CITY OF NEWPORT BEACH
100 Civic Center Drive
Newport Beach, California 92660
949 644-3001 | 949 644-3020 FAX
newportbeachca.gov

August 30, 2021

DELIVERED VIA EMAIL

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/Workshop on October 15, 2021, related to the Basin Plan Amendments to Incorporate Total Maximum Daily Loads for Copper in Newport Bay

Dear Dr. Candelaria:

The City of Newport Beach ("City") submits this letter and supporting materials in response to the notice we received on June 29, 2021, and a subsequent notice received on August 13, 2021, 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 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. This is the 3rd time formal written comments have been provided. Due to limited written communication, lack of clarity, the failure to timely respond to comments, and what appears to be a disregard for scientifically justifiable alternative approaches, the City does not feel the Regional Board's staff have truly considered the submitted comments and the scientific/legal opinions. In addition, the new data shows there is clearly no Cu impairment in the harbor. Therefore, the City is submitting again, the same comments provided in the previous proposed amendment adoptions as well as the 2019 bay-wide copper monitoring report and an updated review of studies conducted by regulatory agencies to evaluate the availability and use of non-copper antifouling paints (AFPs).

As you know, the City provided extensive 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 very concerned about the proposal to require the City and others to restrict or ban the use of California approved legally available copper-based 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 California 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.

Apparently, our comments and concerns were the same as many other affected stakeholders as this item generated a significant number of comments both in writing and in oral testimony. The planned Regional Board meeting to adopt the TMDL on October 28, 2016, was revised to be a workshop because it was acknowledged by all, including then Executive Officer, Kurt Berchtold, 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 and 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.

The promised workshops were postponed for almost three years and, when they were finally held in May of 2019, the community brought forward similar concerns. However, there was no discussion related to alternative paints at these workshops and Regional Board staff said they would hold further workshops on alternative non-copper AFPs. Unfortunately, these future workshops never occurred.

The primary constraint preventing the City from supporting the Amendments remains the fact that the City is being asked to implement copper reductions that limit individual boaters use of legally approved paints. In addition, alternative non-toxic/non-copper boat paints are not readily available and are more expensive and less effective than the legally approved paints. Moreover, these paints have not been embraced by the boating community.

While the City could provide educational materials, it does not have the authority to prevent boat owners from using copper based AFPs. The required action in the proposed Amendments also shifts the burden on the City to develop an implementation plan that is infeasible and sets the City, County and State up for failure.

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 and unsupported, in part because they rely on data that is out-of-date, incorrect and overly conservative; and

- The Amendments are impractical, if not impossible, for the City to effectively implement.

Again, this is an important enough issue that we believe we need to approach the full Regional Board with our concerns. Therefore, on September 17, 2021, 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. Allow for an additional review period and for the current DPR study to be completed (est. 2024). This study is evaluating the effectiveness of recently approved lower leach rate copper paints. DPR developed the new copper leach rate limits to bring harbors, like Newport into compliance. The 2019 results suggest the current paint formulations are sufficient and it is premature to add additional limits. The City has partnered with DPR and expanded the study to include all areas of the harbor and two more sampling events are planned for 2022 and 2023. To move forward, it is important to include DPRs findings in the development of implementation plans, so we can assess whether further reductions are needed.

   While there may be a couple isolated spots in the harbor with very low-level exceedances of dissolved copper in the areas with the least circulation, those exceedances have not resulted in any observed toxic effects nor are they at concentrations anticipated to result in observed toxic effects (DPR monitoring report). The last targeted sampling effort conducted by the City and DPR[1] in the summer of 2019 found only 5 out of the 47 sample locations with detectable dissolved copper concentrations above 4.0 µg/L resulting in a bay-wide average concentration of 2.6 µg/L, which is well below the 3.1 µg/L criteria (Attachment 6). As stated above, the new low leach rate copper AFPs now being implemented were designed to bring harbors like Newport into compliance. The Regional Board Staff Report continues to misrepresent the current conditions in the harbor and uses only portions of studies, suspect data, and out of date data to present a biased view that is not reflective of current conditions.

3. Work with the City to address this issue. The City commits to participating thoroughly and in good faith in future discussions, provided 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 spans a wide array of legal and technical issues that were summarized in the proceeding comment packages, which again, we do not believe have been addressed thoroughly. Now we are providing another updated memorandum that summarizes the availability of non-copper AFP.

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[1] Submitted in conjunction with this correspondence is a letter from Gregory Newmark of Meyers Nave, which discusses the adequacy of this sampling effort.

4. Require a formal separate unbiased peer-review of the Amendments. The City and other stakeholders have continued to question the data being used, the analytical interpretation, and the use of certain criteria that appears to be arbitrarily selected or biased. The response to comments is not sufficient to resolve the differences between the stakeholders' scientific understandings and the approaches applied in the amendment. Staff included a justification letter for "no additional peer review", and in that letter it says all numeric targets were from peer reviewed/published sources, which is not true. This version of the BPA includes a new numeric target for copper in sediment that is not recognized by the scientific or the regulatory community. Staff inappropriately pulled the Sediment Quality Guideline modeling tool apart and developed a site-specific threshold. There is no precedent for this; in fact, guidance recommends against this type of use. Further, a peer-review will provide an additional assessment of the feasibility of the proposed implementation plan and schedule with and without forced conversions to non-copper AFPs.

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

- The Regional Board does not have authority to impose responsibility on the City for discharges of copper from individual boats painted with state-regulated copper AFPs.

  The City is not a discharger and has no active role in the individual decision-making or regulation of activities leading to the release of copper from AFPs because:

  a) The City does not regulate the individual choices of boat owners to engage in the legal use of AFPs;

  b) The City lacks knowledge with respect to which of the vast majority of privately owned and operated boats use AFPs (versus alternative paints);

  c) The City lacks knowledge regarding the respective leach rates; and

  d) The City does not control the manner of and/or frequency with which boats painted with AFPs are cleaned.

  The City does not permit or license the cleaning of boats with AFPs, and the City is legally prohibited from controlling the design, sale or use of AFPs. If DPR determines the reduced copper leach rate paints are not sufficient to reduce copper to compliance levels, then the Regional Board and DPR need to determine if further paint leach rate formulas are needed in specific waterbodies or identify the regulatory mechanisms to force individual owners to use specific paints. DPR still controls the use of pesticides in the State of California; the City cannot control the use of any pesticide. Additionally, the Regional Board does not have authority to compel the City to adopt an implementation plan in the manner required in the Proposed Basin Plan Amendment (BPA). Such an attempt is a direct violation of section 13360 of the Porter-Cologne Water Quality Control Act.

- The copper TMDL is impractical because alternatives to copper AFPs are not effective or available and may have significant adverse environmental impacts. The State of Washington has realized this point and delayed the ban on the use of copper based AFPs because it feared the alternatives will cause greater environmental harm.

- The phased implementation schedule is unreasonable, unsupported and would force substantial 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, while allowing safe alternative paints to be developed and evaluated.

- The City requests that further data review and possible implementation schedule be aligned with the copper reductions from DPR's lower copper AFPs leach limits and the copper brake pad initiative, which will be implemented over the next seven years. The brake pad initiative should reduce copper in both the stormwater runoff and in aerial deposition. It would be appropriate for the compliance schedule (minimum percent reduction from AFPs) 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.

- The copper TMDL imposes unfunded state mandates on local agencies.

- 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, and give substandard consideration to current conditions and technical analyses. 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 to better understand and define any potential copper-related issues in Newport Bay.

- Conducting three independent harbor-wide water column sample tests for copper (July 2015, February 2016, and August 2019). With additional tests planned for 2022 and 2023 in partnership with DPR.

- Conducting five toxicity tests in areas of higher copper concentrations (all showed no toxicity).

- Conducting boat zone testing to better assess copper bottom paint leach rate 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 processes, re-application rates, and cost of copper and non-copper AFPs.

- 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.

- Partnering with DPR to assist in bay-wide monitoring to better understand the effectiveness of the lower leach rate paints.

- Completing significant dredging efforts. Since 2010, and with your assistance and financing, there have been significant dredging efforts to remove sediments/legacy contaminants, and to improve flushing and circulation, thus improving the overall water quality of Newport Bay.

    a. Specifically, the City <u>voluntarily</u> dredged the Rhine Channel in 2011. This channel was deemed a "toxic hot spot" by the Regional Board who was heavily involved and supported the project.

    b. In 2012, the USACE, via a collaborative partnership with the City, along with City funds, dredged a significant portion of the Lower Harbor (about 600,000 cubic yards). An estimated 100,000 cubic yards of material was not suitable for ocean disposal, and therefore required alternate disposal at the Port of Long Beach – yet another effort to clean up and improve the harbor.

    c. In 2021, the USACE, via a collaborative partnership with the City, is now actively dredging the entrance channel area and portions of Balboa Beach. An estimated 125,000 cubic yards of material is being removed. Note, this work is currently ongoing.

d. In the near future (2022), the USACE, via a collaborative partnership with the City, along with City funds, will dredge an estimate 900,000 cubic yards of material and thereby further improve water quality in the harbor.

For these and other reasons, and to continue our history of working cooperatively, we again respectfully request that you and your Regional Board staff colleagues consider our recommendation that the Regional Board not adopt the Amendments on September 17, 2021. Additional time and stakeholder collaboration is needed to develop a feasible implementation plan that is informed by a thorough understanding of the effectiveness of current copper reduction measures.

Please know that we appreciate the Regional Board's role in protecting water quality. As you know, Newport Beach loves the water, and it is a significant part of our lives. We as a community remain willing and ready to discuss the development of amendments that incorporate a justified and grounded implementation plan to address verified water quality concerns in the Newport Harbor.

Sincerely,

Grace K. Leung
City Manager
City of Newport Beach

Cc:

David Webb, City of Newport Beach, Director of Public Works
Aaron Harp, City of Newport Beach, City Attorney
John Kappeler, City of Newport Beach, Senior Engineer
Jayne Joy, Santa Ana Regional Water Quality Control Board, Executive Officer
Amanda Carr, Orange County Public Works, Deputy Director
Jayne Joy, SARWQCB, Executive Officer
William Ruh, SARWQCB, Board Chair
Linda I. Ackerman, SARWQCB, Board Vice Chair
Tom M. Rivera, SARWQCB, Board Member
William von Blasingame, SARWQCB, Board Member
Lana Ong Peterson, SARWQCB, Board Member
Daniel Selmi, SARWQCB, Board Member

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: City of Newport Beach's August 22, 2018, Comment Letter and Supporting Materials
Attachment 5: Updated 2020 Review of Studies Conducted to Evaluate the Availability and Use of Non-copper Antifouling Paints
Attachment 6: 2019 Dissolved Copper Data Summary

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

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/cm$_2$/d to achieve compliance with the dissolved Cu CTR criterion".* The only required BMPs for using paints at 9.5 µg/cm$_2$/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.

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: o 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
		o 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. o 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). o 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)
		  o 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)
		  o 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)
		  o 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 summar y 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 Consider ations	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.	

CITY OF NEWPORT BEACH
100 Civic Center Drive
Newport Beach, California 92660
949 644-3001 | 949 644-3020 FAX
newportbeachca.gov

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:

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

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Leonie Mulvihill and Chris Miller, City of Newport Beach	**Date:**	October 12, 2016
From:	Andrew Martin and Shelly Anghera, Ph.D., Anchor QEA, LLC	**Project:**	150243-16.01
Re:	TMDL Loading Calculations from Copper Antifouling Boat Paint and Resulting Allocations		

INTRODUCTION

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) specified dissolved copper loading from boats to Newport Bay was estimated to be 36,000 pounds (lbs) per year (yr). A review of the calculation for the dissolved copper load was conducted based on available published information. Based on the best defensible assumptions for each of the variables in the calculation, it is believed the copper loading predicted from boats as described in the TMDL is greatly over-estimated.

The first section of this memorandum provides an overview of the methods and assumptions used within the Staff Report to generate the copper loading from boats and then addresses calculation errors in the Staff Report. The second section recommends more appropriate and defensible alternative assumptions for daily leach rate, boat hull cleaning requirements, and number of vessels within Newport Bay to calculate a more accurate copper loading from copper antifouling paint (AFP).

STAFF REPORT METHOD FOR CALCULATING DISSOLVED COPPER LOAD FROM BOATS TO NEWPORT BAY

The following elements describe the methods and calculations that were the basis for the Staff Report's determination of the total dissolved copper load from boats in Newport Harbor. For each step of the calculation, the general approach is presented and discrepancies

with the calculations are identified. Supporting each step of the calculation (with text in *italics*), the corrected results are presented.

- **Step 1 - Identify a leach rate.** To determine the dissolved copper load from boats to Newport Bay, the Staff Report uses a maximum leach rate of 9.5 micrograms per square centimeters per day (μg/cm^2/day) – assuming appropriate best management practices (BMPs) were used during hull cleaning. The Staff Report applied this rate to both epoxy and ablative-type paint products.
- **Step 2 – Convert daily leach rate to yearly leach rate.** The Staff Report specifies a yearly leach rate of 3,505.1 μg/cm^2/yr for epoxy-type paints and a yearly leach rate of 3,499.7 μg/cm^2/yr for ablative-type paints. The Staff Report fails to identify the discrepancy for having two different yearly leach rates because the number of days in a year should be constant for both types of paint. Furthermore, the Staff Report incorrectly calculates a yearly leach rate. The number of days in a year is 365 (considering adjustments for an extra day due to leap year every 4 years, it may be reasonable to consider a value of 365.25). By dividing the Staff Report yearly leach rate values (3,505.1 μg/cm^2/yr and 3,499.7 μg/cm^2/yr) by the maximum leach rate (9.5 μg/cm^2/day) used, the results suggest that there are 368.96 and 368.39 days in a year.
  - *The correct yearly leach rate for epoxy and ablative-type paint products should be 3,467.5 μg/cm^2/yr (using the more accurate 365 days per year constant).*
- **Step 3 – Convert yearly leach rate to total loading (lbs) per boat.** The Staff Report used an average hull length (40 feet) and width (13 feet) taken from Earley (2013) and then applied a wetted hull surface area factor (0.85). Appropriate conversion factors from the unit area of square centimeters to average boat wetted hull surface area (in square feet) and from micrograms to pounds were necessary. The Staff Report correctly applied these calculations and presented a result of 3.17 lbs/boat/yr.
  - *Applying these same calculations to the corrected yearly leach rate (presented in Step 2 above) would result in a value of 3.14 lbs/boat/yr. This would ultimately result in a **net decrease** in the calculated copper load.*
- **Step 4 – Calculate an average condition for epoxy and ablative-type paints (using BMP methods).** Assuming 80% of the boats in Newport Harbor use epoxy-type paints and 20% use ablative-type paints, a weighted average can be calculated. In the Staff

Report, because the same leach rate was used for epoxy and ablative-type paints, this calculation is not necessary, and the Staff Report presents the same value of 3.17 lbs/boat/yr. However, for future scenarios discussed herein, this proportion of vessels using epoxy to ablative-type paints is maintained and meaningful in the discussion of the total dissolved copper load from boats.

- **Step 5 – Adjust calculations to address boat hull cleaning using non-BMP methods (e.g., scouring pads).** The Staff Report relies on a conclusion from the Earley (2013) study that indicates boat hull cleaning using BMP methods (soft cloths) results in 25.6% and 31.9% less dissolved copper into the water column for epoxy and ablative-type paints, respectively, than for boat hull cleaning using non-BMP methods. This adjustment could be made to the daily leach rate or to the calculated loading (in lbs)/year; the Staff Report chose the latter. However, the Staff Report incorrectly applied these percent reductions. The Earley (2013) study indicated BMP methods resulted in a specific percentage **less than** non-BMP methods (i.e., the percent reduction was based on the non-BMP leach rate [or non-BMP loading]). The Staff Report multiplied the percent reduction by the BMP loading, rather than correctly multiplying the percent reduction by the non-BMP loading—which the Staff Report was attempting to calculate. Because only the BMP loading was known, the Staff Report should have used the Earley (2103) study to determine the correct percent increase in dissolved copper loading from boat hull cleaning using non-BMP methods compared to using BMP methods. This percent increase was 34.3% and 46.9% for epoxy and ablative-type paints, respectively. Based on the incorrect methodology, the Staff Report results suggest loading values of 3.99 lbs/boat/yr and 4.18 lbs/boat/yr for epoxy and ablative-type paints when non-BMP boat hull cleaning methods are used.
  - *If the Staff Report had correctly applied the results from the Earley (2013) study, the loading values should have been 4.21 lbs/boat/yr and 4.61 lbs/boat/yr. This would ultimately result in a **net increase** in the calculated copper load.*
- **Step 6 – Calculate an average condition for epoxy and ablative-type paints (using non-BMP methods).** Similar to Step 4, assuming 80% of the boats in Newport Harbor use epoxy-type paints and 20% use ablative-type paints, a weighted average can be calculated. Therefore, based on the Staff Report approach, the average copper loading when non-BMP methods are used was 4.02 lbs/boat/yr.

- *If the Staff Report had correctly applied the results from the Earley (2013) study, the average loading value should have been 4.29 lbs/boat/yr. Again, this would ultimately result in a **net increase** in the calculated copper load.*

- **Step 7 – Calculate a total copper loading from boats.** The Staff Report assumes 50% of the vessels have their boat hulls cleaned with BMP methods and the remaining 50% of vessels have their boat hulls cleaned with non-BMP methods. Based on this assumption, the Staff Report suggests a total copper loading of approximately 3.60 lbs/boat/yr. The Staff Report further assumes a total of 10,000 boats present in Newport Bay. Therefore, the total copper loading from boats is equivalent to 36,000 lbs/yr.
  - *If the Staff Report had correctly applied the results from the Earley (2013) study, the average loading value should have been 3.71 lbs/boat/yr. Applying this value to the Staff Report's account of the total number of vessels (10,000), then the total copper loading from boats should have been 37,100 lbs/yr. This would ultimately result in a **net increase** in the calculated copper load from the 36,000 lbs/yr presented in the Staff Report.*

A summary of the Staff Report (as-is and adjusted) copper loading rates (per boat/yr and total/yr) is presented in Table 1 (see "Staff Report" and "Staff Report Adjusted" columns).

ALTERNATIVE CONSIDERATIONS FOR CALCULATING DISSOLVED COPPER LOAD FROM BOATS TO NEWPORT BAY

Leach Rates

The Earley (2013) study developed leach rates for dissolved and total copper from boat hulls that were cleaned with or without appropriate BMPs using copper-based AFPs that were "representative of the most commonly utilized paints for recreational boats in California." Anchor QEA believes it is more appropriate to use these published leach rates for recreational boats in California as a starting point for calculating loads from recreational boats. Using the total and dissolved copper loading rate for a 3-year life cycle and adjusting to a daily rate, the following leach rates were derived:

- Epoxy-type paints using BMPs during boat hull cleaning
  - Dissolved copper = 6.47 $\mu g/cm^2/day$

- Ablative-type paints using BMPs during boat hull cleaning
  - Dissolved copper = 6.85 μg/cm^2/day
- Epoxy-type paints using non-BMP methods during boat hull cleaning
  - Dissolved copper = 8.69 μg/cm^2/day
- Ablative-type paints using non-BMP methods during boat hull cleaning
  - Dissolved copper = 10.07 μg/cm^2/day

Following the same steps in calculations as the Staff Report, the dissolved copper loading would be 2.56 lbs/boat/yr (or 25,600 lbs/boat/yr). These calculations were presented in the Staff Report (Appendix 6, top of page 154) and included in Table 1 for comparison (see "Earley 2013 Total Cu" and "Earley 2013 Dissolved Cu" columns).

We expect this value to be reduced through the implementation of the Department of Pesticide Regulations (DPR) recommendations for maximum allowable leach rate for copper AFPs. DPR's memorandum for determining a maximum allowable leach rate (DPR EMB 2014) found that leach rates for 169 copper AFP products ranged from 1.0 to 29.6 μg/cm^2/day with a mean of 11.1 μg/cm^2/day, and that 58% of these products did not currently meet the recommended maximum allowable leach rate of 9.5 μg/cm^2/day. Therefore, 42% of these products are already below the 9.5 μg/cm^2/day maximum allowable leach rate. Assuming the distribution of AFP products on the market is similar to the distribution of AFP on boats, then a weighted mean of the Staff Report[1] and the Earley (2013) study[2] can be calculated to provide a more reasonable alternative estimate of the total dissolved copper loading[3]. The results of this reasonable alternative calculation suggest total dissolved copper leach rate would be reduced to 2.75 lbs/boat/year (*or 2.73 lbs/boat/year using adjusted values*). For a detailed summary of the calculation results, see Table 1, "Reasonable Alternative" columns.

[1] Staff Report approach represents 58% of the available paints being reformulated to have a maximum leach rate of 9.5 μg/cm^2/day.

[2] Earley study uses readily available paints that represent 42% of the current market that meet the maximum allowable leach rate. These paints are 6.47 to 6.85 μg/cm^2/day for epoxy and ablative-type paints using BMPs, respectively.

[3] The other paints evaluated in Earley (2013) do not meet the DPR requirements for leach rate and non-BMP limited leach rates and were excluded from the calculation.

