	A copper TMDL is not needed. There are ongoing programs that will continue reductions of metals to the marine environment for the next 15 years. The effectiveness of ongoing source reductions should be evaluated to determine if additional actions are required. ▪ Past actions have made a lot of progress o Dredging in Upper and Lower Newport Bay o Ongoing municipal separate storm sewer systems (MS4s), source reductions o Clean boating programs o Regional air quality improvements ▪ Anticipated and expected future actions that will reduce copper in the coming years include: o Continued MS4 reductions/controls o Brake pad initiative will reduce copper and zinc throughout California o Future maintenance dredging may contribute to deepening of harbor and increases in circulation. o The environment is naturally recovering and will only improve with time. Long-term monitoring programs have demonstrated reductions (e.g., Regional Bight Monitoring Program, California Mussel Watch Program). o DPR paint restrictions will provide significant source reductions that we think will be sufficient to maintain water quality in Newport. If needed, a boater education program and a diver training program may be developed by interested stakeholders.	Key Comment 4 addresses the need for a new copper TMDL. The City still stands by this comment. As the Regional Board have stated, there is an existing TMDL that includes metals. There are management actions currently being implemented that, with time to evaluate, may be sufficient to reduce copper in the water to levels that meet beneficial uses.	Comment addressed, but City does not agree with response.
20	5.3.1	The loadings from copper antifouling paints (AFPs) were incorrectly calculated (see technical memorandum: Newport Bay TMDL Copper Leachate Draft Memo_101216_v2.PDF).	The calculations were not corrected as requested. The revised approach taken by the Regional Board is to disregard the importance of	No, but it is now a moot point because the Regional Board will not

Comment	Location	Comment	Regional Board's Response	Addressed
		The Staff Report incorrectly calculated loading from copper AFP and failed to consider a range of leach rates from currently available copper AFP on the market, appropriate vessel counts, conditional best management practice (BMP) requirements. • Calculation Errors. 1) The conversion from a daily leach rate to a yearly leach rate used a greater number of days (368.96 and 368.39 for epoxy and ablative-type paints, respectively) than occur in a year (365). This overestimated the calculated loading. 2) The adjustments to the loading rate did not correctly apply findings from the Earley (2013) study. The Earley (2013) study presented percent decreases from non-BMP methods to BMP methods. Because the Staff Report had already calculated loading rates for BMP methods, it should have used data presented in the Earley (2013) report to determine the percent increase from BMP to non-BMP methods in order to calculate loading rates for BMP methods. This underestimated the calculated loading. • Other Considerations. 1) The DPR Environmental Monitoring Branch (EMB) 2014 memorandum identified leach rates from currently available copper AFP that ranged from 1.0 to 29.6 micrograms per square centimeter per day ($\mu g/cm^2/day$). It further determined that 58% of these AFP products were greater than the recommended maximum leach rate of 9.5 $\mu g/cm^2/day$. This suggests that 42% of the products are already below the maximum recommended leach rate. The Staff Report assumes none of the products currently being used on vessels have leach rates that are below the maximum recommended leach rate. This approach overestimates the loading rates from vessels. 2) The Staff Report is based on 10,000 vessels moored or berthed in Newport Bay. The City of Newport Beach has conducted a review of the available moorings, commercial (marina), and residential slips available and has determined a total of 4,470 vessels occur in Newport Bay. Using 10,000 vessels substantially overestimates the loading rate from vessels. 3) The DPR EMB	the calculations (e.g., number of boats to be converted) and focus TMDL compliance on attainment of the copper CTR in the water column. So, regardless of the number of boats converted, the water must be below the CTR.	use the calculations to justify implementation actions.

Comment	Location	Comment	Regional Board's Response	Addressed
		2014 memorandum recommended a maximum leach rate of 9.5 µg/cm^2/day provided that boat hull cleaning used suitable BMP methods (soft cloth pile instead of abrasive scour pads). The Staff Report calculated an average loading rate assuming 50% of the vessels were continued to be cleaned with non-BMP methods. This approach overestimates the loading rate from vessels. After adjusting for the incorrect calculations and considering reasonable alternative approaches to the loading calculation, a more accurate loading rate of approximately 11,000 pounds per year (lbs/yr) is expected, rather than a loading rate of approximately 36,000 lbs/yr as stated in the Staff Report.		
21	5.3.4	Bay sediments are not elevated in metals at concentrations above the ERM and are not associated with the presence of sediment toxicity or overlying water toxicity. This section should be removed.	Not addressed, Staff Report not revised as requested	No
22	5.3.6	Algae and other vegetation have not been shown to be a concern or a pathway for metals uptake in higher trophic organisms in Newport Bay.	Not addressed	No
23	5.4	The City has a hydrodynamic model that can more accurately assess the loading capacity for copper. It should be used.	Not addressed	No
24	5.5	A margin of safety (MOS) was not calculated correctly; therefore, load allocations were not accurately calculated for boats within Newport Bay (see technical memorandum: Newport Bay TMDL Copper Leachate Draft Memo_101216_v2.PDF). • MOS. The MOS was incorrectly calculated as 20% of the TMDL, rather than more appropriately calculated as 20% of the sum of the waste load allocation (WLA) and load allocations (LAs). This approach overestimates the MOS and simultaneously underestimates the allocation for one or more types of WLAs or LAs. See other comments provided by the City about the overly conservative use of 20% MOS in the TMDL calculation. • LA for boats. Because the MOS was overestimated, in order to make the TMDL equation equitable (TMDL = WLA + LA + MOS), one or more WLAs or LAs were underestimated. The Staff Report	Key Comment 7 discusses MOS. The MOS was revised to be 10%. Boat count was revised.	Yes

Comment	Location	Comment	Regional Board's Response	Addressed
		appears to be solving for the copper LA for boats (all other WLA or LA values had corresponding references supporting the development of those values). Therefore, it is reasonable to assume the difference in the overestimated MOS should have been applied to the underestimated LA for boats. As such, the LA for boats should be 6,448 lbs/yr instead of 6,060 lbs/yr. • Alternative MOS. The Staff Report failed to justify a MOS of 20%. Considerations should be made for the use of an alternative MOS value of 10%. Using a similar approach for recalculating the LA for boats as stated above, a 10% MOS would suggest LAs for boats should be 7,330 lbs/yr.		
25	5.5 Table 5.5	Please confirm how the boat LA was calculated. It appears to have been back-calculated from known values for the TMDL, WLAs (for MS4 permittees, CalTrans, Other NPDES permittees, and boatyards), and LAs (for Agricultural runoff, open space runoff, and air deposition).	Not addressed	No
26	5.6.1.3.1 .4	Conversion to alternative paints is not as easy as RWQCB staff suggest. See other comments provided by the City about the difficulty in purchasing and applying proven paints that are non-toxic.	Key Comment 2 addresses the availability of non-toxic paints and uses other TMDLs as examples to support feasibility. The response does not appear to be sufficient in addressing the boating community's concerns. Additional materials have been provided to summarize the availability of non-toxic paints through a literature review of work conducted by other agencies.	Not sufficiently to address the boating community's concerns.
27	5.6.2.1	Reginal Board outreach was not sufficient. The TMDL was a surprise to most named responsible parties.	Key Comment 11 discusses outreach. The Regional Boards' response misses the	No

Comment	Location	Comment	Regional Board's Response	Addressed
			point of the comment. While the City knew of the pending TMDL, "most named responsible parties" did not. The TMDL names Dischargers/Responsible Parties as: City of Newport Beach (City), County of Orange (County), Marina owners/operators, Individual boat owners, and Underwater hull cleaners. All dischargers other than the City and County were not notified. Further, Staff agreed to hold workshops to discuss boat paints with the community and no workshops were held.	
28	6.2	Recent sediment chemistry data from the OC Monitoring Program (Mass Loading Station, and Wetland and Estuary elements), Bight '13 Regional Monitoring Program, OC Coastkeeper & Candelaria (2014) study, Federal Dredging Post Sediment Condition study, and Rhine Channel Post Remediation study do not support the justification for arsenic, chromium, mercury, and zinc impairments; therefore, these non-TMDL action plan should be removed from the Staff Report (see TMDL Current Data memorandum dated October 13, 2016). Only Rhine Channel shows elevated metals concentrations relative to ERM guidance values, but the Rhine Channel is subject of an ongoing Cleanup and Abatement Order.	See Comment 9	No
29	7.0 and BPA Impleme	As provided, the TMDL calculations to estimate harbor loading from boat paint are inaccurate and do not accurately assess the copper AFP reduction measures needed to comply with the CTR. The City or any other discharger cannot develop an implementation plan for copper	Regional Boards response is partially defined in Comment 20. In addition, the revised approach puts	No, but it is now a moot comment.

Comment	Location	Comment	Regional Board's Response	Addressed
	ntation Plan	reductions until the impairment has been defined accurately. The implementation actions have not been proven to be necessary to protect beneficial uses because impairment has not been accurately assessed and demonstrated.	the dischargers in charge of developing an implementation plan, therefore we cannot comment on the Regional Boards recommended implementation plan.	
30	8.3 Cost Considerations	For a summary of the 5-year cost to implement the program without any cost considerations to the boat owners and marina operators, see the TMDL Cost Estimate memorandum dated October 13, 2016. The cost considerations fail to address the full spectrum of requirements under the TMDL, including implementation plan development; compliance monitoring and special studies; in-water hull cleaning diver certification; and continuing education programs for boaters, boatyards, and marinas. Furthermore, a more rigorous economic accounting should be conducted, including providing a range of costs for the specific items mentioned, such as dredging to remediate copper in Lower Newport Bay, ongoing maintenance costs associated with more frequent boat hull painting, and costs to implement specific BMPs. The potential cost impacts were only considered for individual boat owners and not the financial impact to marina operators and the local marina industry. Banning the use of copper-based AFPs may cause most boaters to move to nearby harbors or leave boating because of this financial (and perceived as unnecessary) hardship. Only the wealthiest boaters will be able to afford to stay involved with boating, and they may choose nearby harbors and hurt the local economy by creating unfair impacts on marina owners and businesses. Other harbors are scheduled for copper TMDL considerations, but those TMDLs are years away from being enacted, and when enacted will have years to become compliant. Thereby, the requirements set forth for Newport Bay will affect our community more than 10 years before other harbors are impacted by this legislation.	Staff report was not modified to include consideration of costs noted in this comment. Key Comments 12.3 discusses costs to implement TMDL in the SED. Only costs provided in the SED included monitoring costs. A separate comment is provided for SED monitoring cost assumptions.	No