Number of Vessels

The Staff Report assumes 10,000 boats are moored or berthed within Newport Bay. The City of Newport Beach used aerial photography to document the number of vessels typically moored or berthed within Newport Bay. The results of that survey suggest only 4,470 vessels greater than 18 feet are moored or berthed in Newport Bay (Miller 2016). While boat hulls in Newport Bay have not been tested to confirm the presence of copper in the AFPs, copper is currently used in 90% of marine AFPs in California and worldwide (Singhasemanon et al. 2009; Blossom 2015); therefore, only 4,023 boats should be considered in calculating the dissolved copper load from boats. The loading calculation should be revised to reflect a more accurate number of boats with copper AFP. Adjusting the total number of vessels used in the calculation, the total dissolved copper load (in lbs/yr) ranges from approximately 10,311 lbs/yr based on the Earley (2013) study to 14,475 lbs/yr based on the Staff Report (see Table 1, rows for assumed vessel numbers).

Best Management Practices

The Staff Report developed the dissolved copper loading estimate assuming 50% of boats are cleaned using BMP methods and 50% are cleaned using non-BMP methods. This scenario contradicts the DPR EMB (2014) recommendation of a "maximum allowable leach rate for AFP products at 9.5 $\mu g/cm^2$/day under the condition that in-water hull cleaners follow CPDA's [California Professional Divers Association's] BMP method with soft-pile carpet…" Therefore, it is overly conservative to assume any boats will be cleaned using non-BMP methods. The calculation to assess loading from copper AFP should be revised to account for 100% of boat hull cleanings using approved BMP methods. Adjusting the boat hull cleaning approach to use only recommended BMPs in the calculation, the total dissolved copper load (in lbs/yr) ranges from 8,702 lbs/yr based on the Earley (2013) study to 12,762 lbs/yr based on the Staff Report (see Table 1, row for "Total Annual Copper Load Assuming Cleaning Events Consist of 100% with BMPs and 0% without BMPs"). Using a reasonable alternative estimate described above, the total dissolved copper loading is approximately 11,057 lbs/yr (*or 10,979 lbs/yr using adjusted values*).

Margin of Safety

The standard approach to calculate the TMDL is to quantify waste load allocations (WLAs) and load allocations (LAs) and add a margin of safety (MOS); in this case, the Regional Water Quality Control Board choose 20%. The Staff Report provides references for the derivation of the WLA for municipal separate storm sewer system water permittees, California Department of Transportation, other National Pollutant Discharge Elimination System permittees, agriculture runoff, and open space runoff, and provides a reference for LA for air deposition. The Staff Report then calculates a WLA for boats by solving the equation. The Staff Report incorrectly applies an MOS in the TMDL equation. The Staff Report calculates a 20% MOS based on the TMDL value (11,646 lbs Cu/yr), rather than calculating the MOS on the sum of the WLA and LA. This approach underestimates the allocation for one or more types of WLA or LAs. The MOS can be correctly determined by dividing the Total TMDL value of 11,646 lbs/yr by 1.2 and subtracting that quotient from the Total TMDL value instead of simply multiplying by 0.2. This results in an MOS of 1,941 lbs/yr[4] (instead of 2,329 lbs/yr as currently presented in the Staff Report). This is a difference of 388 lbs/yr. Because the Staff Report appears to be solving for the Cu LA for boats, it is reasonable to assume the LA for boats should be 6,448 lbs/yr[5]. In Table 1, the row titled "Corrected Allowable Annual Copper Load for Newport Bay (lbs/yr) from Boats" and the two rows beneath it, detail the percent reduction in copper AFP necessary to meet the LA.

Alternative MOS values should be considered because a change to 10% MOS would have significant impacts on the need for management alternatives. A 10% MOS would be 1,059 lbs/yr (instead of 2,329 lbs/yr as currently presented in the Staff Report). This is a difference of 1,270 lbs/yr. Because the Staff Report appears to be solving for the Cu LA for boats, it is reasonable to assume the LA for boats should be 7,330 lbs/yr. In Table 1, the row titled "Adjusted MOS of 10% Annual Copper Load for Newport Bay (lbs/yr) from Boats" and the two rows beneath it, detail the percent reduction in copper AFP necessary to meet the LA.

[4] Calculated as 11,646 lbs/yr - ((11,646 lbs/yr)/1.2)

[5] This calculation can be checked by multiplying the MOS by the new WLA and LA and should equal the Total TMDL value as such: 0.2 x (3,176 lbs/yr [sub-total of tributary or storm drain WLAs and LAs] + 6,529 lbs/yr [corrected sub-total of boatyard WLAs and Boats and Other LAs to properly apply MOS factor]) yields an MOS of 1,941 lbs/yr. Applying these values to the TMDL equation (TMDL = ΣWLA +ΣLA + MOS) yields a TMDL value of 3,176 lbs/yr + 6,529 lbs/yr + 1,941 lbs/yr = 11,646 lbs/yr.

Implementation Considerations

It is important to properly quantify the LA for boats to understand the appropriate implementation requirements to meet the proposed TMDL. A comparison of the percent reductions required to meet the TMDL using the Staff Report LA for boats and the adjusted LA for boats based on corrected MOS calculations is presented in Table 1. The Staff Report suggests dissolved copper loadings from boats would need to be reduced by 83% to meet the TMDL numeric target of 3.1µg/liter dissolved copper. Applying reasonable alternative approaches to the leach rate, appropriate vessel inventory and boat hull cleaning methods, and a corrected LA for boats, dissolved copper loadings from boats would only need to be reduced by 41% to meet the TMDL. Further, if an alternative MOS of 10% is applied, then dissolved copper loadings from boats would only need to be reduced by 33% to meet the TMDL numeric target.

SUMMARY

The Staff Report presents values for dissolved copper loadings from boats and an LA for boats in Newport Bay that are based on incorrect calculations and assumptions. Using information contained within the Staff Report, the DPR EMB 2014 Memorandum, and the Earley (2013) study, Anchor QEA determined new dissolved copper loadings and an LA for boats using corrected formulas and reasonable assumptions. The results of this analysis demonstrates the Staff Report overestimates the dissolved copper loadings from boats through use of overly conservative assumptions. This results in underestimating the LA for boats and requires a much greater reduction in dissolved copper from boats in Newport Bay than is necessary.

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Table 1
Calculated Copper Loading from Copper Antifouling Paints in Newport Bay

Loading Scenario	Total Annual Copper Load Per Boat					
	Staff Report	Staff Report Adjusted[1A, 1B]	Earley 2013 Total Cu	Earley 2013 Dissolved Cu	Reasonable Alternative[7] (58% Staff Report + 42% Earley 2013 Dissolved Cu)	Reasonable Alternative[7] (58% Staff Report Adjusted + 42% Earley 2013 Dissolved Cu)
80% Epoxy/20% Ablative with Cleaning BMPs	3.17	*3.14*	2.59	2.16	2.75	*2.73*
80% Epoxy/20% Ablative without Cleaning BMPs[2]	4.02	*4.29*	3.85	2.96	--[8]	--[8]
Total (50% With BMPs and 50% Without BMPs)	3.60	*3.71*	3.22	2.56	--[8]	--[8]
Total for Alternate Scenario (100% With BMPs and 0% Without BMPs)[3]	3.17	*3.14*	2.59	2.16	2.75	*2.73*
	Total Annual Copper Load Assuming Cleaning Events Consist of 50% with BMPs and 50% without BMPs (lbs/year)					
10,000 vessels[4]	35,981.5	*37,135.3*	32,188.7	25,629.0	--[8]	--[8]
4,470 vessels[5]	16,083.7	16,599.5	14,388.3	11,456.1	--[8]	--[8]
4,023 vessels[6]	14,475.4	14,939.5	12,949.5	10,310.5	--[8]	--[8]
	Total Annual Copper Load Assuming Cleaning Events Consist of 100% with BMPs and 0% without BMPs (lbs/year)					
10,000 vessels[4]	31,721.6	*31,390.8*	25,859.8	21,630.3	27,483.2	*27,291.4*
4,470 vessels[5]	14,179.5	14,031.7	11,559.3	9,668.7	12,285.0	*12,199.3*
4,023 vessels[6]	12,761.6	12,628.5	10,403.4	8,701.9	11,056.5	*10,979.3*
Staff Report Allowable Annual Copper Load for Newport Bay (lbs/yr) from Boats	6,060					
Percent reduction necessary to meet Allowable Annual Copper Load assuming 10,000 vessels with 50% BMP/50% non-BMP (%)	83.16%	*83.68%*	81.17%	76.35%	--[8]	--[8]
Percent reduction necessary to meet Allowable Annual Copper Load assuming 4,023 vessels with 100% BMP/0% non-BMP (%)	52.51%	*52.01%*	41.75%	30.36%	45.19%	*44.81%*
Corrected Allowable Annual Copper Load for Newport Bay (lbs/yr) from Boats	6,448					
Percent reduction necessary to meet Corrected Allowable Annual Copper Load assuming 10,000 vessels with 50% BMP/50% non-BMP (%)	82.08%	*82.64%*	79.97%	74.84%	--[8]	--[8]
Percent reduction necessary to meet Corrected Allowable Annual Copper Load assuming 4,023 vessels with 100% BMP/0% non-BMP (%)	49.47%	*48.94%*	38.02%	25.90%	41.68%	*41.27%*
Adjusted MOS of 10% Annual Copper Load for Newport Bay (lbs/yr) from Boats	7,330					
Percent reduction necessary to meet Corrected Allowable Annual Copper Load assuming 10,000 vessels with 50% BMP/50% non-BMP (%)	79.63%	*80.26%*	77.23%	71.40%	--[8]	--[8]
Percent reduction necessary to meet Corrected Allowable Annual Copper Load assuming 4,023 vessels with 100% BMP/0% non-BMP (%)	42.56%	*41.96%*	29.54%	15.77%	33.70%	*33.24%*

Notes:

1A. The annual leachate rate was incorrectly calculated for epoxy and ablative type paints. Using a per day rate of 9.5 $\mu g/cm^2$, the annual rate should be 3,467.5 $\mu g/cm^2/yr$ for both types of paint, instead of the 3,505.1 and 3,499.7 $\mu g/cm^2/yr$ listed for epoxy and ablative paints, respectively. This resulted in a net decrease in the calculated loading rates.

1B. The % increase due to copper loading from non-BMP cleaning events was incorrectly calculated. The Staff Report used the percent reduction value derived from the Earley 2013 study (25.6% and 31.9% for dissolved copper for epoxy and ablative paints, respectively). This value percent reduction value underestimates the amount of copper loading from non-BMP cleaning events. Instead, a percent increase value should have been used (34% and 47%, respectively). This resulted in a net increase in the calculated loading rates.

2. For the Earley 2013 scenarios, reported data for non-BMP results were used rather than relying on a calculated percent increase/decrease relative to reported data with BMPs.

3. The Staff Report did not include a 100% BMP + 0% non-BMP scenario. This scenario was calculated using Staff Report results for comparisons to other scenarios.

Table 1

Calculated Copper Loading from Copper Antifouling Paints in Newport Bay

4. Staff Report assumed 10,000 vessels within Newport Bay.

5. Current estimate of number of vessels in Newport Bay is 4,470 (Miller 2016).

6. 90% of current number of vessels in Newport Bay (4,023) have copper-based paints; the remaining 10% do not have copper-based paints.

7. The Reasonable Alternative is based on the DPR EMB (2014) study that indicated 58% of AFP products did not currently meet the maximum allowable leach rate of 9.5 $\mu g/cm^2/yr$; therefore, 42% of AFP products did meet this standard. Assuming the distribution of AFP products is similar to the distribution of AFP on boats, a weighted average was calculated as 0.58 x Staff Report + 0.42 x Earley 2013. The leach rate presented in the Earley 2013 study was found to be representative of the remaining 42% of vessels.

8. The use of the maximum allowable leach rate for AFP products at 9.5 $\mu g/cm^2/day$ is only allowed under the condition that in-water hull cleaners follow the California Professional Divers Association's BMP method with soft-pile carpet (DPR EMB 2014); therefore only 100% BMP scenarios are included.

Italic text indicates adjusted rates.

-- = not applicable

AFP = antifouling paint

BMP = best management practice, use of soft pile pads

Cu = copper

DPR EMB = Department of Pesticide Regulation Environmental Monitoring Branch

lbs/yr = pounds per year

MOS = margin of safety

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Leonie Mulvihill and Chris Miller, City of Newport Beach	**Date:**	October 11, 2016
From:	Andrew Martin, Adam Gale, and Shelly Anghera, Ph.D., Anchor QEA, LLC	**Project:**	150243-16.01
Re:	Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr)		

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 2016a) identifies in-water hull cleaning diver certification, evaluation and augmentation to boater education programs, and continued compliance monitoring activities within Newport Bay as a means for assessing the effects of implementation strategies identified within the TMDL, among other pertinent details and implementation requirements. The Staff Report further identifies special studies to understand the potential ongoing contaminant loading from sediments, algae, and other vegetation.

LOBBYING

The TMDL requires responsible parties to assist the Regional Water Quality Control Board (RWQCB) in efforts to gain state and federal support for removal of Cu antifouling paint (AFP) from distribution. The effort would likely include support from the City of Newport Beach (City) attorney, City staff, and lobbyist groups, as well as science-based memorandums from the technical support team. The estimated cost to the City is estimated to be $50,000 per year.

REQUIRED IMPLEMENTATION PLAN DEVELOPMENT

Within 3 months of the approved TMDL, the following two plans need to be developed:

1. Copper AFP Reduction Implementation Plan: Develop an implementation plan and schedule to reduce Cu discharges from Cu AFPs. Specifically, within 3 months of the approved TMDL, the dischargers shall submit one or more implementation plan(s) and schedule(s) to achieve reductions of Cu discharges from Cu AFPs, and then

implement the plan(s) and schedule(s) after approval from the RWQCB. The estimated cost to develop a copper AFP reduction implementation plan is $100,000.

2. Sediment Remediation Implementation Plan: Within 3 months of the approved TMDL, the dischargers shall submit an implementation plan and schedule to correct Cu sediment impairment in areas that exceed the Effects Range Median sediment guideline for Cu, including the Turning Basin and South Lido Channel. This plan will include consideration of other metals (i.e., zinc and mercury). The estimated cost to develop a sediment remediation implementation plan is $75,000.

REQUIRED MONITORING AND SPECIAL STUDIES

The proposed plan shall include recommended corrective strategies for areas of known sediment impairment, and monitoring and evaluation necessary to determine: 1) the effectiveness of the corrective actions on sediment Cu impairment; and 2) the extent of sediment zinc and mercury (and Cu) impairment in areas of Newport Bay that have not been monitored (especially in marina and boatyard areas).

The following cost estimate was developed in response to the compliance monitoring and special study recommendations identified in the Staff Report. The proposed program is a reasonable approach consistent with monitoring requirements defined in other regional TMDL programs (e.g., the Los Angeles and Long Beach Harbor Waters Toxics TMDL).

This cost estimate assumes a 5–year monitoring program that would be subject to refinement (i.e., adaptive management) at the end of each contract period based on results of the previous 5 years of data. Costs were based on typical staffing requirements, and 2016 rates were used for analytical laboratory, vessel support, and other subcontractor support. This cost estimate assumes a 4% annual escalation rate to address a variety of factors such as an industry-average inflation rate and unforeseen program support needs such as extensive coordination and communication with regulatory agencies and regional monitoring groups, and changes in subcontractor fees as a result of subcontractor and equipment availability.

The major elements of the compliance monitoring activities and special studies (and relative frequency) consist of the following:

- Compliance monitoring
  - Water quality (three times annually)
  - Sediment quality (once biennially)
  - Fish/mussel tissue quality (once biennially)
- Special studies
  - Contaminant loading from sediment (once)
  - Contaminant loading from vegetation (once)

For the purposes of this cost estimate, a hypothetical 5-year schedule is shown in Table 1. The monitoring year is based on the wet season and begins in July and end in June. Reporting for that year is provided by December.

Table 1
5-Year Schedule of Compliance Monitoring Activities and Special Studies

Event	2017/18				2018/19				2019/20				2020/21				2021/22				2022/23			
	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp
CM – WQ	●	●	●		●	●	●		●	●	●		●	●	●		●	●	●		□	□	□	
CM – Sed	●								●								●							
CM – F/M	●								●								●							
SS – SedLoad					●																			
SS – VegLoad					●																			
Reporting						●				●				●				●				●		

Notes:
CM = compliance monitoring
F = fall (October to December)
F/M = fish/mussel tissue quality
Sed = sediment quality
SedLoad = loading from sediment
WQ = water quality
SS = special study
Sp = spring (April to June)
Su = summer (July to September)
VegLoad = loading from vegetation
W = winter (January to March)
● = Event required within 5-year contract cycle; included in this cost estimate
□ = Event not included in this cost estimate; part of subsequent contract cycle

Compliance Monitoring Activities

Specific components and assumptions of each of the compliance monitoring activities are provided in the following subsections.

Water Quality

- Three events annually (two wet weather and one dry weather)
  - The first qualifying storm after October 1 and a second qualifying storm after January 1 will be targeted
  - The dry weather event will occur during the Summer with a minimum antecedent dry period of 72 hours
- Analytical chemistry for all events
  - Total and dissolved metals
  - Total organic carbon (TOC)
  - Dissolved organic carbon (DOC)
  - Total suspended solids (TSS)
  - Field parameters (pH, temperature, dissolved oxygen, conductivity/salinity, and turbidity)
- Water column toxicity only during the first wet weather event
  - *Mytilus* development (chronic) marine water test
- Fifteen stations
  - Three specified tributary stations (San Diego Creek, Santa Ana Delhi, and Big Canyon Wash)
  - Twelve randomly selected stations throughout Upper and Lower Newport Bay
    - Random selection based on the Southern California Regional Bight Monitoring Program protocols
- Two quality assurance/quality control (QA/QC) samples

Sediment Quality

- One event biennially (dry weather)
- Analytical chemistry

  - Total metals
  - TOC
  - Grain size
- Sediment toxicity
  - 10-day amphipod sediment test
- Fifteen stations
  - Three specified tributary stations (San Diego Creek, Santa Ana Delhi, and Big Canyon Wash)
  - Twelve randomly selected stations throughout Upper and Lower Newport Bay
    - Random selection based on the Southern California Regional Bight Monitoring Program protocols
- Two QA/QC samples

Fish/Mussel Quality

- One event biennially (dry weather)
- Analytical chemistry
  - Total metals
  - % lipids
  - % moisture
- Two fish species
  - Three fish composite samples per station
- One mussel species
  - Three mussel composite samples per station
- Four randomly selected stations
  - Two in Upper Newport Bay
  - Two in Lower Newport Bay

Special Studies

Specific components and assumptions of each of the special studies are provided in the following subsections.

Contaminant Loading from Sediment

Determine the flux of contaminants of concern from bedded sediment to the water column.

- One field event
- Development of a study-specific monitoring plan to supplement the compliance monitoring Sampling and Analysis Plan (SAP)
- Co-located bulk sediment, porewater, and overlying water analytical chemistry
  - Total metals
  - Dissolved metals (in porewater and overlying water only)
  - TOC
  - DOC (in porewater and overlying water only)
  - TSS (in overlying water only)
  - Grain size (in sediment only)
  - Total solids (in sediment only)
- Three randomly selected stations
- One QA/QC sample

Contaminant Loading from Vegetation

Determine the flux of contaminants of concern from algae and other marine vegetation to the water column.

- Historical data review and scientific literature search on contaminant flux from vegetation to water column
- Reconnaissance effort with dive team to identify potential sample locations and document evidence of decaying vegetation
- One field event
- Development of a study-specific monitoring plan to supplement the compliance monitoring SAP
- Vegetation samples to include root and shoot biomass

  - Target healthy and decaying vegetation

- Co-located bulk sediment, overlying water, and vegetation analytical chemistry for each type of vegetation (healthy and decaying)
  - Total metals
  - Dissolved metals (in overlying water only)
  - TOC (in sediment and overlying water only)
  - DOC (in overlying water only)
  - Grain size (in sediment only)
  - Total solids/% moisture (in sediment and vegetation only)
- Ten targeted stations (targeted in areas of known algae and other vegetation)
- One QA/QC sample

Supporting Tasks

Several tasks would be required on an annual basis regardless of the scheduled compliance monitoring activities or special studies. The effort for each of these tasks is scaled relative to the amount of field work and samples collected.

- Compliance monitoring plan development (Year 1 costs only)
  - SAP
  - Health and Safety Plan
  - Quality Assurance Project Plan
- Data validation and management
  - U.S. Environmental Protection Agency Level 2A data validation
  - Database support
  - Development of California Environmental Data Exchange Network (CEDEN)-formatted files for submittal to State Water Resources Control Board
- Annual reporting
  - Data report including field observations, summary of analytical chemistry, and toxicity results with comparisons to applicable criteria
- Status update meetings

  - Four meetings per year with City staff
- Project management
  - Approximately 5% of overall project costs

Required Monitoring and Special Studies Cost Estimate

The estimated costs associated with the program outlined in the preceding sections is provided in Table 2.

Table 2
Cost Estimate for 5-Year Compliance Monitoring and Special Study Program in Support of the Newport Bay TMDL

	Year 1	Year 2	Year 3	Year 4	Year 5
SAP/HASP/QAPP	$35,000	--	--	--	--
CM – WQ	$121,000	$126,500	$132,000	$137,500	$143,000
CM – Sed	$74,250	--	$80,500	--	$88,000
CM – F/M	$68,750	--	$71,500	--	$74,250
SS – SedLoad	--	$44,000	--	--	--
SS – VegLoad	--	$99,000	--	--	--
Data Validation and Management	$40,000	$40,000	$45,000	$30,000	$47,500
Status Update Meetings	$7,500	$8,000	$8,500	$9,000	$9,500
Annual Reporting	$30,000	$95,500	$32,500	$22,500	$35,000
Project Management	$19,000	$21,000	$18,500	$10,000	$20,000
Annual Total	**$395,500**	**$434,000**	**$388,500**	**$209,000**	**$417,250**

Notes:
CM = compliance monitoring
F/M = fish/mussel tissue quality
HASP = Health and Safety Plan
QAPP = Quality Assurance Project Plan
SAP = Sampling and Analysis Plan
Sed = Sediment quality
SedLoad = Loading from sediment
SS = Special study
VegLoad = Loading from vegetation
WQ = Water quality

The 5-year program cost estimate is $1,844,250.