Comment	Location	Comment	Regional Board's Response	Addressed
31	9.0	This TMDL was not peer reviewed. The RWQCB cannot assume review for the EPA 2002 TMDL that included organics is either reflective or relevant to this copper TMDL.	Key Comment 9 discusses peer-review. The Regional Board disagrees with the City's concern that the material in the staff report is not sufficiently reviewed. Staff claim the studies they included were peer-reviewed. While that may be true, many of the comments are critical of the methods in which those peer-reviewed studies were included in the Staff report (e.g., inaccurate calculations of copper loading from boats). Therefore, the comment still stands.	Comment addressed, but City does not agree with response.
32	9.2	The City does not believe the RWQCB has actively or has been willing to work with City. The City has provided comments multiple times and provided data for the last 5 years and the RWQCB has not incorporated the City's opinions or current data. Further Reginal Board outreach was not sufficient. The TMDL was a surprise to most named responsible parties.	This comment was not addressed, and it provides an example of the original concern. The City has waited 21 months for a response to comments and a revised set of TMDL documents. The Regional Board did not provide appropriate responses within a reasonable time. Executive Officer and staff assured the Board the comments would be "thoroughly addressed" and	No

Comment	Location	Comment	Regional Board's Response	Addressed
			two workshops with the stakeholders in the boating community would be provided. It has been 21 months since the October 28, 2016 workshop and there have been no workshops, no outreach to the boating community, no inclusion of named dischargers in the development of the latest draft TMDL. A very general response to comments was provided, but numerous specific technical comments were not addressed or acknowledged. The City's October 14, 2016 letter requests the Regional Board work with the City numerous times. There has been no efforts on the Regional Board's behalf to work with the City.	

ATTACHMENT 4

LATITUDE ENVIRONMENTAL

MEMORANDUM

Date: August 21, 2018

To: Mark Vukojevic and John Kappeler, City of Newport Beach

From: Shelly Anghera, Ph.D.

Re: Review Non-copper-based Alternative Antifouling Paints to Support Discussion on Implementation Strategies Identified in the Revised Newport Bay Copper TMDLs and Non-TMDL Action Plans for Zinc, Mercury, Arsenic, and Chromium

The pending revised Newport Bay Copper (Cu) total maximum daily load (TMDLs) and Non-TMDL Action Plans for Zinc, Mercury, Arsenic, and Chromium (Copper TMDL) requires boat owners to reduce the use of copper-based antifouling paints (AFP) through the conversion of paints to non-copper AFP to meet water quality objectives. Conversion to lower leach copper paints is not sufficient based on the loading calculations provided in the Regional Water Quality Control Board's (Regional Board) proposed Basin Plan Amendment. The City of Newport Beach (City) maintains concerns heard from the residents that alternative nontoxic boat paints are not yet proven to be dependable alternatives. The Regional Board continues to assert nontoxic alternative AFP are readily available. Key response to comments #2 addresses the concerns on the availability of nontoxic AFPs. The Supplemental Staff Report (page 6 and 7) states:

> *...First, some nontoxic alternatives to Cu AFPs are available and effective. Lower leach rate Cu AFPs and non-Cu AFPs are also available. In addition, nontoxic paints are the preferred option over non-Cu paints, since non-Cu AFPs include other biocides, such as Zn or organics, that may result in aquatic toxicity.*
>
> *Note that the Port of San Diego conducted a study on alternative paints (nontoxic and non-Cu paints), followed by a Cu Paint Conversion project in Shelter Island Yacht Basin (SIYB) as part of their Cu Reduction Program. Intersleek 900 was the paint of choice for boat conversions and appears to be a viable paint, so there is at least one nontoxic paint that is available and viable. (Note that since the Port's study, Intersleek 900 has been reformulated to Intersleek 1100, which is also a nontoxic paint.) The State of Washington also conducted a study on alternative paints. In addition, LA County will be converting 100 boats using Cu AFPs to nontoxic paints in 2 years.*

Again, a similar statement is provided in the SED (page 18):

> *Nontoxic alternatives to Cu AFPs are available and cost-effective, and nontoxic AFPs, along with lower leach rate Cu AFPs, are the preferred option to non-Cu AFPs (other biocides).*

The Regional Board provides consideration for paints with other biocides. The Supplemental Staff Report (page 2) states:

> *Non-Cu AFPs (other biocides) may also be considered, provided it is demonstrated that the use of these paints would not have a significant adverse environmental impact.*

In response to both the claims of the availability of nontoxic (i.e., non-biocidal) paints and the potential for use of alternative biocide AFPs, a summary of the findings from four studies commissioned by USEPA, CalEPA Department of Toxic Substances Control (DTSC), and Washington State Department of Ecology (Ecology) are provided here.

This summary will demonstrate continued concerns regarding the availability and proven effectiveness and safety of alternative AFP.

1) One paint does not fit all vessel types, all environments (temperature ranges, seasons, types of fouling organisms), and all boat owner needs/uses. The studies presented here suggest AFP effectiveness can vary from boat to boat, year to year, and place to place.
2) Nontoxic (non-biocidal) AFP testing has not been conducted long enough to gain the confidence of the boaters. The earliest paint conversion studies in Southern California began less than 10 years ago.
3) AFP brands and formulations are constantly changing which contributes to the difficulty in gaining boater confidence in alternative AFPs. Not only are the formulas constantly changing, new paints are added to the market and old paints are discontinued. For the studies summarized in this paper, over half of the paints evaluated have been discontinued or the ingredients (formulations) have changed.
4) All AFP contain hazardous chemicals and their safety to human health or other receptors in the environment should be confirmed prior to forcing the boaters to change to potentially more hazardous alternatives.
5) The most supported non-biocidal paints (soft-non-biocidal) were developed for large commercial vessels. These paints use water motion to remove organisms and require specific speeds at certain durations and frequency to sluff off fouling organisms. Intersleek 900 (now Intersleek 1100) and Hempasil X3 are examples of soft-non-biocidal AFP. These paints are expensive to apply, requiring hull to be completely stripped and the product must be applied by professionals. This commercial product may not be cost

effective for all recreational boaters. Further, some paints may include slime resistant coating composed of fluoropolymers (e.g., Intersleek 1100). Fluorocarbon is a general term for a family of substances that are being examined as contaminants of emerging concern (e.g., Teflon). These paints are not regulated as biocides and therefore, have not been tested to determine if high usage of these paints in enclosed waterbodies would result in environmental impacts.

SUMMARY OF AVAILABLE NON-COPPER AFP OPTIONS:

There are a wide range of boat hull coatings available for recreational boaters to prevent the attachment of marine organisms, known as fouling. Non-copper AFP can be classified in the following categories (CalEPA 2011):

Containing no biocides:

- Hard non-biocidal paint: contain no biocides, but instead contain epoxy and sometimes ceramic to prevent organisms from fouling the hull. Ceramic coatings use hard minerals such as quartz to create a hard-protective coating that is also smooth.
- Soft non-biocidal paint: contains no biocides and is based on silicone compounds, fluoropolymers, and wax-like polymers. These types of paint do not function by releasing toxic chemicals to prevent organisms from attaching to the boat hull but rather as a non-stick surface which makes it more difficult for fouling organisms to attach and easier to remove fouling organisms that have attached on the surface. The coatings are soft and vigorous cleaning (or scratching) may damage the antifouling coating resulting in ineffectiveness. (Northwest Green Chemistry (NGC) 2017).
- Photoactive non-biocidal coating: This coating is designed to interact with water and light to produce hydrogen peroxide at the hull surface, thereby deterring fouling. These paints usually include zinc-oxide; specifically, zinc acts as a catalyst in the formation of hydrogen peroxide. Zinc-oxide is not regulated as a biocide (NGC 2017).

Containing biocide:

- Zinc biocide paint: usually contains zinc pyrithione as a zinc biocide and often contains zinc oxide which functions as an adjuvant or a material that aids in the effect of another component.
- Organic biocide paint: often contains Econea, a new organic biocide that has emerged in the last several years and generally contains zinc oxide.
- Zinc/organic biocide combination paint

Evaluation of these non-copper-based AFP as alternatives to copper-based paint was conducted in four studies commissioned by USEPA, CalEPA Department of Toxic Substances Control (DTSC), and Washington State Department of Ecology (Ecology). The USEPA study was conducted in collaboration with the Port of San Diego (2011). The study evaluated 46 paints, including copper and zinc biocidal AFP and non-biocidal AFP. In the CalEPA study (2011), only non-biocidal AFP were evaluated. Based on the USEPA and CalEPA studies, Ecology commissioned a study to further evaluate six potential paints and compare their performance and risks to copper AFP. Since these studies were published, a multi-stakeholder alternatives assessment study was conducted and published in 2017 by Northwest Green Chemistry (a nonprofit organization) in collaboration with Ecology.

Most of these studies included an evaluation of non-copper biocide AFPs, however, this review only includes the findings for the non-biocide AFPs, as this is the expected implementation activity and priority identified by the Regional Board. Findings from the four studies are summarized here.

USEPA 2011 Study: Safer Alternatives to Copper Antifouling Paints for Marine Vessels

Institute for Research and Technical Assistance (IRTA) in collaboration with Unified Port of San Diego evaluated potential alternative antifouling paints (USEPA 2011). The study was funded by USEPA.

Forty-six non-copper AFPs were evaluated for performance, longevity, and cost via two phases: 1) panel testing; and 2) boat hull testing. The paints tested included 16 zinc biocide paints and four organic biocides, two zinc-oxide paints, and 24 non-biocidal paints such as epoxies and silicone paints. The panel testing was to evaluate whether test paints were effective in repelling or preventing growth, and ease of cleaning. The panel testing identified 21 top performing test paints including five non-biocide paints, 14 zinc paints, and two organic biocide paints.

Among the top 21, 11 were screened further with the priority on non-biocidal paints for the boat hull testing. The 11 paints included six non-biocide paints, two zinc-oxide paints, two active zinc biocide paints, and one organic-biocide paint. The 11 selected paints were applied to boat hulls and evaluated for approximately 20 months for fouling growth (the amount of fouling present, its location on the boat hulls and the types of fouling), cleaning effort (the level

of effort required to clean the hulls), and test paint condition (test paint integrity). The top performing test paints included two non-biocidal products (Intersleek 900 and Hempasil X3) and two zinc-biocide products (Ecominder and Seaguard HMF). See Table 1 for the evaluation of the 11 paints.