In-Water Hull Cleaning Diver Certification Program and Continue Education Program(s)

The Basin Plan Amendment (BPA; RWQCB Santa Ana 2016b) outlines steps to apply oversight and enforcement to the implementation tasks and to augment existing boater education programs. The specific implementation tasks include:

- *Implementation Task 1.2.2.2: Require all underwater hull cleaners to use BMPs including soft cloths or hull cleaning containment methods, and develop a diver certification program A plan and schedule to identify, implement and enforce the use of BMPs by all underwater hull cleaners, by a certification, permit or licensing system, that includes education, training and certification of all underwater hull cleaners. Additional BMPs that include hull cleaning in slip liners or dry dock storage may also be included.*
- *Implementation Task 1.2.2.5: Continue Education Program(s) for Boaters, Boatyards and Marinas Identify and evaluate existing boater and/or boat related education program(s) in the Bay, and revise those programs as necessary to include the following tasks, at a minimum: (1) Cu water quality issues and TMDL requirements; (2) Transitioning from Cu to nontoxic AFPs including costs, availability and efficacy of nontoxic AFPs/coatings; conversion costs from Cu to nontoxic AFPs; application and maintenance costs; and hull cleaning costs; (3) Nontoxic AFP use requirements including recommended BMPs for hull cleaning and frequency of cleaning; (4) BMPs requirements for all underwater hull cleaners; (5) Use of lower leach rate Cu AFPs with leach rates at or below 9.5 $\mu g/cm^2$ /d. (6) Conditions and requirements instituted by the State Lands Commission, the City of Newport Beach and Orange County to reduce Cu AFP discharges to achieve TMDL requirements by responsible parties (e.g. new conditions in marina lease agreements and marina slip agreements; hull cleaning permits or licenses that include BMP requirements); (7) Potential boat storage options, and containment systems for boat cleaning and/or storage (e.g. slip liners).*

Specific details outlining each of the implementation tasks are outlined in Table 3. The overall program implementation through a 5-year period is presented in Table 4.

Table 3
Outline to Develop and Implement In-Water Hull Cleaning Diver Certification Program and Continue Education Program(s) in Support of the Newport Bay TMDL

Implementation Plan Task	Specific Task	Implementation Responsibility	Description	Approximate Costs
1.2.2.2	Require all underwater hull cleaners to use best management practices (BMPs) including soft cloths or hull cleaning containment methods, and develop a diver certification program	Underwater hull cleaner to implement new cleaning tools; additional cleaning time.	Similar to the Port of San Diego, the City can develop a permit system that is issued on an annual basis for all hull cleaning vendors to service vessels in Newport Harbor. The application process includes the following: • Development of BMP Plan – The plan would describe methods to clean, tools to use, and cleaning schedules, and all employees, agents, and independent contractors must follow. • In-water Hull Cleaning Training – Businesses can either self-train their employees using the BMP Plan they develop or take a course on hull cleaning. However, formal certification is not required. The required proof of training includes dates of training, names of persons trained, and the written materials used for the training. Any new employees, agents, and representatives, including independent contractors, must be trained before performing in-water hull cleaning activities for the business. • Issuance of diver identification cards • $250/year permit processing fee	Increased costs to in-water hull cleaners include developing the permit application materials and the processing and fee ($250/year). Additional BMPs could affect the cleaning time and therefore generate less profit. Depending on the size of the vessel and whether it is a sailboat or power boat, costs range from $50 for a smaller boat (30 feet) up to several hundred for larger sailboats. With implementation of this program, in-water hull cleaning costs will likely increase and be passed to the customer.
	A plan and schedule to identify, implement, and enforce the use of BMPs by all underwater hull cleaners, by a certification, permit, or licensing system, that includes education, training, and certification of all underwater hull cleaners. Additional BMPs that include hull cleaning in slip liners or dry dock storage may also be included.	City to develop and implement diver certification program.	The City would be responsible for developing and implementing a certification/permit program. The program would likely be managed by Harbor Resources and include the following: • Schedule to implement the certification/permitting • Develop and adopt regulation to require certification/permits for in-water hull cleaning. • Establish BMPs – use existing resources (such as Port of San Diego) and new BMPs based on research evaluated through other basin amendment tasks. • Develop permit application materials, including application form, BMP template, website, and tracking materials. • Website with instructions and access to electronic application materials. • Staff to implement and enforce the certification/permit program. Enforcement of the program could include inspections at local paint inspection suppliers and boatyards to inspect materials, products, and feedback.	The Port of San Diego currently has 52 certified/permitted in-water hull companies. This equates to approximately $13,000/year in permit fees; however, it is likely that the majority of those costs goes to a very small portion of actually processing the permits. Develop Implementation Plan Program – approximately $120,000. Implement and enforce Implementation Program – approximately $100,000/year. This assumes one staff at $120/hour for 16 hours/week.

Implementation Plan Task	Specific Task	Implementation Responsibility	Description	Approximate Costs
1.2.2.5	Continue Education Program(s) for Boaters, Boatyards, and Marinas. Identify and evaluate existing boater and/or boat-related education program(s) in the Bay, and revise those programs as necessary to include the following tasks, at a minimum: (1) Cu water quality issues and TMDL requirements (2) Transitioning from Cu to nontoxic AFPs including costs, availability, and efficacy of nontoxic AFPs/coatings; conversion costs from Cu to nontoxic AFPs; application and maintenance costs; and hull cleaning costs (3) Nontoxic AFP use requirements including recommended BMPs for hull cleaning and frequency of cleaning (4) BMPs requirements for all underwater hull cleaners (5) Use of lower leach rate Cu AFPs with leach rates at or below 9.5 $\mu g/cm^2/d$ (6) Conditions and requirements instituted by the State Lands Commission, the City, and Orange County to reduce Cu AFP discharges to achieve TMDL requirements by responsible parties (e.g., new conditions in marina lease agreements and marina slip agreements, and hull cleaning permits or licenses that include BMP requirements) (7) Potential boat storage options, and containment systems for boat cleaning and/or storage (e.g., slip liners)	City to develop and maintain Continue Education Program.	Specific Education Program updates listed in tasks 1 through 7 are part of other implementation tasks outlined in the basin plan amendment; therefore, this implementation task does not require new information to address tasks 1 through 7. Review of existing education programs developed for boatyards, boaters, and marinas. Goal is to evaluate the status of each and to prepare an implementation plan to determine what requires updates or establishment of a new education program. The implementation program will likely include the following: • Public outreach meetings – several meetings with commercial, residential, and general public. • City informational website updates – components of the website would match tasks 1 through 7. • Postings at marinas, boat/shipyards, and marine retail stores (WestMarine). • Grants – Copper Hull Paint Conversion Project. In San Diego, the Port developed a similar program in concert with the RWQCB. To offset the costs for commercial and recreational boaters, individual grants can help offset costs associated with stripping the existing copper hull paint from participating boats and/or applying non-biocide hull paint. A Project Assessment and Evaluation Plan was developed at the initiation of the project to summarize how the project's performance was to be assessed, evaluated, and reported to fulfill grant agreement requirements.	• Evaluate existing education programs and develop Implementation Program Plan – approximately $45,000. • Public outreach meetings – assume 4 meetings with each meeting costing approximately $7,500 for a total of $30,000. • City informational website updates – initial website development is approximately $10,000 and then quarterly updates at approximately $5,000. $25,000/year for the first year and then $20,000/year. • Postings at marinas – develop postings, printing, and installation. Approximately $15,000. • Grants – Approximately $75,000 to develop the Project Assessment and Evaluation Plan, including coordination with the RWQCB. Cost to implement the grant program would be determined at a later date.

Table 4
Overall Program Costs to Develop and Implement In-Water Hull Cleaning Diver Certification Program and Continue Education Program(s) in Support of the Newport Bay TMDL

	Year 1	Year 2	Year 3	Year 4	Year 5
Implementation Task 1.2.2.2: Diver Certification Plan and Implementation					
Develop Diver Certification Program	$120,000	--	--	--	--
Implement and Enforce Diver Certification Program	$100,000	$100,000	$100,000	$100,000	$100,000
Implementation Task 1.2.2.5: Continue Education Program(s) for Boaters, Boatyards, and Marinas					
Evaluate Existing Education Programs and Develop Implementation Program Plan	$45,000	--	--	--	--
Public Outreach Meetings (assume 4 meetings per year)	$30,000	$30,000	$30,000	$30,000	$30,000
City Informational Website	$25,000	$20,000	$20,000	$20,000	$20,000
Postings at Marinas and Boatyards	$15,000	--	--	--	--
Grants – Develop the Project Assessment and Evaluation Plan	$75,000	--	--	--	--
Annual Total	**$410,000**	**$150,000**	**$150,000**	**$150,000**	**$150,000**

SUMMARY

The total costs to comply with the implementation tasks identified within the BPA and Staff Report are totaled in Table 5.

Table 5
Overall Program Costs to Implement Required Elements in Support of the Newport Bay TMDL

Required Implementation Tasks	Year 1	Year 2	Year 3	Year 4	Year 5
Implementation Tasks 1.2.1 and 2.1 Costs to Develop Implementation Plans	$175,000	--	--	--	--
Implementation Task 1.2.2.6 Work with DPR and USEPA	$50,000	$50,000	$50,000	$50,000	$50,000
Implementation Tasks 1.2.2.4, 2.1, 3.2, 4.1, 5.1, 6.1, and 6.2. for Compliance Monitoring and Special Studies	$395,500	$434,000	$388,500	$209,000	$417,250
Implementation Task 1.2.2.2: Diver Certification Plan and Implementation	$220,000	$100,000	$100,000	$100,000	$100,000
Implementation Task 1.2.2.5: Continue Education Program(s) for Boaters, Boatyards, and Marinas	$190,000	$50,000	$50,000	$50,000	$50,000
Annual Cost	**$1,030,500**	**$634,000**	**$588,500**	**$409,000**	**$617,250**

REFERENCES

RWQCB (Regional Water Quality Control Board) Santa Ana, 2016a. *Staff Report – Basin Plan Amendments for Copper TMDLs and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic and Chromium in Newport Bay, California*. August 30, 2016.

RWQCB Santa Ana, 2016b. *Draft Attachment A to Resolution No. R8-2016-0059. Amendments to the Water Quality Control Plan –Santa Ana Region to incorporate the Newport Bay Copper (Cu) TMDLs, and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As) and Chromium (Cr)*. September 2016.

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Leonie Mulvihill and Chris Miller, City of Newport Beach	**Date:**	October 13, 2016
From:	Andrew Martin, Steve Cappellino, and Shelly Anghera, Ph.D., Anchor QEA, LLC	**Project:**	150243-16.01
Re:	Current and Relevant Sediment, Water, and Tissue Data to Support the Newport Bay Copper (Cu) TMDLs and Non-TMDL Action Plans for Zinc (Zn), Mercury (Hg), Arsenic (As), and Chromium (Cr)		

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) identifies several data sources to support metal listing of water, sediment, and tissue in the Upper and Lower Newport Bay. Most of the data presented were older than 10 years and were collected prior to significant dredging activities that took place in the Upper and Lower Newport Bay.

The State Water Resources Control Board recommends data must be less than 5 years for sediment quality assessments. For dredging evaluations, the U.S. Environmental Protection Agency and Regional Water Quality Control Board (RWQCB) require data to be less than 3 years old for issuance of permits. Only one study (Orange County Coastkeeper and Candelaria 2014) with data less than 5 years old was included in the Staff Report (RWQCB Santa Ana 2016).

There are several relevant and current studies that are representative of current conditions that were not included in Staff Report. Those studies are as follows:

- OC Monitoring Program – Stormwater and Estuary programs from 2006 to present
- Rhine Channel Post-Remediation Study (Anchor QEA 2011)
- Federal Dredging Post-Sediment Condition (Anchor QEA 2013)
- Southern California Bight 2013 Regional Monitoring Program (SCCWRP 2015, 2016)

This memorandum was developed to summarize the best available data that should be used to assess current condition in the Upper and Lower Newport Bay.

ORANGE COUNTY COASTKEEPER AND CANDELARIA

A description of the Orange County Coastkeeper and Candelaria (2014) study is provided in the Staff Report (RWQCB Santa Ana 2016). Surface sediment and bottom water samples were collected from 15 areas in Newport Bay in October 2012, March 2013, and August 2013.

Sediment Results

A total of 44 samples were collected for sediment in the 15 areas. All sediment samples were analyzed for metals. Copper exceeded the Effects Range Median (ERM) value of 270 parts per million (ppm) in seven samples collected at three sampling areas (Harbor Marina, Lido Village, and Lido Yacht Anchorage). Mercury exceeded the ERM value of 0.7 parts per billion (ppb) in seven samples collected in four sampling areas (Harbor Marina, Lido Village, Lido Yacht Anchorage, and Balboa Island Channel). Zinc exceeded the ERM value of 410 ppm in two samples collected at two sampling areas (Harbor Marina and Lido Village).

Toxicity testing was conducted at all sites where ERM exceedances for metals had been previously measured. During the last sampling event, sediment toxicity was evaluated using the 10-day amphipod (*Eohaustorius estuarius*) survival test at the six sites that had the highest metal concentrations. No toxicity was observed in the six toxicity tests conducted.

Water Results

A total of 30 water samples were collected near the sediment surface in the 15 areas in October 2012 and March 2013 (15 samples for each event). All water samples were analyzed for metals. The copper California Toxics Rule (CTR) value of 3.1 micrograms per liter (µg/L) was exceeded in four samples, all of which occurred in the October 2012 event. No copper CTR exceedances occurred in the March 2013 event.

Summary of Findings

A summary of the ERM exceedances is provided in Table 1. Sediment toxicity was conducted at all the stations that had ERM exceedances for the measured metals. No sediment toxicity was observed. Therefore, this study does not support the listing of copper, zinc, and mercury as recommended in the Staff Report. These findings can be used to support the delisting of sediment toxicity in the Lower Newport Bay.

OC MONITORING PROGRAM – STORMWATER AND ESTUARY PROGRAMS FROM 2011 TO PRESENT

The Orange County Stormwater Program, implemented by the County of Orange, the Orange County Flood Control District, and the cities of Orange County, is a comprehensive approach to satisfying requirements set forth in the National Pollutant Discharge Elimination System permits R8-2009-0030 and R9-2009-2002 that are administered by the Santa Ana RWQCB and San Diego RWQCB, respectively. The program has a variety of components, some of which include inspections and enforcement at commercial and industrial facilities, public education, and water quality monitoring at outfalls within Newport Bay. The program is currently in its fourth permit term.

The Water Quality Monitoring Program element of the Orange County Stormwater Program has several goals to address the following key concerns:

- Is the water safe to drink?
- Is it safe to swim in the waters?
- Is it safe to eat fish and shellfish from the waters?
- Are the aquatic ecosystems health?

These questions are answered through the assessment of environmental data collected as part of the following Water Quality Monitoring Program elements:

- **Long-term mass emissions** monitoring to determine annual contaminant loading in surface runoff
- **Estuary and wetlands** monitoring to assess the impact of municipal separate storm sewer system discharges on aquatic habitat in estuarine or brackish waters
- **Bacteria and pathogens** monitoring to assess impacts of stormwater and non-stormwater runoff on recreational beneficial uses
- **Urban stream bioassessment** monitoring to assess the quality of aquatic habitats
- **Dry weather reconnaissance** monitoring to detect the presence of illicit discharges/illicit connections

This data review focuses on the sediment chemistry and toxicity results generated as part of the estuary and wetlands element of the Water Quality Monitoring Program. The estuary and

wetlands element includes quarterly dry weather sediment quality monitoring at seven locations within Newport Bay (four locations in Lower Newport Bay and three in Upper Newport Bay). During each quarterly event, sediment samples are collected for analytical chemistry (conventionals, metals, polycyclic aromatic hydrocarbons [PAHs], polychlorinated biphenyls [PCBs], organochlorine pesticides, organophosphate pesticides, and pyrethroids) and sediment toxicity (using a 10-day amphipod [*Eohaustorius estuarius*] survival test). Once per year, an additional sediment toxicity test (using a 48-hour bivalve [*Mytilus galloprovincialis*] sediment-water interface test) and benthic community analyses is conducted.

Sediment Quality Results

Publically available data from the Orange County Public Works website supporting the OC Watersheds monitoring program were reviewed (OC Public Works 2016). Since 2011, the quarterly dry weather sediment quality monitoring program has collected 139 samples in seven locations in Upper and Lower Newport Bay (Figure 1). Copper, arsenic, chromium, and zinc did not exceed respective ERM values in any of these samples (Figure 2). Mercury was the only contaminant measured at concentrations greater than its ERM value (Figure 2), and this occurred at only one station in the Rhine Channel (LNBRIN).

Since 2011, the quarterly dry weather sediment quality monitoring program has conducted 96 sediment toxicity tests. Each station was tested 15 times with the exception of stations LNBRIN (n = 7) and UNBCHB (n = 14). Of those 96 sediment toxicity tests, 18 had a toxic response (i.e., survival less than 80%). Trends in the sediment toxicity results are illustrated in Figure 3 for Upper and Lower Newport Bay. The graphs show typically non-toxic conditions during the last 5 years.

Summary of Findings

A summary of the ERM exceedances is provided in Table 1. ERM exceedances have only occurred within the Rhine Channel since 2011. Sediment toxicity did not co-occur with any metal ERM exceedances except for two events in the Rhine Channel (station LNBRIN). Toxicity has not been observed in the last three sampling events in the Rhine Channel (LNBRIN). This study does not support the sediment listing for copper, zinc, and mercury in the Lower Newport Bay as recommended in the Staff Report. These findings can be used to

support the delisting of sediment toxicity in the Lower Newport Bay and the Upper Newport Bay as it relates to metals. Compliance with sediment toxicity should not be associated with any metal TMDL. This monitoring program supports the management of Rhine Channel as a separate waterbody, independent of a metals TMDL.

RHINE CHANNEL POST-REMEDIATION STUDY

The Rhine Channel, located in lower Newport Bay, was identified during the 2002 Toxics TMDL as a source of impaired sediments for several metals and organochlorine pesticides. At that time, it was listed as a separate waterbody for regulatory management. In the 2011 TMDL revisions, the Rhine Channel was removed from the list of impaired areas in Newport Bay for OC pesticides based on the assumption that sediment remediation was forthcoming and that all contaminated material would be soon removed.

In late 2011, the City of Newport Beach (City) began dredging within the Rhine Channel to remove impacted sediments. Because of constraints associated with the structural integrity of the bulkheads, and private property access issues, the City was forced to limit dredging to center parts of the channel and was not able to excavate areas within 20 to 50 feet of the bulkhead. The goal for the project was to remove as much of the impacted sediment as possible to take advantage of an available disposal site within the Port of Long Beach (Port). Approximately 80,000 cubic yards (cy) were removed over 3 months and delivered to the Port for sequestration. Figure 4 shows the dredge footprint as a color isopach of sediment removal thicknesses where darker oranges and reds represent the thickest dredge cut and blue shows areas that were not dredged. Post construction monitoring of the surface sediments showed that a clean surface was achieved over all dredged area and it was estimated that approximately 80% of the surface area of the Rhine Channel had been remediated. Areas not dredged along the bulkheads continued to be impacted after dredging was completed. The City and the RWQCB are currently working together to review the significance of the remaining impacted material and determine if additional focused dredging or capping is warranted to comply with the intent of the original TMDL.

During the development of the post-construction sampling plan, the RWQCB insisted that samples be collected in a stratified random fashion to ensure that samples were collected from both dredged and non-dredged areas in an effort to provide representative data for

existing conditions. Figure 5 shows the locations of the surface sediment samples collected to verify TMDL compliance. The number and location of these stations was not weighted to match the percentage of the area dredged and instead were randomly spread across the site. As expected, the stations that were positioned outside of the dredge footprint continued to show elevated concentrations for multiple constituents. Mercury was elevated post-construction even within the dredge areas due to re-suspension of residuals from un-dredged areas into the deeper channel running down the middle of the Rhine.

Sediment Quality Results

A total of 12 stations were tested for metals, pesticides, and PCBs in the surface and subsurface sediments. Surface samples were compared to the TMDL numeric values to determine compliance and yielded the following results, as presented in Table 2: 8 of the 12 surface samples exceeded the copper ERM, all 12 samples exceeded the mercury ERM, and 3 of the 12 samples exceeded the zinc ERM. No arsenic, cadmium, chromium, or nickel ERM exceedances were observed with any of the samples. No toxicity testing was conducted as part of this investigation.

Further evaluation of the data shows that the samples collected outside of the dredge footprint (stations 12, 13, 14, and 15) represent the highest concentrations measured for most analytes. For example, all three of the zinc ERM exceedances were for stations outside of the dredge area; the three highest copper concentrations observed were for these same three stations; and three of the four highest mercury concentrations were measured outside the dredge area. The results of this data show that the Rhine Channel continues to be one of the primary sources of legacy contaminant sources in Lower Newport Bay, with concentrations many times those observed in other areas. Significant volumes of contaminants were removed under this program, but some remain and will need to be further managed by the City in cooperation with the RWQCB. That effort should continue to occur as a separate effort from the rest of the Bay.