The study concluded that soft non-biocidal paints Intersleek 900 and Hempasil X3, which ranked high in the performance evaluation of the hull testing, were cost effective over the long-term and were available on the retail market and, therefore, the best alternative paints tested in the study. Note that both Intersleek 900 and Hempasil X3 are multi-component coating systems. Application of these products require a tie coat (to bind paint to hull) and a primer to be applied prior to the application of a topcoat. The Intersleek 900 tested in the study consisted of Intersleek 970 White Part A as top coat and Veridian Tie Coat as tie coat (CalEPA 2011). Since the study was completed, the manufacturer of Intersleek 900 has changed formulations and Veridian Tie Coat is no longer available in the U.S. market. Currently available Intersleek 1100SR consists of multiple different Intersleek products including those that were not available at the time of the study.[1] In addition, the boat paint manufacturer for Interlux Paint Company testified at the Los Angeles Water Board hearing in February 2014, that soft non-biocidal paints, such as Intersleek 900 and Hempasil X3, are designed for oceangoing commercial vessels such as container ships that continuously move through the oceans at high speeds, providing the needed self-cleaning effect, and are not designed for small recreational vessels.

[1] Currently available Intersleek 1100SR. Available from https://www.international-marine.com/product/intersleek-1100sr

Table 1. Evaluation of Paint Performance Conducted in the Hull Testing Phase of the USEPA 2011 Study

Type	Paint	Hull testing	Recommended as an Alternative by the Study	Currently Available for Sale
Non-biocidal	Hempel (USA), Inc.'s Hempasil X3 (87500)	Yes	Yes[1]	Yes
	International Paint LLC's Intersleek 900	Yes	Yes[1]	Yes, but formulations changed[2]
	Kop-Coat, Inc.'s Klear N' Klean XP-A100	Yes	No	-
	Phase Coat Bare Bottom	No[3]	No	-
	PropSpeed	No[3]	No	-
	VC Performance Epoxy	Yes	No	-
Non-biocidal zinc-oxide	Sunwave	Yes	No	-
	EP-21	Yes	No	-

Notes:

- Indicates that the current availability for sale has not been confirmed since the studies (USEPA 2011, CalEPA 2011, and Ecology 2014)

1 Designed for oceangoing commercial vessels, such as container ships, that continuously move through the oceans at high speeds, providing the needed self-cleaning effect and not designed for small recreational vessels

2 The exact Intersleek 900 tested in the study is no longer available because the manufacture changed formulations. Currently available Intersleek 1100SR. Available from https://www.international-marine.com/product/intersleek-1100sr

3 Boat removed from study due to ineffectiveness of product as applied to the boat or delaminating from hull

California EPA 2011 Study: Safer Alternatives to Copper Antifouling Paints: Non-biocidal Paint Options

Sponsored by USEPA Region IX and CalEPA's DTSC, the CalEPA 2011 study further investigated the performance of non-biocidal paints via panel and boat testing. The study conducted panel testing of newly developed non-biocidal paints in addition to those tested in the USEPA 2011 study, including seven soft non-biocidal paints, six hard non-biocidal paints, and four other non-biocidal paints (Table 2).

The panel testing involved inspecting panels with non-biocidal paints for the level of fouling, the ease of cleaning, and the overall paint condition. The study concluded that the hard non-biocidal paints and the other non-biocidal paints in Table 2 did not perform as well as the soft non-biocidal paints primarily because they are much more difficult to clean. The performance of the hard non-biocidal paints and the other non-biocidal paints in the panel testing is much harder to evaluate and judge because the hard non-biocidal paints require periodic or routine cleaning with a power tool and are not effectively cleaned with hand tools, which make the paints less desirable because of the cleaning costs.

Seven non-biocidal paints were tested on ten boats including the top three performing paints from the panel testing of the study (Klear N' Klean XP-A101, XA 278, and Sher-Release), one paint that had been included in the panel testing but not in the boat testing in the USEPA 2011 study (BottomSpeed), two of top performing paints evaluated in the USEPA 2011 study (Intersleek 900 and Hempasil X3), and one additional emerging paint that had not been tested on panels (XZM 480). The boat testing indicated that Klear N' Klean XP-A101, XA 278, BottomSpeed, and Sher-Release performed better than the others tested. XZM 480 did not adhere to the hull properly for the hull protection. Note that Klear N' Klean XP-A101 had been applied only 2 months before the study was completed, which was not long enough to confirm the performance of XP-A101. Furthermore, as documented by USEPA (2011), XP-A101 contains an ingredient that has since been removed from the market, so it cannot be offered for sale. XA 278 and BottomSpeed have been removed from the market as well. In summary, the only paints tested in this study that are still available for sale: Sher-Release, Intersleek, and Hempasil X3, are designed for commercial vessels.