Summary of Findings

A summary of the ERM exceedances is provided in Table 1. This monitoring program supports the management of Rhine Channel as a separate waterbody, independent of a metals TMDL.

FEDERAL DREDGING POST SEDIMENT CONDITION

Beginning in May 2012 and continuing into January 2013, the City, the County of Orange, and the U.S. Army Corps of Engineers dredged a large area within Lower Newport Bay to take advantage of a disposal area at the Port and a source of funds from all three entities. The project included two phases that targeted the removal of approximately 1.3 million cy of sediment; 1 million was determined suitable for ocean disposal and the remaining 300,000 was suitable only for confined disposal. The unsuitable material was delivered to the Port and placed into the Middle Harbor fill site with the material from the Rhine Channel (removed just prior to the federal dredging project). Figure 6 shows the areas within Lower Newport Bay that were dredged under this program.

Following the nearly year-long dredging effort, the City was asked to conduct a post-construction sediment collection program to document existing conditions of the sediment surface for the purpose of updating the RWQCB's TMDL database for Newport Bay. It was assumed at that time that the new sediment data would replace the previous values observed for the various dredge units used in conjunction with toxicity tests to determine sediment suitability. Eleven stations were selected for testing as shown in Figure 6.

Sediment Quality Results

Metals were detected in all samples as shown in Table 3. At one station, mercury measured 1 milligram per kilogram (mg/kg), slightly above the ERM value of 0.71 mg/kg. All other metal values were less than ERM values. Copper and zinc values were considered estimates for all stations because the percent recovery values for the associated matrix spike/matrix spike duplicate were less than the project control limits, indicating a potentially low bias. Estimated values were considerably less than the respective ERM values.

The post-construction sampling also included toxicity testing using the sediment-water interface test with bivalves (*Mytilus galloprovincialis)*. All 11 stations were tested in four batches, each with a laboratory control. Mean percent normal alive embryos in the controls ranged from 79.3 to 94.1%, meeting the criterion of 70% normal alive. Results for test sediments were control-normalized (divided by control survival). Mean percent normal

alive embryos ranged from 81.2 to 113% in test sediments. Test sediment values were statistically compared to their respective controls, and no significant differences were found.

Summary of Findings

These data show that large portions of Lower Newport Bay were dredged during 2012 and 2013 for navigation and contaminant removal and the results were successful. More than 300,000 cy of contaminated sediment were removed, and the post-construction testing verified that the final surface concentrations were not only below the ERM but also exhibited no toxicity to a species very sensitive to metals (especially copper). A summary of the ERM exceedances is provided in Table 3. The one ERM exceedance that was detected, mercury, was only 0.3 ppb above the ERM and was almost an order of magnitude lower than the concentrations observed in the Rhine Channel. This study does not support the sediment listing for copper, zinc, and mercury in the Lower Newport Bay as recommended in the Staff Report. These findings can be used to support the delisting of sediment toxicity in the Lower Newport Bay and the Upper Newport Bay as it relates to metals. Compliance with sediment toxicity should not be associated with any metal TMDL. This monitoring program supports the management of Rhine Channel as a separate waterbody, independent of a metals TMDL.

BIGHT '13 SEDIMENT QUALITY OBJECTIVE ASSESSMENT (SCCWRP 2015)

The Southern California Bight (SCB) is the approximate 400 miles of coastline from Point Conception in Santa Barbara County to Cabo Colnett in Ensenada, Mexico. The Southern California Coastal Water Research Project (SCCWRP) coordinates multiple agencies and organizations to conduct an extensive monitoring program within the SCB every 5 years. The most recent monitoring program occurred in 2013 (i.e., Bight '13). The Bight program began in 1994, and data gathered during monitoring events has allowed for long-term tracking of benthic communities, fisheries, water quality, sediment chemistry and toxicity, and the general health of the SCB over time.

The Bight '13 program consisted of several key study elements, including the following:

- Nutrients
- Contaminant Impact Assessment (CIA; i.e., Coastal Ecology)
- Shoreline Microbiology

- Marine Protected Areas
- Trash and Debris

The CIA was designed to understand the existing condition of the benthic environment and biological resources in the SCB. This goal was achieved by developing a robust sampling program to determine the extent, magnitude, and trends of direct effects from sediment contaminants, and indirect risks of sediment contaminants to seabirds. For the purposes of this review, only sampling approach and results from the CIA were reviewed, as this element of the Bight '13 program is the most relevant to the Newport Bay TMDL.

In the Bight '13 program, nearly 400 sites throughout the SCB were sampled to accomplish the goal and objectives of the CIA. Specifically, in Newport Bay, nine sites were sampled: four in Lower Newport Bay and five in Upper Newport Bay. It should be noted that none of the Bight '13 stations were located in Rhine Channel. At each location, the top 5 centimeters of sediment were collected with a Van Veen grab sampler. Samples were submitted for sediment chemistry (conventionals, metals, PAHs, organochlorine pesticides, PCBs, and polybrominated dipheynyl ethers), benthic community analysis, and sediment toxicity (using a 10-day amphipod [*Eohaustorius estuarius*] survival test and a 48-hour bivalve [*Mytilus galloprovincialis*] sediment-water interface test). In addition, trawls were conducted to determine fish and macroinfauna community structure and assess gross fish pathology.

Sediment Quality Results

Nine samples were collected as part of the Bight '13 monitoring program within Newport Bay (SCCWRP 2016). None of the metals of concern (copper, arsenic, chromium, mercury, or zinc) exceeded ERM values from any of these stations. The toxicity line of evidence was categorized as moderate at two stations in Upper Newport Bay and as high at one station in Upper Newport Bay. All other Newport Bay stations were determined to be non-toxic. In 2014, SCCWRP resampled the station categorized as having high toxicity in 2013 in order to conduct a toxicity investigation evaluation. The follow-up testing showed no occurrence of toxicity.

Summary of Findings

Metals were not present in sediments at concentrations greater than the ERM as summarized in Table 1. The observed moderate toxicity in two out of nine samples was not paired with ERM exceedances of any metal; therefore, there is no direct linkage between metals in sediment to benthic impairments, nor dissolved copper (fluxed from sediment) in overlying water to aquatic organisms. This study does not support the sediment listing for copper, zinc, and mercury in the Lower Newport Bay as recommended in the Staff Report. These findings can be used to support the delisting of sediment toxicity in the Lower Newport Bay and the Upper Newport Bay as it relates to metals. Compliance with sediment toxicity should not be associated with any metal TMDL. This monitoring program supports the management of Rhine Channel as a separate waterbody, independent of a metals TMDL.

FISH TISSUE DATA ON CEDEN

CEDEN is a central location to find and share information from various monitoring programs and includes water quality, aquatic habitat, and wildlife health data. CEDEN aggregates this data and makes it accessible to environmental managers and the public. Tissue data from Newport Bay collected after 2006 are available on CEDEN (http://www.ceden.org/) and were collected as part of the Newport Bay Watershed Bio Trend Monitoring Program from 2007 through 2010, Surface Water Ambient Monitoring Program in 2009, and the State's Mussel Watch Program in 2010. These data may not be reflective of current conditions, but they are the most recent data available and can be used to demonstrate the range of metals that may be considered background conditions for Newport Bay and the Orange County coastal region.

Tissue Summary

Tables 4, 5, and 6 provide a summary of three monitoring programs. Figure 7 shows the concentration of mercury in fish outside of the harbor to fish inside Newport Bay. Figure 8 shows concentrations of arsenic and cadmium in fish outside of the harbor to fish inside Newport Beach.

Summary of Findings

Fish tissue from fish caught inside Newport Bay are similar to or less than fish tissue of fish caught just outside of the bay and along the Southern California coast. Therefore, fish caught in Newport Bay do not appear to be exposed to any additional metals that may be associated with Newport Harbor. The CEDEN database also includes mussel data; a more thorough data review should be included in any future tissue assessments for Newport Harbor.

REFERENCES

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SCCWRP, 2016. Southern California Bight 2013 Regional Monitoring Program: Volume IV Sediment Chemistry. April 2016.

Table 1
Summary of Sediment Quality Results for Evaluations Less than 5 Years Old in Upper and Lower Newport Bay

Study	Sediment Samples	ERM Exceedances for Copper	ERM Exceedances for Mercury	ERM Exceedances for Zinc	ERM Exceedances for Arsenic	ERM Exceedances for Chromium	Toxicity Tests	Toxic Samples
Orange County Coastkeeper and Candelaria (2014)	44	7	7	2	0	0	6[1]	0[1]
Bight '13	9	0	0	0	0	0	91 + 1[1,3] 9[2]	4[1,4] 0[2]
Federal Dredging Post Sediment Condition (Anchor QEA 2013)	11	0	1	0	0	0	11[1] 11[2]	0[1] 0[2]
OC Monitoring (2011 to 2016) 139 sediment samples, 96 toxicity samples	139	0	7 (all in Rhine Channel)	0	0	0	96[1] 19[2]	18[1,4] 0[2]
Rhine Channel Post Remediation Study (Anchor QEA 2011)	12	8	12	3	0	0	--	--
Summary for Lower and Upper Newport Bay	215	15	27	5	0	0	122[1] 39[2]	22[1,4] 0[2]
Summary for Lower and Upper Newport Bay without Rhine Channel	196	7	8	2	0	0	120[1] 32[2]	20[1,4] 0[2]

Notes:
1 = 10-day amphipod acute test
2 = 48-hour sediment/water interface *Mytilus* development test
3 = Station B13-8274 was toxic in the 2013 assessment and retested in 2014 for potential toxicity investigation evaluation testing. Survivorship was normal in the 2014 reassessment.
4 = Toxic response does not co-occur with ERM exceedance in metals, except for two instances in the Rhine Channel where Hg exceeds the ERM.
-- = not evaluated

Table 2
Results of Physical and Chemical Analyses of Surface Sediment Grab Samples

Location Name	TMDL Numeric Targets	ERL	ERM	RC-02	RC-04	RC-06	RC-08	RC-10	RC-11	RC-12	RC-13	RC-14	RC-15	RC-16	RC-17
Sample ID				RC-02-SG	RC-04-SG	RC-06-SG	RC-08-SG	RC-10-SG	RC-11-SG	RC-12-SG	RC-13-SG	RC-14-SG	RC-15-SG	RC-16-SG	RC-17-SG
Sample Date				12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012
Depth				0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm	0 - 2 cm
Conventional Parameters (percent)															
Total organic carbon	--	--	--	**1.6**	**2**	**1.6**	**1**	**0.92**	**1.2**	**2.3**	**2.4**	**2**	**2.4**	**1.6**	**1.4**
Total solids	--	--	--	**37**	**30.6**	**35.4**	**47.2**	**51**	**40.5**	**29.1**	**25.8**	**29.4**	**27.3**	**34.7**	**37.6**
Grain Size (percent)															
Gravel (>2 mm)	--	--	--	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Sand (2.00 mm - 1.00 mm)	--	--	--	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Sand, Coarse	--	--	--	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Sand, Medium	--	--	--	0 U	0 U	0 U	0 U	**0.33**	0 U	0 U	0 U	0 U	0 U	0 U	0 U
Sand, Fine	--	--	--	0 U	**0.7**	0 U	0 U	**10.6**	0 U	**0.05**	0 U	**0.42**	**0.88**	0 U	0 U
Sand, Very Fine	--	--	--	**2.64**	**7.36**	**1.54**	**0.3**	**8.96**	**0.81**	**4.55**	**2.49**	**5.41**	**2.8**	**1.11**	**0.42**
Silt	--	--	--	**59.3**	**53.44**	**53.31**	**58.05**	**51.39**	**58.73**	**52.18**	**54.65**	**50.17**	**55.5**	**57.81**	**57.44**
Fines (silt + clay)	--	--	--	**97.36**	**91.94**	**98.46**	**99.7**	**80.11**	**99.19**	**95.41**	**97.51**	**94.17**	**96.32**	**98.89**	**99.58**
Clay, <5 micron	--	--	--	**38.06**	**38.5**	**45.15**	**41.65**	**28.72**	**40.46**	**43.22**	**42.85**	**44**	**40.82**	**41.08**	**42.14**
Metals (mg/kg)															
Arsenic	--	8.2	70	**8.36**	**11.5**	**8.93**	**7.27**	**6.54**	**6.89**	**16.5**	**19.1**	**15.9**	**14.4**	**10.9**	**8.22**
Cadmium	--	1.2	9.6	**0.496**	**0.541**	**0.617**	**0.388**	**0.403**	**0.314**	**0.912**	**0.877**	**0.833**	**0.841**	**0.778**	**0.736**
Chromium	52	81	370	**16.7**	**33**	**17.4**	**14.3**	**15.7**	**18.7**	**35.3**	**41.6**	**35.8**	**42.2**	**29.8**	**28.3**
Copper	18.7	34	270	**400**	**428**	**399**	**220**	**166**	**178**	**673**	**862**	**605**	**624**	**318**	**249**
Lead	30.2	46.7	218	**80.4 J**	**84.5 J**	**71.3 J**	**44.2 J**	**34.8 J**	**28.5 J**	**118**	**127**	**96.4**	**101**	**63.1**	**41.3**
Mercury	0.13	0.15	0.71	**5.2**	**3.9**	**2.8**	**2.3**	**1.6**	**1.1**	**5.6**	**6.3**	**4.9**	**4.3**	**3**	**1.3**
Nickel	--	20.9	51.6	**7.82**	**17.3**	**8.63**	**8.5**	**7.82**	**10.9**	**20.1**	**23.2**	**20.6**	**23.1**	**19.6**	**16.5**
Selenium	--	--	--	0.0987 U	0.119 U	**0.321**	0.0774 U	0.0716 U	0.0902 U	**1.26**	**0.991**	**0.933**	**1.64**	**0.604**	**0.844**
Zinc	124	150	410	**257 J**	**285 J**	**280 J**	**165 J**	**160 J**	**155 J**	**430**	**486**	**370**	**425**	**283**	**280**

Notes:
USEPA Stage 2A data validation was completed by Anchor QEA.
Results are reported in dry weight basis.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest detection limit value is reported as the sum.
Total chlordane is the sum of alpha-chlordane and gamma-chlordane only.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT if measured.
Total PCB congeners is the total of all PCB congeners listed in this table.
Detected concentration is greater than TMDL numeric targets
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level

Bold = detected result
-- = not reported or not applicable
cm = centimeters
ERL = effects range low
ERM = effects range median
J = estimated value
mg/kg = milligrams per kilogram
mm = millimeter
U = compound analyzed but not detected at greater than the detection limit
TMDL = total maximum daily load
All non-detect results are reported at the method detection limit.

Table 3
Results of the Chemical Analyses of Surface Sediment Grab Samples for the Federal Channel Post-Dredge Condition

	Sediment Quality Guideline (ERM)	Phase I Station IDs									Phase II Station IDs	
		LW	LE	Y1	Y2	NC	WL	BR	CG	BE	LS	Y3
Conventional Parameters (percent)												
Total organic carbon	--	**1.8**	**1.7**	**1.4**	**1.4**	**1.7**	**1.7**	**1.3**	**0.74**	**1.7**	**1.8**	**1.9**
Total solids	--	**40.6**	**41.9**	**46.9**	**45.7**	**42.5**	**41.2**	**54.1**	**69.2**	**42.5**	**39.4**	**39.6**
Grain Size (percent)												
Gravel (>2 mm)	--	--	--	--	--	--	--	--	--	--	0 U	0 U
Sand (2.00 - 1.00 mm)	--	--	--	--	--	--	--	--	**1.42**	--	0 U	0 U
Sand, Coarse	--	--	--	--	--	--	--	--	**8.02**	--	0 U	0 U
Sand, Medium	--	--	**0.12**	--	--	**0.06**	--	**1.76**	**22.81**	--	0 U	0 U
Sand, Fine	--	**0.05**	**6.31**	**1.06**	**0.56**	**3.78**	--	**7.8**	**29.01**	**1.24**	0 U	0 U
Sand, Very Fine	--	**3.74**	**6.11**	**9.13**	**4.61**	**5.4**	**0.27**	**11.99**	**11.31**	**2.7**	0 U	0 U
Silt	--	**66.2**	**60.05**	**63.37**	**64.32**	**62.29**	**66.83**	**56.96**	**19.41**	**62.02**	0 U	**47.33**
Clay, <5 micron	--	**30.01**	**27.41**	**26.45**	**30.51**	**28.47**	**32.9**	**21.48**	**8.01**	**34.04**	**100**	**100**
Fines (silt + clay)	--	**96.21**	**87.46**	**89.82**	**94.83**	**90.76**	**99.73**	**78.45**	**27.42**	**96.06**	**100**	**52.67**
Metals (mg/kg)												
Arsenic	70	**8.06**	**8.07**	**7.45**	**6.78**	**7.23**	**8.14**	**4.08**	**3.34**	**7.97**	**7.51**	**7.99**
Cadmium	9.6	**1.15**	**1.35**	**1.38**	**1.58**	**1.45**	**1.44**	**1.02**	**0.51**	**1.2**	**1.21**	**1.44**
Chromium	370	**37.2**	**46.8**	**25.2**	**36.3**	**37.5**	**42.1**	**23.7**	**11.7**	**41.9**	**35.3**	**30.3**
Copper	270	**93.6 J**	**95 J**	**76.3 J**	**72.1 J**	**93.9 J**	**103 J**	**56 J**	**39.6 J**	**135 J**	**91.4**	**74.8**
Lead	218	**31.2**	**31.9**	**23.4**	**24.8**	**31.1**	**32.3**	**17.8**	**8.97**	**46.6**	**31.5**	**24.5**
Mercury	0.71	**0.15**	**0.15**	**0.11**	**0.096**	**0.13**	**0.22**	**0.1**	**0.12**	**1**	**0.282**	**0.117**
Nickel	51.6	**25.2**	**26.8**	**18.9**	**27.8**	**23.7**	**26.3**	**15.7**	**7.77**	**25.5**	**21.6**	**20.9**
Selenium	4	**0.75 J**	**0.665 J**	**0.262 J**	**0.722 J**	**0.664 J**	**0.692 J**	**0.36 J**	**0.188 J**	**0.648 J**	**0.612**	**0.433**
Tin	48	**3.19**	**3.34**	**1.95**	**3.16**	**2.96**	**3.02**	**1.91**	**1.1**	**3.51**	**2.04**	**2.09**
Zinc	410	**215 J**	**217 J**	**175 J**	**172 J**	**209 J**	**229 J**	**155 J**	**78.5 J**	**206 J**	**194**	**182**

Notes:
Results are reported in dry weight basis
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest method detection limit value is reported as the sum.
Total PAH is the sum of the 25 PAH compounds analyzed for this sampling event.
Total PCB Congeners is the sum of all reported PCB congeners.
Total Chlordane includes alpha-chlordane (cis-chlordane), beta-chlordane (trans-chlordane), cis-nonaclor, trans-nonaclor, and oxychlordane.
Total DDX is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Detected concentration is greater than Work Plan Sediment Guidelines
Non-detected concentration is above one or more identified screening levels

Bold = Detected result
J = Estimated value
U = Compound analyzed but not detected above detection limit. Undetected results are reported at the method detection limit.
-- No criteria exists
ERM = effects range median
mg/kg = milligrams per kilogram
mm = millimeter
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl

Table 4
Mercury Concentrations in Fish Sourced from Along the Orange County Coast (SWAMP 2009) Relative to Screening Levels Used in the Staff Report. All fish

Composite Station Code	Composite Common Name	Tissue Prep	Tissue Name	Analyte	Unit	Result
80113SASB	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.257
80113SASB	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.25
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.247
80111CCSA	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.229
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.226
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.217
80113SASB	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.207
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.207
80111CCSA	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.205
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.185
80111CCSA	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.145
80113SASB	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.131
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.127
80114ORCO	Barred Sand Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.126
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.123
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.08
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.077
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.074
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.062
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.06
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.058
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.051
80113SASB	Barred Surfperch	Skin off	Fillet	Mercury, Total	µg/g ww	0.05
80111CCSA	Brown Smooth-hound Shark	Skin off	Fillet	Mercury, Total	µg/g ww	1.45
80111CCSA	Brown Smooth-hound Shark	Skin off	Fillet	Mercury, Total	µg/g ww	1.45
80113SASB	Brown Smooth-hound Shark	Skin off	Fillet	Mercury, Total	µg/g ww	0.715
80113SASB	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.052
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.047
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.047
80113SASB	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.042
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.041
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.041

Composite Station Code	Composite Common Name	Tissue Prep	Tissue Name	Analyte	Unit	Result
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.038
80111CCSA	Chub Mackerel	Skin off	Fillet	Mercury, Total	µg/g ww	0.038
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.345
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.243
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.218
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.201
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.199
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.192
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.186
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.185
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.174
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.157
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.156
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.156
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.155
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.143
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.139
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.137
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.133
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.126
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.126
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.118
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.113
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.113
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.111
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.109
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.107
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.106
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.105
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.103
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.102
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.102
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.086
80114ORCO	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.079
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.077

Composite Station Code	Composite Common Name	Tissue Prep	Tissue Name	Analyte	Unit	Result
80111CCSA	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.076
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.063
80113SASB	Kelp Bass	Skin off	Fillet	Mercury, Total	µg/g ww	0.038
80113SASB	Spotfin Croaker	Skin off	Fillet	Mercury, Total	µg/g ww	0.046
80111CCSA	White Croaker	Skin off	Fillet	Mercury, Total	µg/g ww	0.199
80111CCSA	White Croaker	Skin off	Fillet	Mercury, Total	µg/g ww	0.196
80111CCSA	White Croaker	Skin off	Fillet	Mercury, Total	µg/g ww	0.152
80114ORCO	White Croaker	Skin off	Fillet	Mercury, Total	µg/g ww	0.131

Notes:
µg/g = microgram per gram wet weight

Table 5
Arsenic and Cadmium Concentrations from Mussels Collected in the Ocean in the Vicinity of Newport Bay (California State Mussel Watch Program 2010)

Analyte	Station	Result	Unit
As	NBWJ/Newport Beach-West Jetty	1.733	µg/g wet weight
As	ABWJ/Anaheim Bay-West Jetty	1.603	µg/g wet weight
As	SDHI/San Diego-Harbor Island	0.962	µg/g wet weight
As	DNPT/Dana Point	2.145	µg/g wet weight
As	CCSB/Crystal Cove State Beach	1.904	µg/g wet weight
Cd	SDHI/San Diego-Harbor Island	0.303	µg/g wet weight
Cd	ABWJ/Anaheim Bay-West Jetty	0.178	µg/g wet weight
Cd	CCSB/Crystal Cove State Beach	0.275	µg/g wet weight
Cd	DNPT/Dana Point	0.368	µg/g wet weight
Cd	NBWJ/Newport Beach-West Jetty	0.407	µg/g wet weight

Notes:
µg/g = microgram per gram
As = arsenic
Cd = cadmium

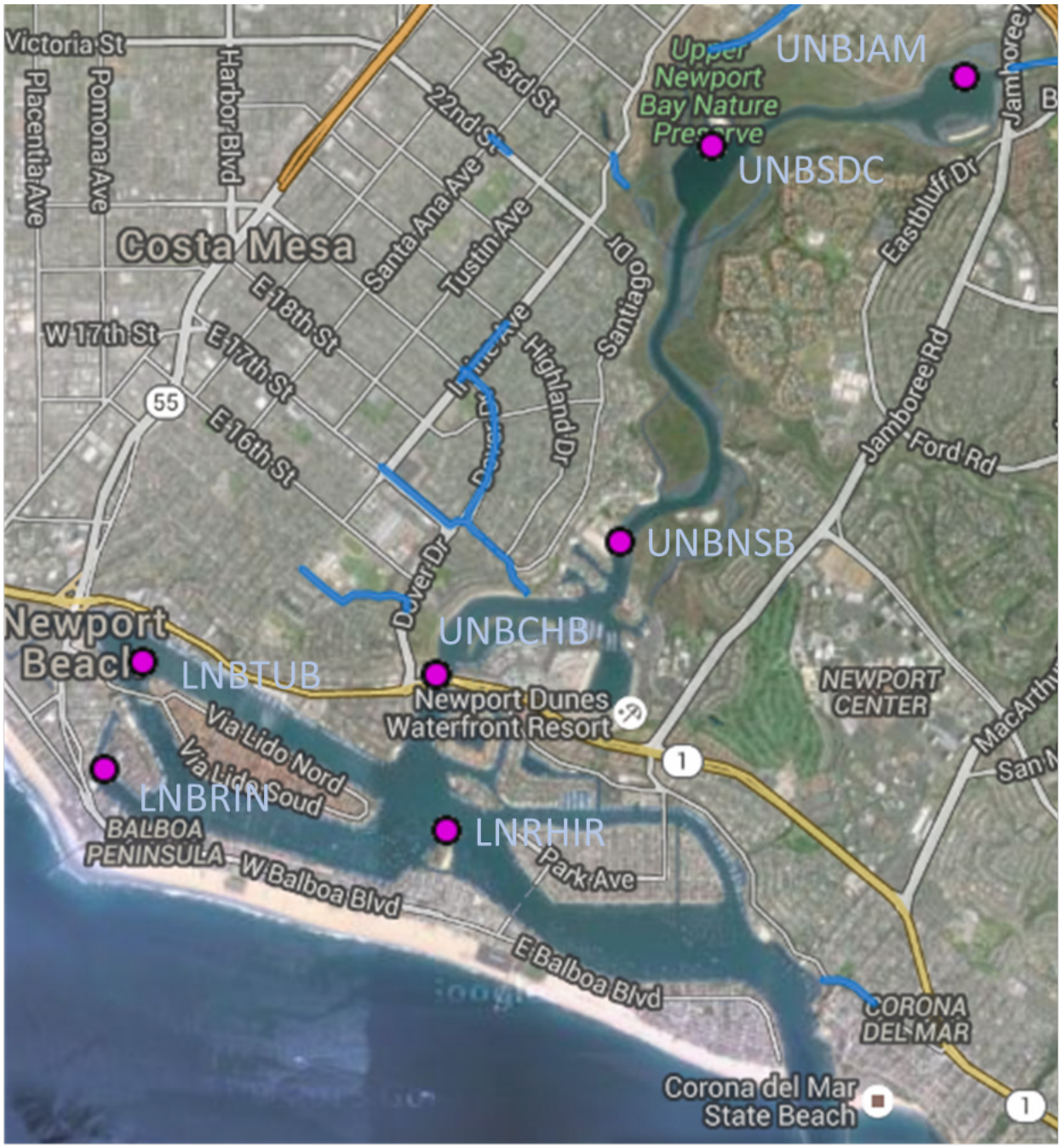
Table 6
Metals Concentrations in Fish Collected as Part of the Newport Bay Watershed Bio Trend Monitoring Program from 2007 through 2010 and Downloaded from CEDEN

Station	Sampling Date	Common Name	Tissue Prep	Tissue Type	Analyte	Unit	Result	Qual	MDL
801SARPOL	7/10/2008	California Halibut	Skin on	Not recorded	Arsenic	µg/g ww	0.55	=	0.02
801SARJAM	6/20/2007	California Halibut	Skin on	Not recorded	Arsenic	µg/g ww	0.32	=	0.02
801SARJAM	8/12/2008	California Killifish	Skin on	Not recorded	Arsenic	µg/g ww	0.48	=	0.02
801SARPOL	6/19/2007	Shiner Surfperch	Skin on	Not recorded	Arsenic	µg/g ww	0.96	=	0.02
801SARPOL	6/19/2007	Spotted Sand Bass	Skin off	Not recorded	Arsenic	µg/g ww	0.58	=	0.02
801SARPOL	7/10/2008	Spotted Sand Bass	Skin off	Not recorded	Arsenic	µg/g ww	0.29	=	0.02
801SARJAM	5/25/2010	Top Smelt	Skin off	Not recorded	Arsenic	µg/g ww	0.41	=	0.02
801SARJAM	8/12/2008	Top Smelt	Skin on	Not recorded	Arsenic	µg/g ww	0.59	=	0.02
801SARPOL	7/10/2008	California Halibut	Skin on	Not recorded	Cadmium	µg/g ww		ND	0.002
801SARJAM	8/12/2008	California Killifish	Skin on	Not recorded	Cadmium	µg/g ww		ND	0.002
801SARPOL	6/19/2007	Shiner Surfperch	Skin on	Not recorded	Cadmium	µg/g ww	0.027	=	0.002
801SARPOL	6/19/2007	Spotted Sand Bass	Skin off	Not recorded	Cadmium	µg/g ww	0.005	=	0.002
801SARPOL	7/10/2008	Spotted Sand Bass	Skin off	Not recorded	Cadmium	µg/g ww		ND	0.002
801SARJAM	8/12/2008	Top Smelt	Skin on	Not recorded	Cadmium	µg/g ww	0.013	=	0.002
801SARJAM	5/25/2010	Top Smelt	Skin off	Not recorded	Cadmium	µg/g ww	0.007	=	0.002
801SARJAM	6/20/2007	California Halibut	Skin on	Not recorded	Chromium	µg/g ww	0.46	=	0.15
801SARPOL	6/19/2007	Shiner Surfperch	Skin on	Not recorded	Chromium	µg/g ww	0.75	=	0.15
801SARPOL	6/19/2007	Spotted Sand Bass	Skin off	Not recorded	Chromium	µg/g ww	0.7	=	0.15
801SARJAM	8/12/2008	Top Smelt	Skin on	Not recorded	Chromium	µg/g ww	0.55	=	0.15
80112NWPT	6/16/2009	Black Perch	Skin off	Fillet	Mercury	µg/g ww	0.047	=	0.012
80112NWPT	6/17/2009	Black Perch	Skin off	Fillet	Mercury	µg/ g ww	0.041	=	0.012
80112NWPT	6/16/2009	Shiner Surfperch	Skin off	Fillet	Mercury	µg/g ww	0.051	=	0.012

Station	Sampling Date	Common Name	Tissue Prep	Tissue Type	Analyte	Unit	Result	Qual	MDL
80112NWPT	6/16/2009	Shiner Surfperch	Skin off	Fillet	Mercury	µg/g ww	0.041	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.245	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.207	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.202	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.195	=	0.012
80112NWPT	6/16/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.167	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.16	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.122	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.12	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.09	=	0.012
80112NWPT	7/25/2009	Spotted Sand Bass	Skin off	Fillet	Mercury	µg/g ww	0.085	=	0.012
80112NWPT	10/21/2009	White Croaker	Skin off	Fillet	Mercury	µg/g ww	0.232	=	0.012
80112NWPT	10/21/2009	White Croaker	Skin off	Fillet	Mercury	µg/g ww	0.227	=	0.012
80112NWPT	10/21/2009	White Croaker	Skin off	Fillet	Mercury	µg/g ww	0.221	=	0.012
801SARPOL	7/10/2008	California Halibut	Skin on	Not recorded	Zinc	µg/g ww	369	=	0.8
801SARJAM	6/20/2007	California Halibut	Skin on	Not recorded	Zinc	µg/g ww	13.3	=	0.8
801SARJAM	8/12/2008	California Killifish	Skin on	Not recorded	Zinc	µg/g ww	24.8	=	0.8
801SARPOL	6/19/2007	Shiner Surfperch	Skin on	Not recorded	Zinc	µg/g ww	21	=	0.8
801SARPOL	6/19/2007	Spotted Sand Bass	Skin off	Not recorded	Zinc	µg/g ww	8.05	=	0.8
801SARPOL	7/10/2008	Spotted Sand Bass	Skin off	Not recorded	Zinc	µg/g ww	6.32	=	0.8
801SARJAM	8/12/2008	Top Smelt	Skin on	Not recorded	Zinc	µg/g ww	33.7	=	0.8
801SARJAM	5/25/2010	Top Smelt	Skin off	Not recorded	Zinc	µg/g ww	31	=	0.8

Notes:
µg/g = microgram per gram wet weight
MDL = method detection limit
ND = non detect

FIGURES



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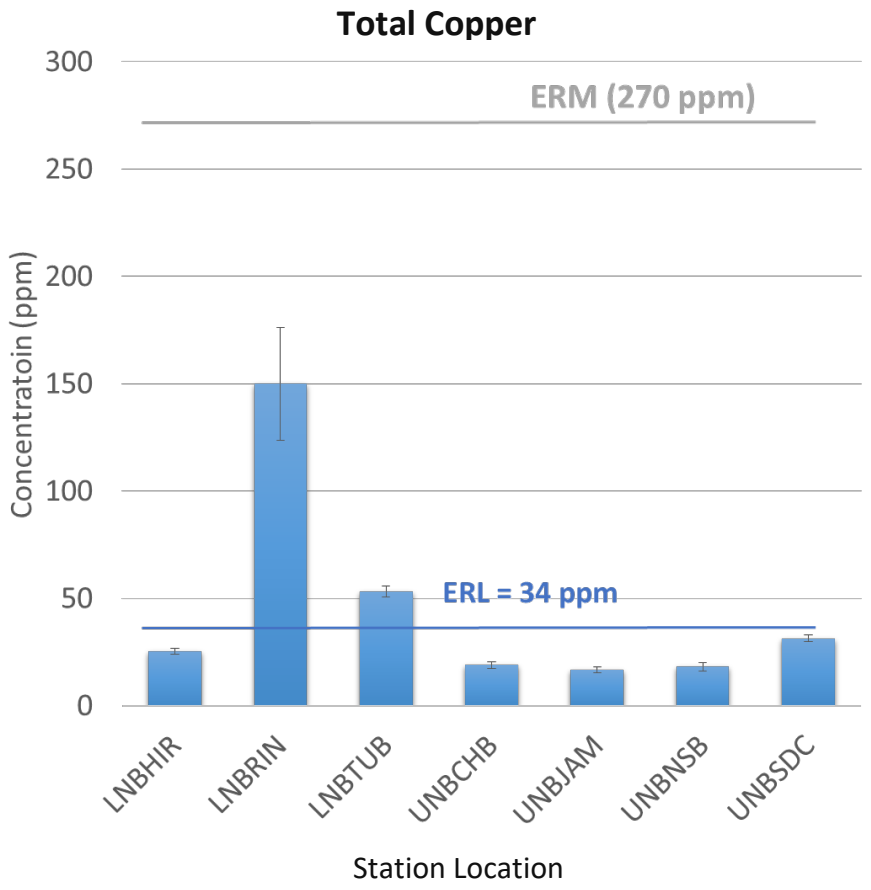
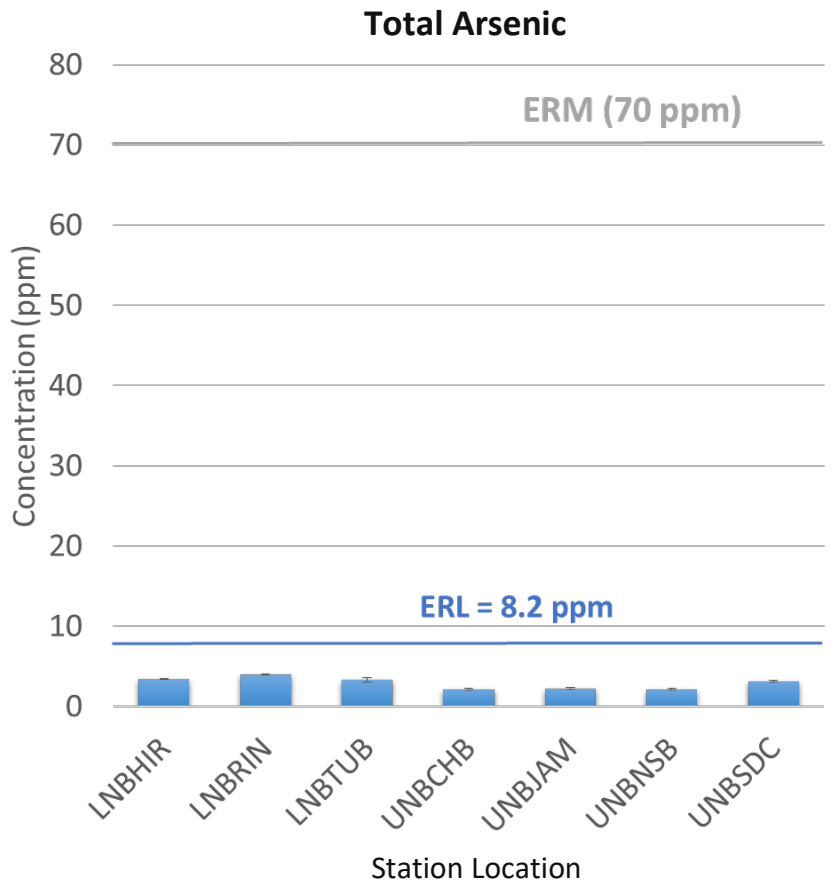
ANCHOR QEA

Figure 1
Vicinity Map and Station Locations for OC Monitoring Program
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach





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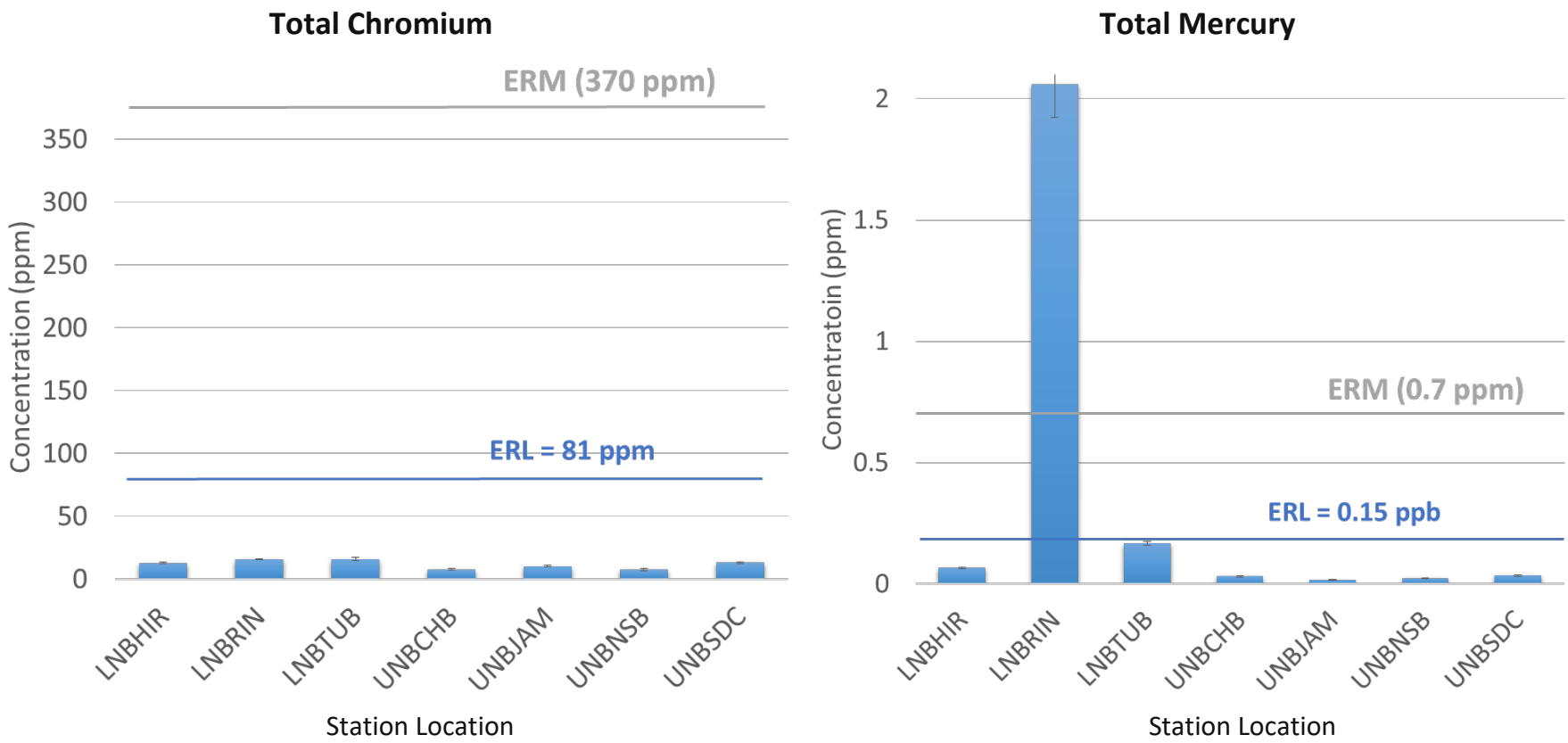
ANCHOR QEA

Figure 2
Summary of Metals Concentrations in Newport Bay Sediment Relative to ERM Values
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



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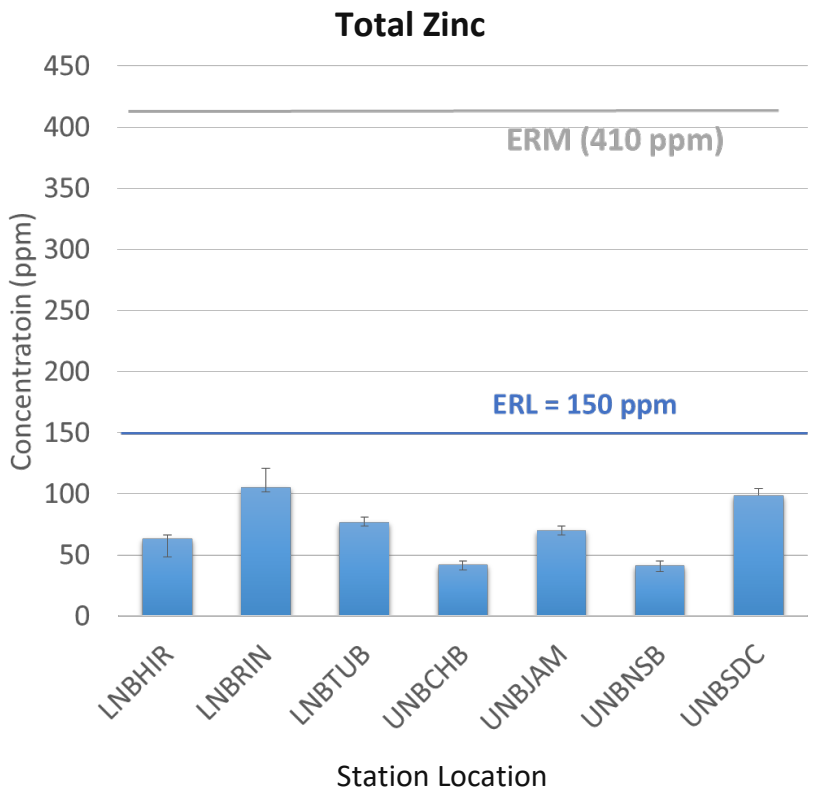
ANCHOR QEA

Figure 2
Summary of Metals Concentrations in Newport Bay Sediment Relative to ERM Values
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