Table 2. Paints Evaluated in the CalEPA 2011 Study

Category	Paint	Panel Tested	Hull Tested	Recommended as an Alternative	Currently Available for Sale
Soft non-biocidal	Kop-Coat, Inc.'s Klear N' Klean XP-A100	Yes	No	No	-
	Kop-Coat, Inc.'s Klear N' Klean Plus XP-A101	Yes	Yes	Yes	No
	Sher-Release (or FUJIFILM Hunt Smart Surfaces, LLC's Surface Coat Part A-Black)	Yes	Yes	Yes	Yes
	International Paint LLC's XZM 480	No	Yes	No	-
	Hempel (USA), Inc.'s Hempasil XA 278	Yes	Yes	Yes	No
	Hempel (USA), Inc.'s Hempasil XA 284	Yes	No	No	-
	XQQ075	Yes	No	No	-
	International Paint LLC's Intersleek 900	No	Yes	No	Yes, but formulations changed[1]
	Hempel (USA), Inc.'s Hempasil X3	No	Yes	No	Yes
	BottomSpeed Coating System's BottomSpeed Top Coat Clear and BottomSpeed TC Base Coat	No	Yes	Yes	No
Hard non-biocidal	HullSpeed 3075	Yes	No	No	-
	HabraCoat	Yes	No	No	-
	Easy On Bottom Wax	Yes	No	No	-
	HullSpeed 3080	Yes	No	No	-
	Oxilane	Yes	No	No	-
	Crystal Marine Pro	Yes	No	No	-
Other non-biocidal[2]	W.A.V.E.	Yes	No	No	No
	SmartBottom	Yes	No	No	No
	Seashell SK9	Yes	No	No	No
	Seashell SK9-S	Yes	No	No	No
Copper-based paint	1082 Trinidad ProBlue	Yes	No	No, control for comparison	-

Notes:

- Indicates that the current availability for sale has not been confirmed since the studies (USEPA 2011, CalEPA 2011, and Ecology 2014).

1 The exact Intersleek 900 tested in the study is no longer available because the manufacture changed formulations. Currently available Intersleek 1100SR. Available from https://www.international-marine.com/product/intersleek-1100sr

2 All non-biocidal paints in "other" category are no longer for sale, and information on ingredients or antifouling mechanisms is not available. CalEPA 2011 study contains no further information on these paints.

Ecology 2014 Study: Assessing Alternatives to Copper Antifouling Paint: Piloting the Interstate Chemicals Clearinghouse (IC2) Alternatives Assessment Guide

Ecology commissioned a study (Ecology 2014 study) to evaluate non-biocide paints using the Interstate Chemicals Clearinghouse (IC2) Guide. The IC2 Guide was an alternative assessment tool, which was developed by a team consisting of state and federal health and environmental agencies including CalEPA DTSC. USEPA and Ecology funded the development of the IC2 Guide, which was intended to be "a set of tools that manufacturers, product designers, businesses, governments, and other interested parties can use to make better, more informed decisions about the use of toxic chemicals in their products or processes" (IC2 2013). The IC2 Guide evaluates alternatives for four categories: 1) hazard assessment: human health, environmental, and physical hazards posed by individual chemicals in alternatives; 2) performance assessment; 3) cost and availability assessment; and 4) exposure assessment: potential exposure pathways to environment and potential risk based on physical-chemical properties of chemicals in alternatives.

In the Ecology 2014 study, six soft non-biocidal paints were selected based on their performance in the USEPA 2011 and the CalEPA 2011 studies and compared to one copper-based paint as a control (Table 3). Three different groups of assessors conducted the evaluation these seven paints via three alternative assessment frameworks (sequential, simultaneous, and hybrid) independently from each other. Although the three frameworks do not differ in their fundamental approaches, the IC2 Guide contains limited decision-making guidance. The three groups of assessors applied different approaches in handling issues raised from the elimination of paints and data gaps in the hazard evaluations. As a result, selected preferable alternatives differ among the three frameworks.

The IC2 evaluation for the first assessment framework (i.e., sequential evaluation) identified three paints as preferred alternatives: Intersleek 900, BottomSpeed TC Base Coat/Top Coat Clear, and Surface Coat Part A – Black 9 (same as Sher-Release). In the second assessment framework (i.e., simultaneous evaluation), Surface Coat Part A – Black was selected as the most preferable. In the third assessment framework (i.e., hybrid evaluation), BottomSpeed TC Base Coat/Top Coat Clear was selected as the most preferable.

Table 3. Paints Evaluated in the Ecology 2014 Study

Type	Paint	Recommended as Preferred Alternative by the Study	Currently Available for Sale
Soft non-biocidal paints	FUJIFILM Hunt Smart Surfaces, LLC's (Sher-Release) Surface Coat Part A – Black	Yes[1,2]	Yes
	Hempel (USA), Inc.'s Hempasil XA278		No
	Kop-Coat, Inc.'s Klear N' Klean Plus XP-A101 White Topcoat	No	-
	International Paint LLC's Intersleek 900	Yes[1,3]	Yes, but formulations changed[4]
	International Paint LLC's XZM480 International	No	-
	BottomSpeed Coating System's BottomSpeed TC Base Coat/Top Coat Clear	Yes[1,5]	No
Copper-based paint	Kop-Coat, Inc.'s Pettit Marine Paint Trinidad Pro Antifouling Bottom Paint 1082 Blue	Control for the comparison	-

- Indicates that the current availability for sale has not been confirmed since the studies (USEPA 2011, CalEPA 2011, and Ecology 2014).

1 All three paints identified as preferred contain hazardous chemicals that pose human health and/or environmental risks and are categorized to be avoided.

2 The hybrid framework concluded that Surface Coat Par A-Black contains a chemical with equivalent hazard concern as the copper control.

3 The simultaneous framework concluded that Intersleek 900 could be either similar or worse than the copper control for the hazard.