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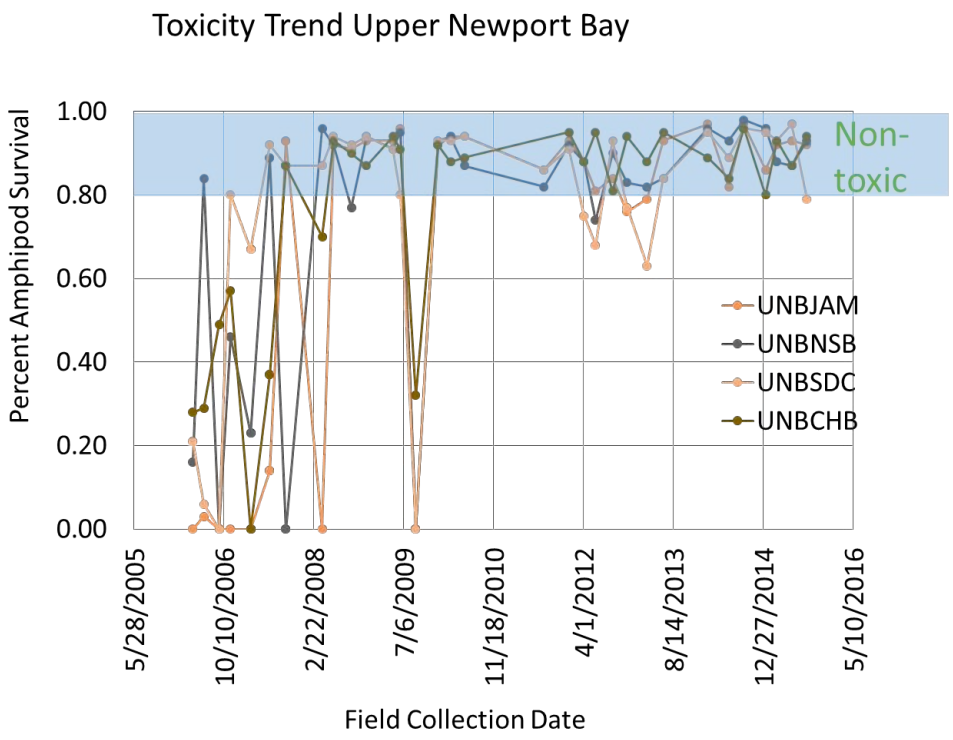
ANCHOR QEA

Figure 2
Summary of Metals Concentrations in Newport Bay Sediment Relative to ERM Values
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



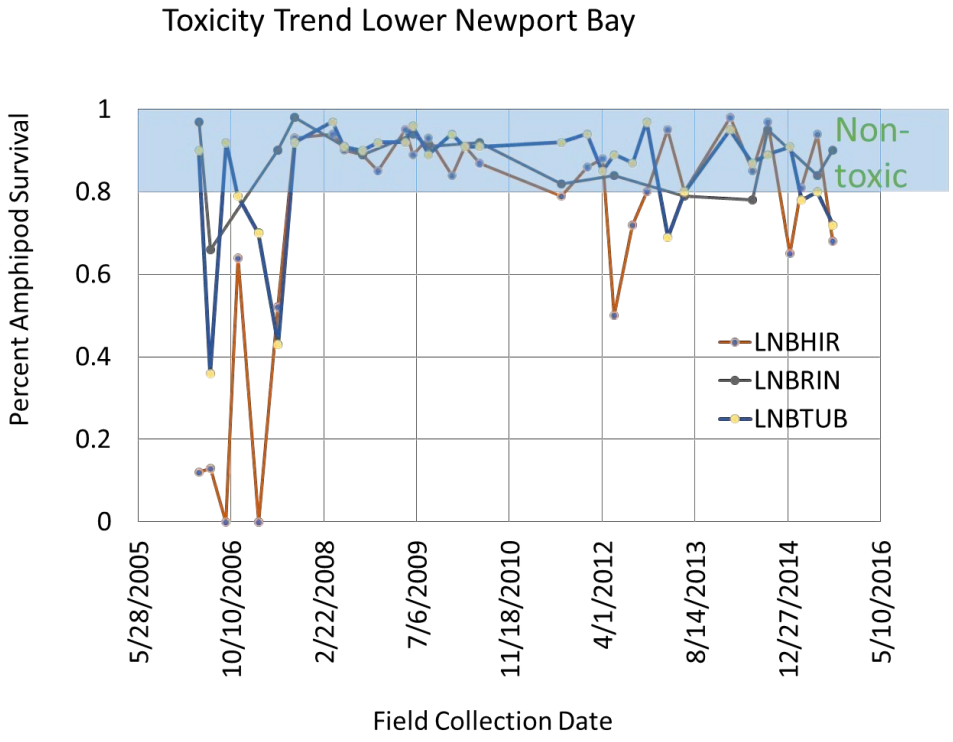


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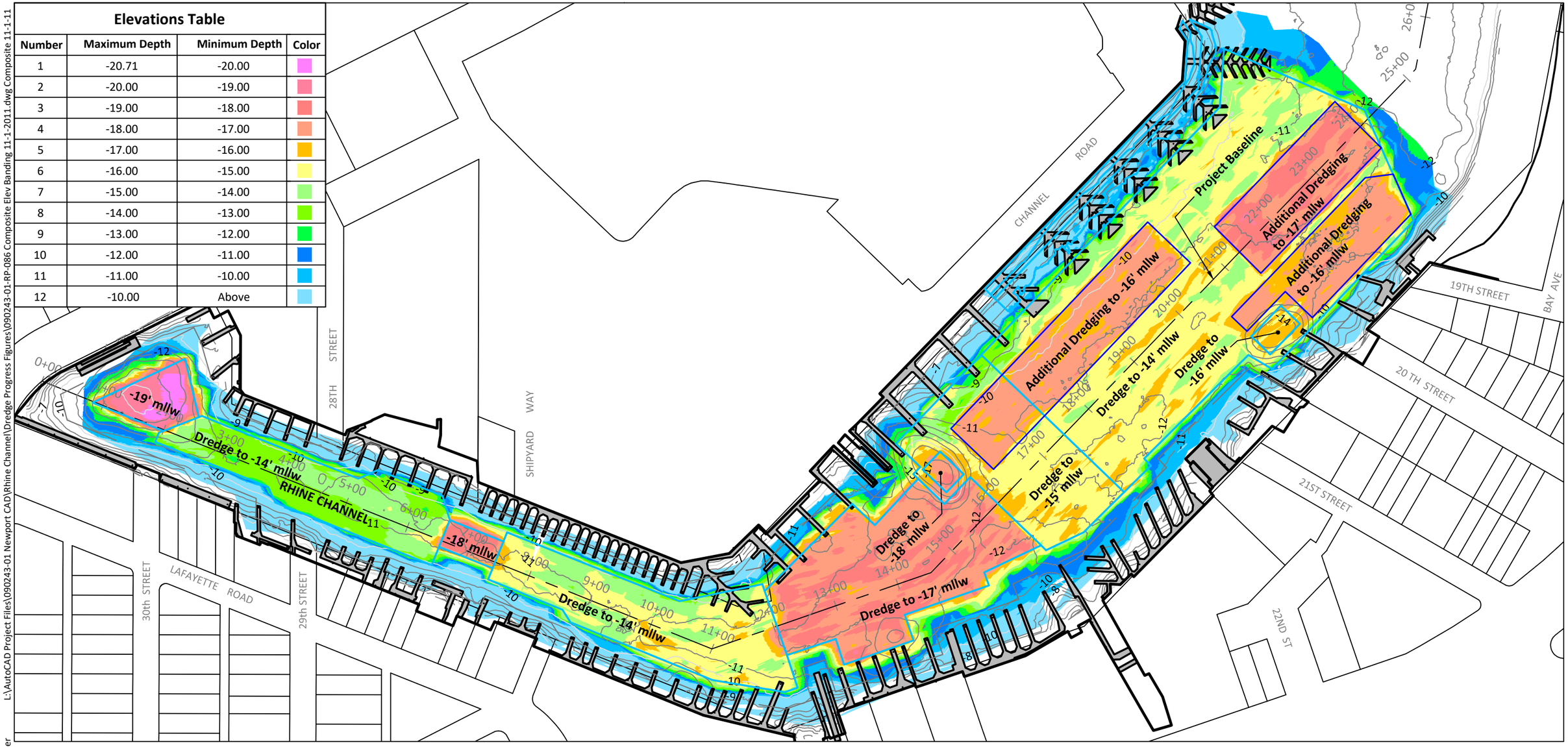
Figure 3
Sediment Toxicity Trends in Newport Bay
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



Elevations Table

Number	Maximum Depth	Minimum Depth	Color
1	-20.71	-20.00	
2	-20.00	-19.00	
3	-19.00	-18.00	
4	-18.00	-17.00	
5	-17.00	-16.00	
6	-16.00	-15.00	
7	-15.00	-14.00	
8	-14.00	-13.00	
9	-13.00	-12.00	
10	-12.00	-11.00	
11	-11.00	-10.00	
12	-10.00	Above	

SOURCE: Drawing prepared from City of Newport Beach and ESRI basemaps, and all Dutra surveys performed as of November 1, 2011.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:
Contours shown are from pre-dredge bathymetric survey conducted by Gahagan & Bryant Associates, Inc., on July 1, 2011.

LEGEND:

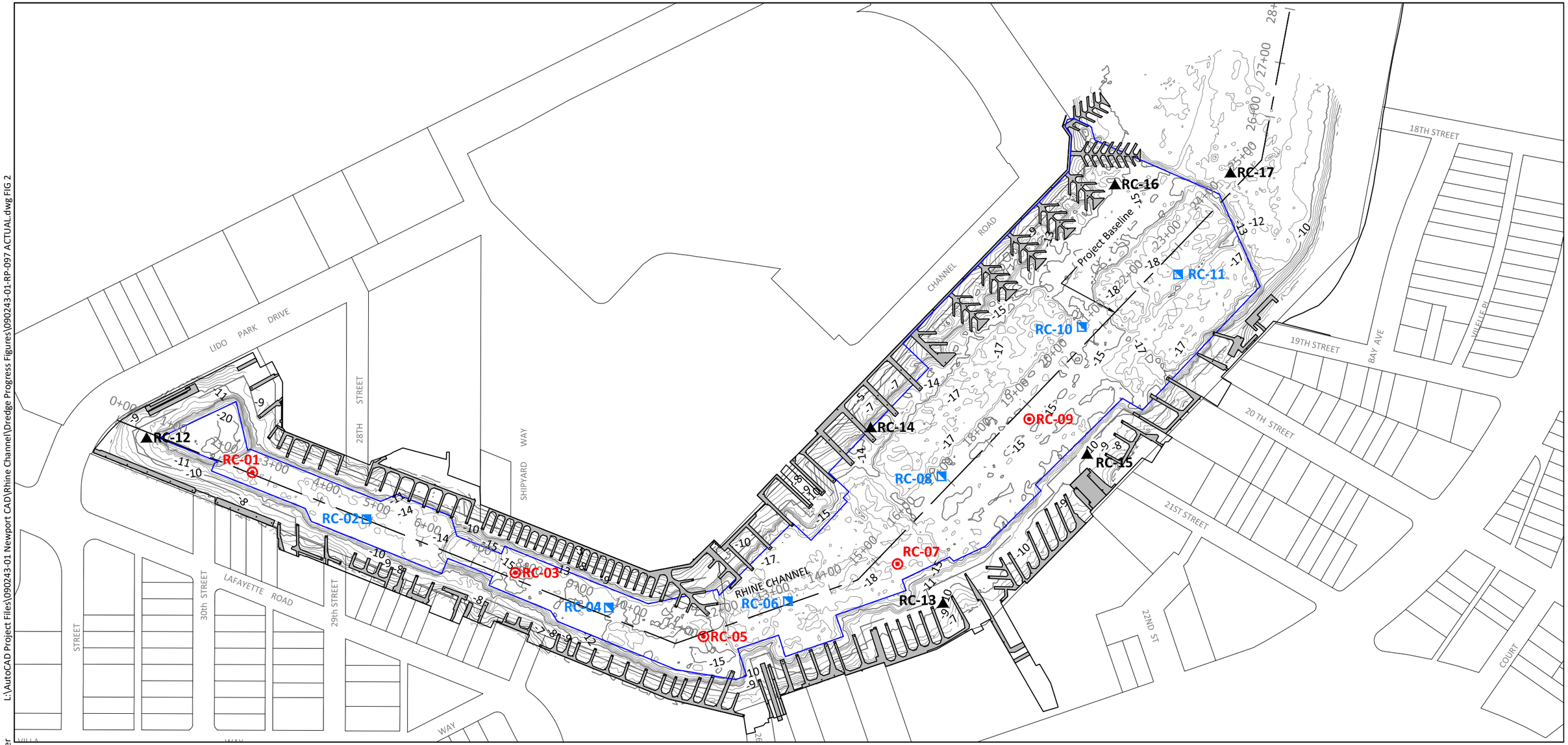
- Dredge Footprint
- Additional Dredging
- Limits of Work (Top of Slope)
- Existing Docks

0 150
Scale in Feet

L:\AutoCAD Project Files\090243-01 Newport CAD\Rhine Channel\Dredge Progress Figures\090243-01-RP-086 Composite Elev Banding 11-1-2011.dwg Composite 11-1-11
Nov 15, 2013 9:00am mpratschner

ANCHOR QEA

Figure 4
Dredge Depths and Final Elevations within Rhine Channel
Newport Bay Copper TMDL and Non-TMDL Action Plans
City of Newport Beach



SOURCE: Drawing prepared from City of Newport Beach and ESRI basemaps, and all Dutra Surveys performed as of November 1, 2011.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:
Contours shown are from post-dredge bathymetric survey conducted by Gahagan & Bryant Associates, Inc., on November 2, 2011.

LEGEND:

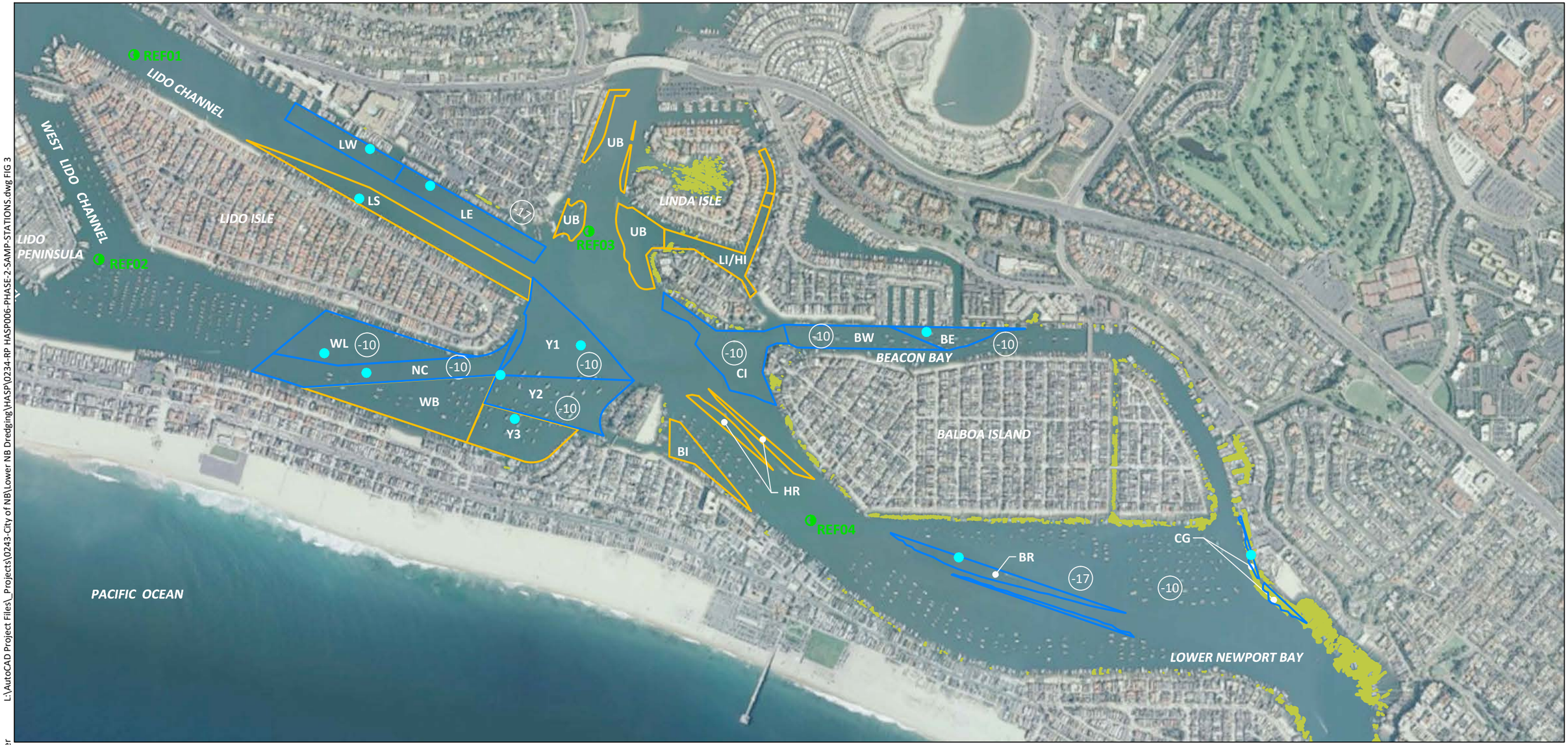
- RC-# Actual Sampling Locations for Sediment Coring
- RC-# Actual Sampling Locations for Surface Sediment
- RC-# Actual Sampling Locations for Sediment Coring and Surface Sediment
- -10 Post-Dredge Bathymetry
- Dredge Boundary

0 180
Scale in Feet

L:\AutoCAD Project Files\090243-01 Newport CAD\Rhine Channel\Dredge Progress Figures\090243-01-RP-097 ACTUAL.dwg FIG 2
Nov 15, 2013 9:03am mpratschner

ANCHOR QEA

Figure 5
Post-Dredge Bathymetric Data and Actual Sampling Locations
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



SOURCE: Drawing prepared from Bing maps. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

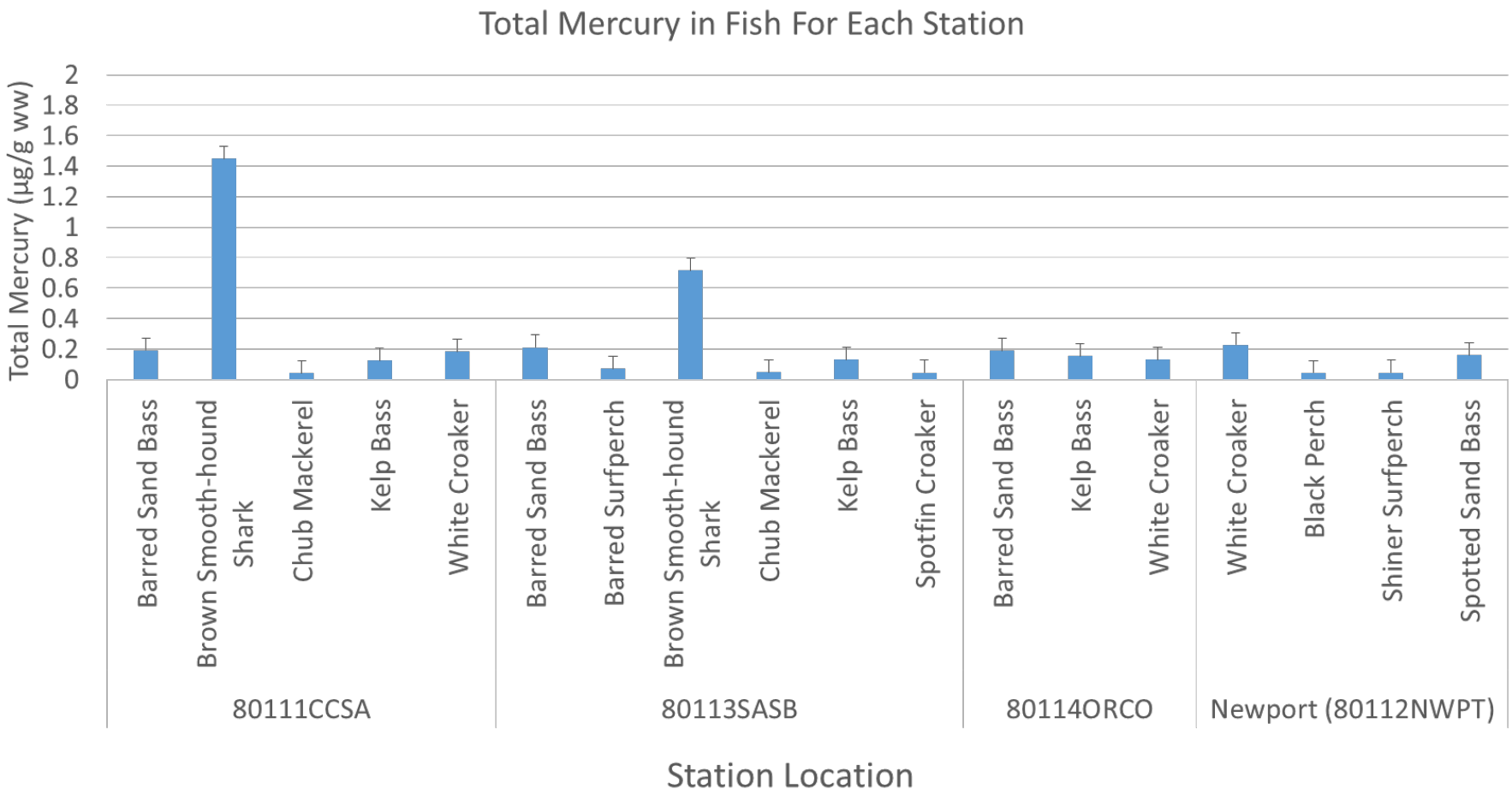
- Phase I Dredge Unit
- Phase II Dredge Unit
- -10 Dredge Depth
- REF# Reference Site
- Sampling Locations