4 The exact Intersleek 900 tested in the study is no longer available because the manufacture changed formulations. Currently available Intersleek 1100SR. Available from https://www.international-marine.com/product/intersleek-1100sr

5 The simultaneous framework concluded that it was uncertain whether BottomSpeed was better or worse than the copper control for the hazard.

A summary of the alternative evaluation conducted for all three IC2 Guide frameworks is presented in Figure 3 of Ecology (2014). Overall, three non-biocidal paints, Intersleek 900, BottomSpeed TC Base Coat/Top Coat Clear, and Surface Coat Part A – Black, were determined to be preferred by at least one of three frameworks in the IC2 Guide evaluations. BottomSpeed is no longer available. As discussed in the hazard assessment in detail, all formulations contain hazardous chemicals that pose human health and/or environmental risks and are categorized to

be avoided.[2] Further, the hazard assessment was limited and incomplete due to the undisclosed chemicals in the primers and the paints. Thus, the study concluded that the safety of the test paints was uncertain and none of the test non-biocidal paints were an ideal alternative to copper-based paint.

Ecology (2014), page i:

> *"Although the assessors were able to select preferred alternatives, results indicated that none of them was a good alternative to copper antifouling paint. Some appeared to be slightly preferable to the copper antifouling paint in terms of hazard, but they all contained chemicals that posed human health and environmental concerns. Therefore, the selection of preferred alternatives does not constitute an endorsement because significant reservations remain. Data gaps due to minimal disclosure of chemicals coupled with the difference in decision rules resulted in uncertainty."*

Northwest Green Chemistry 2017 Study: Washington State Antifouling Boat Paint Alternatives Assessment Report

Ecology engaged the team of TechLaw, Inc. and Northwest Green Chemistry to conduct an alternatives assessment to identify and evaluate alternatives to copper antifouling boat paints. In the alternatives assessment study, the stakeholder team assessed 17 AFP coatings for boats, including 13 biocidal and four non-biocidal coatings (Coval Marine and Hull Coat, CeRam-Kote 54 SST, Aurora Marine VS721, and ePaint EP-21). The alternatives assessment considered hazards to human and environmental health impacts, exposure to workers (do-it-yourself boat maintenance) and exposure to marine environment, paint performance (the likelihood it will be used by boaters) and the cost and availability of the paints.

It should be noted that none of non-biocide AFP tested in the previous studies or included in Table 5. Summary of Available Non-biocidal Paints Recommended in USEPA (2011), CalEPA (2011), or Ecology (2014) were included in the 2017 alternatives evaluation. The authors did not cite why they were excluded. But it suggests these paints were not relevant to the boaters in Washington.

[2] These are chemicals that have a combination of either high persistence in environment, high bioaccumulation potential, and high human toxicity or ecotoxicity and are recommended to avoid.

The alternatives assessment confirmed that less hazardous alternatives to copper AFPs are available, but the report does not recommend any particular paint because of the diversity of boater needs. To support the objectives of this memorandum, the findings on performance of the non-biocidal AFPs are discussed here.

The alternatives analysis used previously collected information on the paints to determine paint performance from two studies, the USEPA 2011 study discussed above and the Practical Sailor panel and hull testing (2017). The USEPA (2011) study conducted with the Port of San Diego did testing on both panels and boat hulls. Of the non-biocide paints evaluated in the NGC analysis, they only tested ePaint EP-21. The performance of the paint was poor, coming off the vessel at the waterline in 7 months. It is acknowledged that the formula may have changed since this study in 2010. It should be noted the USEPA 2011 study did not recommend this paint because it included products using zinc-oxide and the authors did not know if the zinc would leach into the water column. The Practical Sailor's panel and hull testing (Practical Sailor, 2017) only included ePaint EP-21. The NGC assessment scored the findings of these two sources from 'likely to meet expectations' to 'borderline' to 'likely to NOT meet expectations' and 'data gap' as to their ability to meet manufacturers' claims for duration (years of effectiveness in controlling fouling). The four best performing hull paints were biocidal (ePaint EP-2000, Sherwin Williams Sea Voyage, ePaint SN-1, and ePaint ECOMINDER). Three of the non-biocide paints were determined to data gap, with no available data to assess performance, and one paint (EP-21) with mixed results (Table 5

Table 4).

Table 4. Summary of Alternatives Assessment Results for the Non-biocide products

Product	Anti-fouling Mechanism	Ingredient Disclosure[1]	Chronic human (CMRDE[2])	Neuro/ Resp	Biocide	Boatyard COCs (Zinc)	35' boat over 5 years	Overall Recommended[3]	Manufacturer longevity (year)
Coval Marine & Hull Coat	Foul release ceramic/ quartz	Full	0%	0%	none	0%	$4,035	Data Gap	5
ePaint (EP-21)	Photoactive foul release	Full	15% to 17%	15%	none	16% to 48%	$11,127	Borderline results[4]	1
CeRam-Kote (54 SST)	Foul release ceramic	SDS	26% to 53%	0%	none	0%	$3,887	Data Gap	5
Aurora Marine (VT721)	Foul release polymer/ wax	SDS	0%	0%	none	0%	$12,979	Data Gap	1

Notes:
CMRDE - Carcinogenicity, mutagenicity, reproductive/developmental toxicity, and endocrine disruptors
COCs – Contaminants of Concern
SDS – Safety Data Sheet only

1 The level of disclosure provided to the reviewers for product assessment. There is more certainty in results for fully disclosed products than for partially disclosed products. Full disclosure is preferred over Safety Data Sheet (SDS)

2 This is the percent of the product made of chemicals that are carcinogens, mutagens, reproductive/ development toxicants, and/or endocrine disruptors. A chemical is considered a CMRDE if it contains any or all of the hazards in the CMRDE group. Its concentration is the concentration of the chemical in the product and is not based on the number of hazards in the CMRDE group.