0 1000
Scale in Feet

L:\AutoCAD Project Files_Projects\0243-City of NB\Lower NB Dredging\HASP\0234-RP HASP006-PHASE-2-SAMP-STATIONS.dwg FIG 3
Jul 19, 2013 11:52am mpratschner

ANCHOR QEA

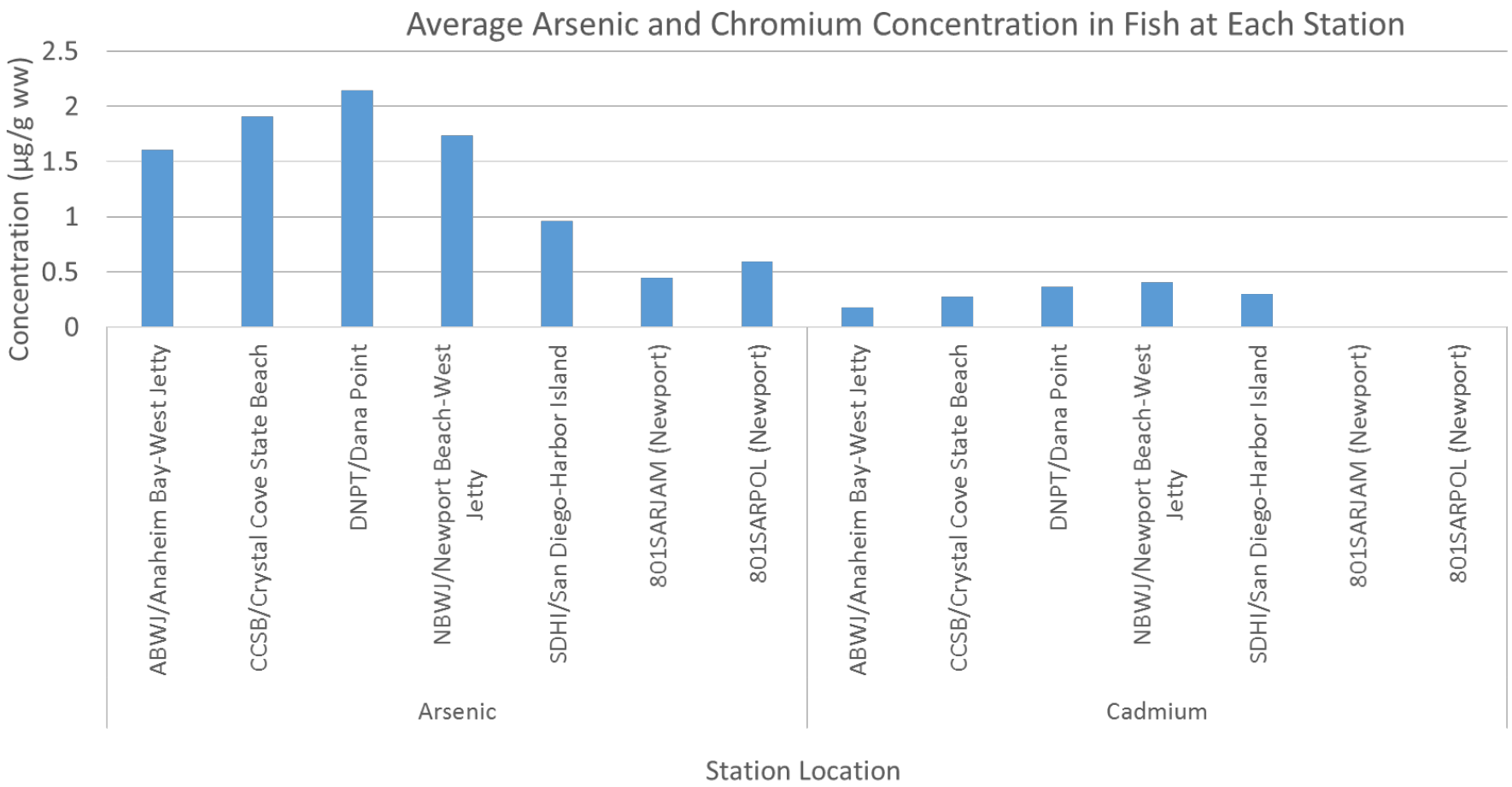
Figure 6
Post-Dredge Sediment Sampling Locations
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



S:\PROJECTS\City_of_Newport_Beach\C-6111_On-call_2015-2017(150243-01)\Copper TMDL Support\Current Data Memo\Fig 7 Total Mercury.docx

ANCHOR QEA

Figure 7
Total Mercury in Fish for Each Station
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach



S:\PROJECTS\City_of_Newport_Beach\C-6111_On-call_2015-2017(150243-01)\Copper TMDL Support\Current Data Memo\Fig 8 Average arsenic chromium.docx

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Figure 8
Average Arsenic and Chromium Concentration in Fish at Each Station
Newport Bay Copper TMDLs and Non-TMDL Action Plans
City of Newport Beach

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Bob Stein, Assistant City Engineer; Chris Miller, Harbor Resources Manager; and Dave Webb, Public Works Director, City of Newport Beach	**Date:**	July 10, 2015
From:	Shelly Anghera, Ph.D., and Chris Gardner, Anchor QEA	**Project:**	150243-01.04
Cc:	Chris Osuch, Anchor QEA		
Re:	Random Sample Points Methodology		

In 1996, Newport Bay (the Bay) was listed on the 303 (d) list for metals, pesticides, and organic pollutants. A total maximum daily load (TMDL) for metals is currently required for dissolved copper, lead, and zinc in the Upper and Lower Bay as well as the Rhine Channel. The TMDL is being updated to include an implementation plan requiring the conversion of 87% of the boats to non-copper-based paints to address water quality concerns for dissolved copper in Newport Bay.

Numeric targets for metals in the Bay are adopted from the California Toxics Rule (CTR). The CTR chronic target for dissolved copper for saltwater is 3.1 micrograms per liter (L). Previous investigations within the Bay have identified elevated copper concentrations in water from boat paint. However, these investigations sampled water adjacent to boats and were not designed to capture representative copper concentrations throughout the extent of the Bay. Anchor QEA designed a sampling plan whereby water samples were collected from 40 discrete locations that were randomly selected from within the sampling extent presented in Figure 1. Collecting water samples from randomly-generated locations will enable the establishment of a general condition of copper concentration throughout the Bay with a high degree of objectivity.

METHODS

Randomized Sampling Design Method

ArcGIS 10.2 geographic information systems (GIS) software was used to delineate the sample extent area and generate the random sample locations from which water samples were

collected for copper analysis. The generation of the random sample locations was accomplished using the *Create Random Points* tool within ArcGIS's ArcToolbox module (Esri 2015). This tool enables a user to generate random points within a constraining feature class (a polygon) and ensures that these random points are spaced no closer than a specified distance. The tool's relevant parameters for our analysis were as follows:

- **Constraining Feature Class** – A feature class whose shape defines the area within which the random sample locations will be generated. This feature class corresponds to the Sampling Extent polygon presented in Figure 1.
- **Number of Points** – The desired number of random sample points to generate within the Constraining Feature Class.
- **Minimum Allowed Distance** – The minimum distance in feet between the sample points that are generated within the Constraining Feature Class.

The *Create Random Points* tool works by first partitioning the polygon representing the Constraining Feature Class into triangles of varying sizes, using a standard polygon partitioning algorithm. To place the first point in the polygon, one of the triangles in the polygon is randomly selected. The probability of selecting a particular triangle is influenced by the size of the triangle, such that the larger the triangle, the higher the probability the triangle will be selected. Two legs of the triangle become the two axes from which to place the random point. Random values are then selected along each of the two legs, and a point is produced within the triangle using these two values. Then another triangle within the polygon representing the constrained extent is randomly selected, and the process repeats itself until the number of desired random samples is generated.

A Constraining Feature Class polygon was digitized from high-resolution orthographic photos to enclose the in-water areas of the Bay and Beacon Bay up to the approximate shoreline, extending northward to a point just south of the Newport Aquatic Center (Figure 1). This polygon was then fed into the *Create Random Points* tool as the Constraining Feature Class parameter. Values of "40" and "300 ft." were entered for the Number of Points and Minimum Allowed Distance parameters, respectively, and the tool was executed, producing a point feature class containing the 40 randomly generated sample points. Fields named "Latitude" and "Longitude" were added to the attribute table of this

feature class and were populated with each point's latitude and longitude values in units of decimal degrees.

Field Sample Collection Methods

Water samples were collected for chemical analysis using a 3-L Van Dorn bottle oriented horizontally. Samples were collected mid-depth at each station. Each sample was analyzed for dissolved copper. Water column chemistry was performed by Eurofins Environmental Laboratories, Inc., located in Garden Grove, California.

Results

The results of chemical analyses are presented in Table 1. Chemical concentrations were compared to water quality criteria. Raw data are provided in the complete chemistry reports (Attachment A forthcoming).

REFERENCES

Esri, 2015. ArcGIS Resources, *Create Random Points*. Accessed: June 30, 2015. Available from: http://resources.arcgis.com/en/help/main/10.2/index.html#//00170000002r000000.

Table 1
Newport Bay Metals TMDL Water Quality Copper Study

Sample ID	Sample Date	Latitude	Longitude	Copper (µg/L)
NB-01-063015	6/30/2015	32.60132	-117.88972	1.64
NB-02-070115	7/1/2015	32.61472	-117.92678	6.4
NB-03-070115	7/1/2015	32.61140	-117.9072	2.14
NB-04-063015	6/30/2015	32.59537	-117.87962	0.287
NB-05-063015	6/30/2015	32.61003	-117.9219	5.51
NB-06-070115	7/1/2015	32.61073	-117.90926	2.11
NB-07-063015	6/30/2015	32.62070	-117.93562	5.75
NB-08-063015	6/30/2015	32.60003	-117.88053	0.309
NB-09-070115	7/1/2015	32.60782	-117.90701	1.89
NB-10-063015	6/30/2015	32.60769	-117.90376	2.81
NB-11-070115	7/1/2015	32.61177	-117.90393	2.66
NB-12-070115	7/1/2015	32.60734	-117.91168	2.64
NB-13-063015	6/30/2015	32.60861	-117.88832	3.72
NB-14-070115	7/1/2015	32.61642	-117.92587	4.65
NB-15-063015	6/30/2015	32.60958	-117.89508	4.07
NB-16-063015	6/30/2015	32.60288	-117.88453	3.44
NB-17-070115	7/1/2015	32.60430	-117.88895	0.739
NB-18-063015	6/30/2015	32.61393	-117.90273	3.66
NB-19-070115	7/1/2015	32.61381	-117.91540	2.37
NB-20-063015	6/30/2015	32.61060	-117.92328	5.73
NB-21-063015	6/30/2015	32.62030	-117.93361	5.2
NB-22-063015	6/30/2015	32.60190	-117.88824	2.29
NB-23-070115	7/1/2015	32.61749	-117.92578	3.36
NB-24-063015	6/30/2015	32.62057	-117.9015	3.16
NB-25-070115	7/1/2015	32.61209	-117.90503	1.81
NB-26-063015	6/30/2015	32.61388	-117.90468	4.99
NB-27-063015	6/30/2015	32.59855	-117.88043	0.303
NB-28-070115	7/1/2015	32.61352	-117.91277	1.95
NB-29-070115	7/1/2015	32.61830	-117.92445	3.02
NB-30-070115	7/1/2015	32.61348	-117.90565	2.36
NB-31-063015	6/30/2015	32.61959	-117.92596	3.52
NB-32-063015	6/30/2015	32.60501	-117.90134	2.6
NB-33-063015	6/30/2015	32.60936	-117.92439	5.63
NB-34-063015	6/30/2015	32.60105	-117.89430	2.26

Sample ID	Sample Date	Latitude	Longitude	Copper (µg/L)
NB-35-063015	6/30/2015	32.60098	-117.88608	0.992
NB-36-070115	7/1/2015	32.61057	-117.91887	4.13
NB-37-063015	6/30/2015	32.60299	-117.89870	1.3
NB-38-063015	6/30/2015	32.60676	-117.90237	2.42
NB-39-063015	6/30/2015	32.61538	-117.90313	4.6
NB-40-070115	7/1/2015	32.61692	-117.92275	3.2

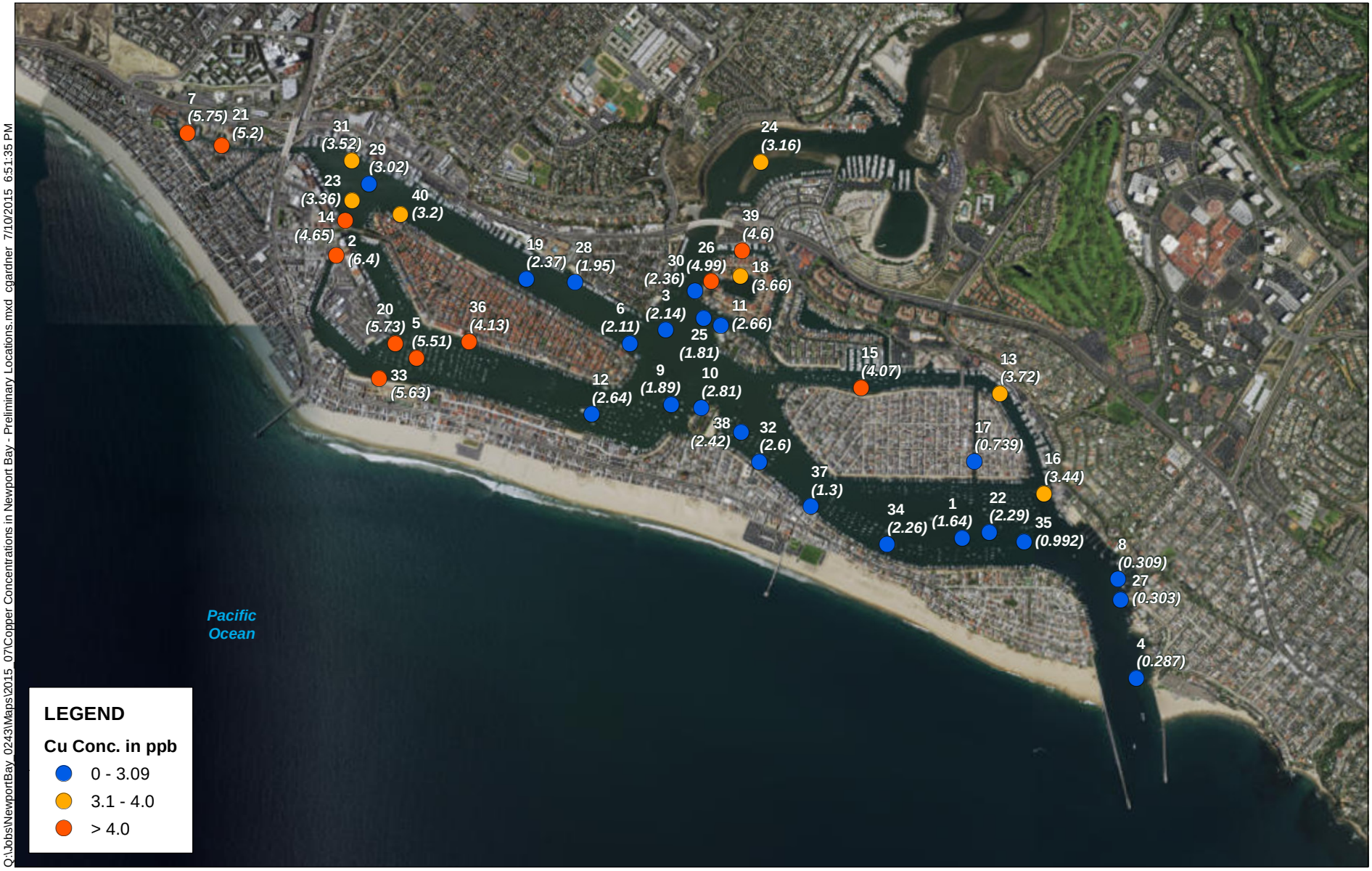
Notes:

Detected concentration is greater than California Toxics Rule screening level (3.1 µg/L)

µg/L microgram per liter

TMDL total maximum daily load

FIGURE

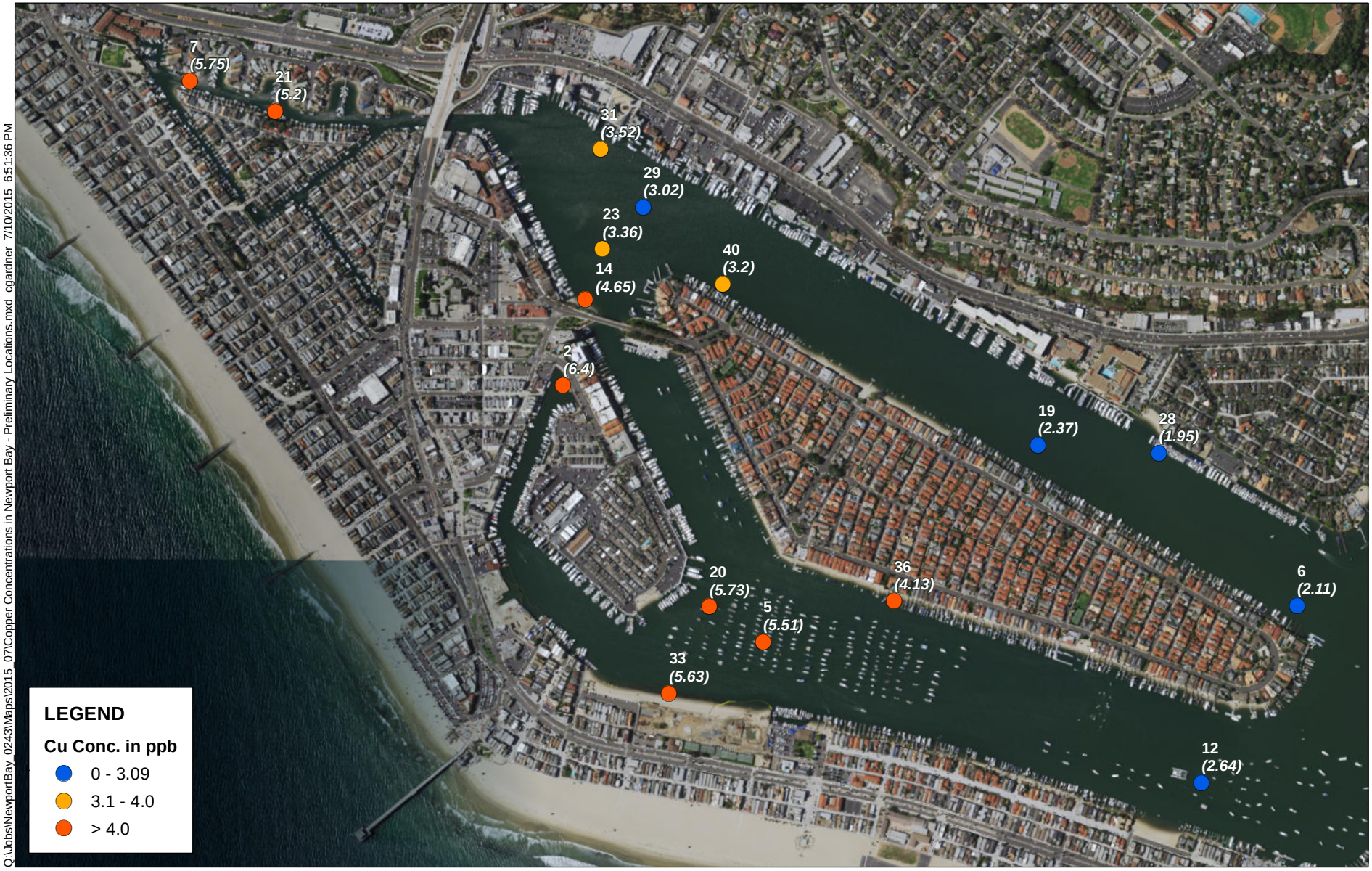


Q:\Jobs\NewportBay_0243\Maps\2015_07\Copper Concentrations in Newport Bay - Preliminary Locations.mxd cgardner 7/10/2015 6:51:35 PM

ANCHOR QEA

Feet
0 1,250 2,500 5,000

Figure 1
Dissolved Copper Concentrations
Frame 1 of 4
Newport Bay Copper Study
City of Newport Beach