3 Evaluation based on San Diego report on copper free marine coatings (USEPA, 2011) and Practical Sailor's panel testing results (2017).

4 Defined as uncertain if this product will or will not meet manufacturers' claims. Available evidence was mixed or consistently mediocre.

SUMMARY OF ALTERNATIVE PAINT EVALUATIONS

Overall, findings concluded that only a few of the paints tested have the potential to be effective in replacing copper-based paints.

- In the USEPA 2011 study, only two paints were found to be effective in replacing copper-based paints: Intersleek 900 and Hempasil X3. Since the study was completed, the manufacturer of Intersleek 900, International Paint Company, LLC, has changed formulations and the exact Intersleek 900 that was tested is no longer available in the U.S. market. At the time of the study, the manufacturer did not recommend the Intersleek paint for recreational vessels because the product is designed for oceangoing commercial vessels, such as tanker or container ships that continuously move through oceans at high speeds, providing the needed self-cleaning effect. This also applies to Hempasil X3, the other soft non-biocidal paint recommended in the study. Thus, both paints tested in the study are not designed for small, and mostly stationary, recreational vessels.
- In the CalEPA 2011 study, the researchers found that XP-A101, Hempasil XA 278, BottomSpeed, and Sher-Release performed the best. However, XP-A101, Hempasil XA278, and BottomSpeed have since been removed from the market and only Sher-Release remains as a potential alternative to copper-based paint.
- In the Ecology 2014 study, two currently available non-biocidal paints, Intersleek 900 and Surface Coat Part A – Black (Sher-Release), showed somewhat positive results. However, a hazard assessment of the study conducted as a part of the same study revealed that all formulations tested contained hazardous chemicals that could pose human health and/or environmental risks as a result of their use. Further, the hazard assessment was limited and incomplete due the undisclosed chemicals in the primers and the paints. Thus, the study concluded that the safety of the test paints was uncertain, and none of the test non-biocidal paints were ideal alternatives to copper-based paint.
- The alternatives assessment confirmed that less hazardous alternatives to copper AFPs are available, but the report does not recommend any particular paint because of the diversity of boater needs. Of the 4 non-biocidal coatings evaluated, sufficient information was not available to confirm performance of these four paints; the findings were determined to be a data gap. Further, Ecology acknowledged that of the few available non-biocidal AFP, there is little data to show how these paints affect aquatic life or water quality. The findings of this study supported recommendations from

Ecology to delay the halting of copper-based AFP (Ecology 2017) because the currently available alternatives may provide greater environmental harm.

In summary, there are only three non-biocide paints tested in these studies that are still available (Table 5) and were recommended in one or more studies. All three paints are designed for commercial vessels. All three paints must be applied by professionals. Even though the paints are recommended alternatives to copper, Ecology (2014 and 2017) maintains concerns over hazardous chemicals within the paint that could pose a risk to humans and the marine environment. Many of the paints evaluated do not have full disclosure of ingredients because of the proprietary rights and many of the compounds being used have not been tested for use in marine systems.

Table 5. Summary of Available Non-biocidal Paints Recommended in USEPA (2011), CalEPA (2011), or Ecology (2014)

Paint	Reference
Hempel (USA), Inc.'s Hempasil X3 (87500)	USEPA 2011
International Paint LLC's Intersleek 900 (currently 1100SR)	USEPA 2011, Ecology 2014
Sher-Release (or FUJIFILM Hunt Smart Surfaces, LLC's Surface Coat Part A-Black)	CalEPA 2011, Ecology 2014

Discussion of Commercial Paints for Recreational Boating USE

Concerns regarding the applicability of these paints (which were designed for commercial use) to the recreational boating industry remains. These paints were designed to be self-cleaning and manufacturers assume the vessels are underway a significant portion of the time and at specified speeds. Hard coatings can tolerate bumping and scratching, but soft-coatings will be damaged. These three recommended paints are soft coatings.

Further, these paints have not been assessed to determine impacts of high concentration of use on vessels in enclosed areas. The same processes that are leading to the buildup of copper in the water column could lead to a buildup of lesser understood chemicals. It is the opinion of the author, that these compounds are likely not a concern for commercial vessels that are continuously moving across large waterbodies. However, it could be an environmental concern if a larger number of vessels that reside in a specific area use the same AFP that has not been

tested for impacts in a recreational harbor. The fluoropolymer paints serve as an example. Though not evaluated in the NCG study, the report discusses specialized coatings that include highly fluorinated compounds (e.g., Intersleek). The report states that highly fluorinated compounds tend to be extraordinarily persistent in the environment. It is believed most of the highly fluorinated compounds are bound up in the polymer matrix, but residual monomers may be free to leach. The potential for new contaminants of concern in enclosed marinas has not been fully studied and therefore, advocates for specific paints should be cautious until more studies can demonstrate they are truly safe for human and environmental resources.

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