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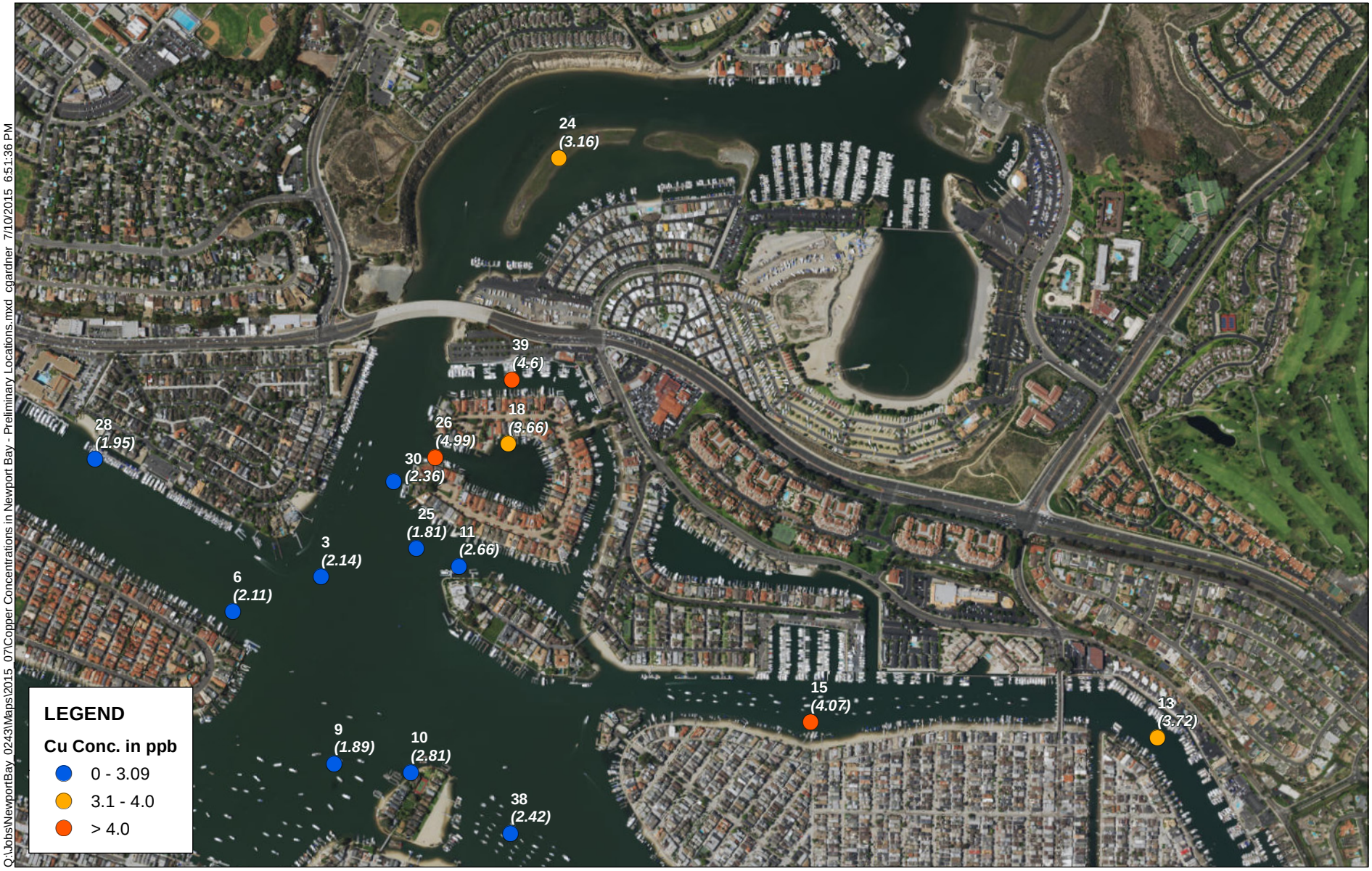
ANCHOR QEA

Feet
0 500 1,000 2,000

Figure 1
Dissolved Copper Concentrations
Frame 2 of 4
Newport Bay Copper Study
City of Newport Beach



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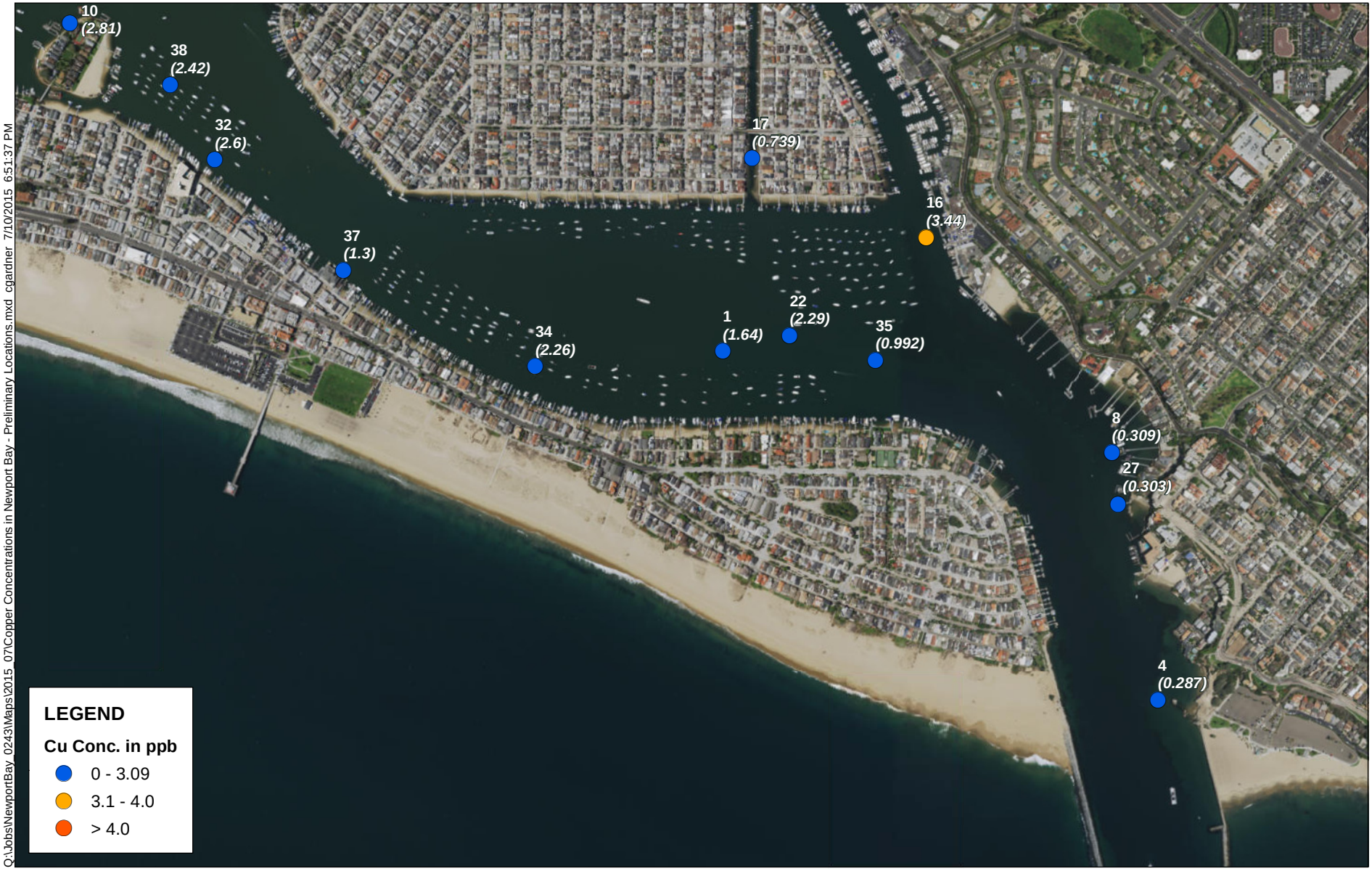
ANCHOR QEA

Feet
0 500 1,000 2,000

Figure 1
Dissolved Copper Concentrations
Frame 3 of 4
Newport Bay Copper Study
City of Newport Beach



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Feet
0 500 1,000 2,000

Figure 1
Dissolved Copper Concentrations
Frame 4 of 4
Newport Bay Copper Study
City of Newport Beach

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Robert Stein, Ph.D., Assistant City Engineer; Chris Miller, Harbor Resources Manager; and Dave Webb, Public Works Director, City of Newport Beach	**Date:**	March 25, 2016
From:	Shelly Anghera, Ph.D., and Chris Osuch, Anchor QEA, LLC	**Project:**	160243-01.01
Re:	Newport Bay Copper Study: Winter 2016		

In 1996, Newport Bay (the Bay) was listed on the Clean Water Act Section 303(d) List for metals, pesticides, and organic pollutants. A total maximum daily load (TMDL) for metals is currently required for dissolved copper, lead, and zinc in the Upper and Lower Bay as well as the Rhine Channel. The TMDL is being updated to include an implementation plan requiring the conversion of 87% of the boats to non-copper-based paints to address water quality concerns for dissolved copper in the Bay. Numeric targets for metals in the Bay are adopted from the California Toxics Rule (CTR). The CTR chronic target for dissolved copper for saltwater is 3.1 micrograms per liter (µg/L). Previous investigations within the Bay have identified elevated copper concentrations in water from boat paint.

SURVEY OF COPPER WITHIN NEWPORT BAY

In June 2015, Anchor QEA, LLC, designed a sampling plan whereby water samples were collected from 40 discrete locations that were randomly selected from within the sampling extent presented in Figure 1 (Anchor QEA 2015). Collecting water samples from randomly generated locations enables the establishment of a general condition of copper concentration throughout the Bay with a high degree of objectivity. Results of the June 2015 study showed water quality exceedances for copper in portions of the harbor (Anchor QEA 2015).

In February 2016, the study was repeated to further evaluate dissolved copper patterns throughout the harbor. This study includes monitoring at the same 40 locations to assess the general dissolved copper conditions in the Bay.

FOCUSED BOAT HULL INFLUENCE

In addition to the 40 previous monitoring locations, 14 new targeted locations at specific distances from around two specified vessels were sampled. The goal of this sampling was to assess the movement of copper away from the hull of the vessel, both upcurrent and downcurrent. These two vessels have recently applied copper-based antifouling paint that represents potential sources of copper to the water column. The two moorings selected are located on the edge of a mooring field in an area of unrestricted circulation.

METHODS

Survey of Copper within Newport Bay: Sampling Design Method

ArcGIS 10.2 geographic information systems (GIS) software was used to delineate the sample extent area and generate the random sample locations from which water samples were collected for copper analysis. The generation of the random sample locations was accomplished using the *Create Random Points* tool within ArcGIS's ArcToolbox module (Esri 2015), following methods described in the June 2015 study report (Anchor QEA 2015). A total of 40 randomly generated stations were designated for sampling throughout the Bay. Sampling locations are shown in Figure 1.

Focused Boat Hull Influence: Sampling Design Method

Two vessels, located at moorings A-154 and A-124, were selected for an additional 14 sampling locations (Figure 2). These vessels represent potential sources of copper to the water column. Sampling was designed such that these locations were sampled during a slack tide to isolate inputs from a source other than the moored vessel and focus on its input of copper to the Bay. Samples were collected 1 foot below the water's surface at the following locations:

- 0.5, 3, and 10 feet off the stern
- 0.5 and 3 feet off the bow
- 0.5 foot off both the port and starboard sides

This sampling approach was designed to study the distance from the vessel that copper may dilute in the water column.

Field Sample Collection Methods

Water samples were collected for copper and dissolved organic carbon (DOC) analyses using a 6-L Van Dorn bottle oriented horizontally. The Van Dorn bottle was decontaminated prior to sample collection at each station. Samples were collected mid-depth at each station. Water samples were placed in coolers with ice and stored at less than 4 °C until delivery to the appropriate laboratory for analysis. Proper chain-of-custody procedures were followed.

Each sample was analyzed for dissolved copper. Dissolved copper analysis was performed by Eurofins Calscience, Inc. (ECI), located in Garden Grove, California. DOC samples were shipped overnight to Analytical Resources Inc. (ARI), located in Tukwila, Washington. Upon receipt, DOC samples were filtered and preserved for potential analysis following the receipt of dissolved copper results from ECI. Samples with elevated copper concentrations (greater than CTR [3.1 µg/L]) were analyzed for DOC. DOC in the water column provides an indication of the bioavailability of copper that may be toxic to marine life.

RESULTS

Survey of Copper within Newport Bay

The results of chemical analyses for both June 2015 and February 2016 are presented in Table 1 for comparison. Chemical concentrations were compared to CTR water quality criteria. In February 2016, samples were collected on February 10 and February 11, when tide height ranged from 0.3 to 5.0 feet. Copper concentrations during this event ranged from 0.27 to 12.7 µg/L (Figure 3), and DOC concentrations ranged from 1.40 to 2.20 mg/L. In June 2015, samples were collected on June 30 and July 1, when tide height ranged from 2.2 to 3.2 feet. Copper concentrations during this event ranged from 0.3 to 6.4 µg/L. Raw data are provided in the complete chemistry reports (Attachment A).

For ocean conditions, DOC concentrations often range from 0.9 to 1.1 mg/L. The higher the DOC the higher the binding potential of copper to the organics, therefore, making the copper not bioavailable. Models are currently being evaluated by the Environmental Protection Agency to examine the relationship between observed copper concentrations within water that contains a specified concentration of DOC to predict the bioavailable fraction of copper. It is hoped that in the future this method will be available to assess

compliance with the water quality standard through estimation of the bioavailable fraction of copper. These data are provided to allow for that comparison in the future.

Focused Boat Hull Influence

The results of chemical analyses for the February 2016 boat-specific sampling are presented in Table 2. Copper concentrations ranged from 0.374 to 0.962 µg/L for the vessel at mooring A-154 and from 0.509 to 0.743 µg/L for the vessel at mooring A-124. Copper concentrations for specified distances from each vessel are shown in Figure 4.

REFERENCES

Anchor QEA, 2015. *Memorandum: Random Sample Points Methodology*. Newport Bay Copper Sampling in Support of the Newport Bay Metals TMDL. Prepared for the City of Newport Beach. July 2015.

Esri, 2015. ArcGIS Resources, *Create Random Points*. Accessed: June 30, 2015. Available from: http://resources.arcgis.com/en/help/main/10.2/index.html#//00170000002r000000.

TABLES

Table 1
Newport Bay Metals TMDL Water Quality Copper Survey

Sample ID	February 2016				June 2015
	Latitude	Longitude	Copper (µg/L)	DOC (mg/L)	Copper (µg/L)
NB-01-021016	33.60130	-117.88969	0.404	--	1.64
NB-02-021116	33.61462	-117.92666	12.7	2.11	6.4
NB-03-021116	33.61147	-117.90715	1.84	--	2.14
NB-04-021016	33.59432	-117.87975	0.217	--	0.287
NB-05-021116	33.60973	-117.92178	5.42	2.20	5.51
NB-06-021116	33.61071	-117.90928	1.66	--	2.11
NB-07-021116	33.62078	-117.9359	6.53	1.51	5.75
NB-08-021016	33.59997	-117.8054	0.27	--	0.309
NB-09-021116	33.60785	-117.90751	2.17	--	1.89
NB-10-021116	33.60771	-117.90388	1.08	--	2.81
NB-11-021116	33.61181	-117.90389	2.31	--	2.66
NB-12-021116	33.60726	-117.91162	3.05	--	2.64
NB-13-021016	33.60888	-117.88866	1.96	--	3.72
NB-14-021116	33.61638	-117.92596	3.99	2.24	4.65
NB-15-021016	33.60951	-117.89503	3.06	--	4.07
NB-16-021016	33.60288	-117.88488	0.83	--	3.44
NB-17-021016	33.60436	-117.88898	0.441	--	0.739
NB-18-021016	33.61384	-117.90271	2.96	--	3.66
NB-19-021116	33.61382	-117.9153	2.09	--	2.37
NB-20-021116	33.61057	-117.92326	7.54	2.10	5.73
NB-21-021116	33.62030	-117.93366	5.91	2.10	5.2
NB-22-021016	33.60190	-117.88818	0.251	--	2.29
NB-23-021116	33.61758	-117.92582	3.28	2.06	3.36
NB-24-021016	33.62063	-117.90151	1.64	--	3.16
NB-25-021116	33.61208	-117.90498	1.94	--	1.81
NB-26-021016	33.61390	-117.90464	2.82	--	4.99
NB-27-021016	33.59538	-117.88033	0.401	--	0.303
NB-28-021116	33.61351	-117.91273	2.52	--	1.95
NB-29-021116	33.61832	-117.92446	2.81	--	3.02
NB-30-021116	33.61346	-117.90563	1.87	--	2.36
NB-31-021116	33.61961	-117.92598	2.77	--	3.52
NB-32-021016	33.60496	-117.90132	1.54	--	2.6
NB-33-021116	33.60946	-117.9258	8.19	1.54	5.63
NB-34-021016	33.60131	-117.88967	0.491	--	2.26

Sample ID	February 2016				June 2015
	Latitude	Longitude	Copper (µg/L)	DOC (mg/L)	Copper (µg/L)
NB-35-021016	33.60087	-117.88622	0.304	--	0.992
NB-36-021116	33.61055	-117.91897	5.02	1.40	4.13
NB-37-021016	33.60308	-117.89871	1.41	--	1.3
NB-38-021016	33.60670	-117.90240	1.93	--	2.42
NB-39-021016	33.61384	-117.90356	4.86	1.67	4.6
NB-40-021116	33.61697	-117.92274	3.09	--	3.2

Notes:

Detected concentration is greater than California Toxics Rule screening level (3.1 µg/L)

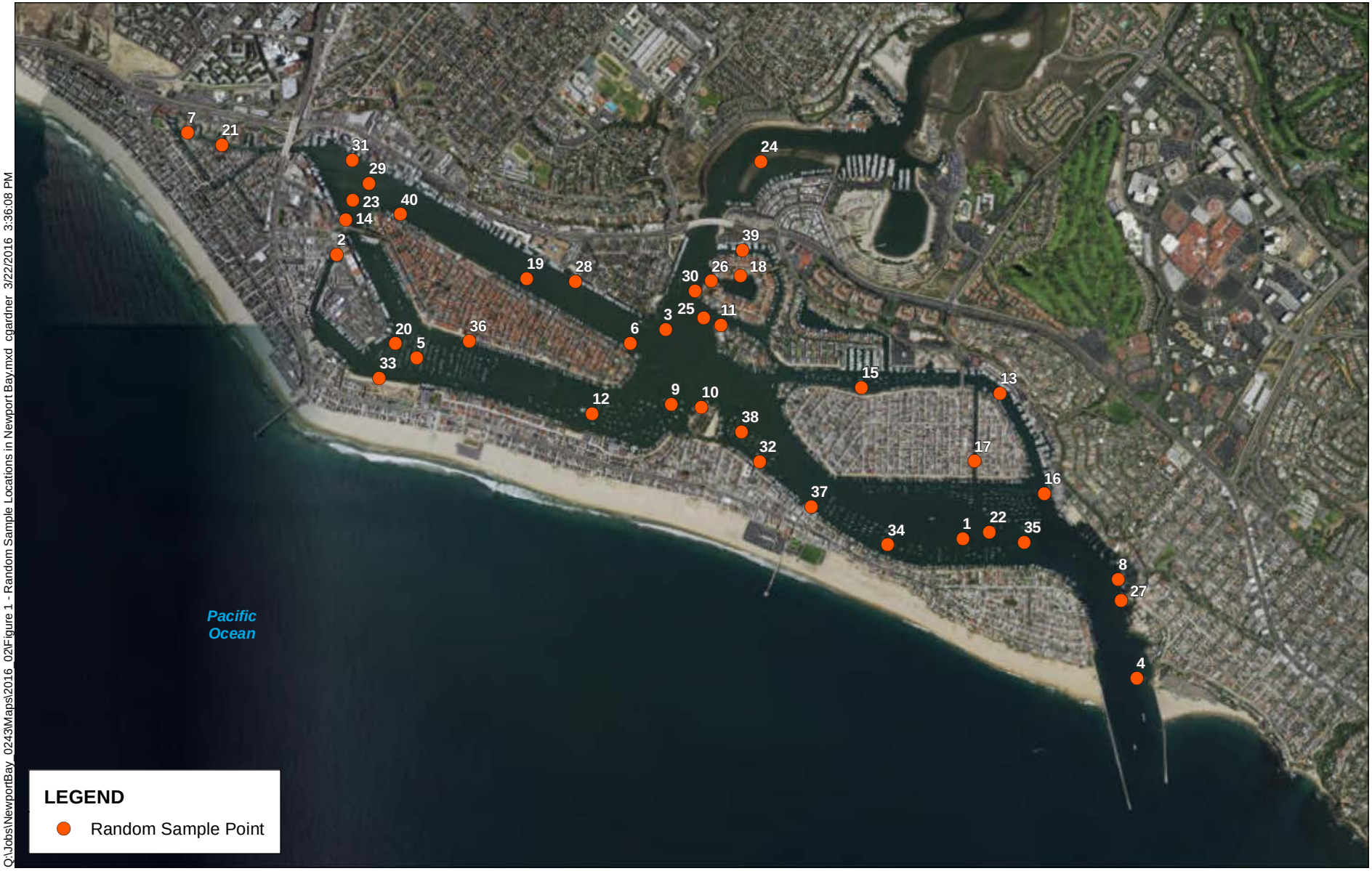
-- Not applicable
µg/L microgram per liter
DOC dissolved organic carbon
mg/L milligram per liter
TMDL total maximum daily load

Table 2
Focused Vessel Study on Moorings A-154 and A-124

Sample ID	Sample Date	Latitude	Longitude	Copper (µg/L)
NB-BL15401-021016	2/10/2016	33.60100	-117.89209	0.567
NB-BL15402-021016	2/10/2016	33.60100	-117.89209	0.374
NB-BL15403-021016	2/10/2016	33.60100	-117.89209	0.504
NB-BL15404-021016	2/10/2016	33.60100	-117.89209	0.81
NB-BL15405-021016	2/10/2016	33.60100	-117.89209	0.823
NB-BL15406-021016	2/10/2016	33.60100	-117.89209	0.962
NB-BL15407-021016	2/10/2016	33.60100	-117.89209	0.338
NB-RD12401-021016	2/10/2016	33.60086	-117.891009	0.509
NB-RD12402-021016	2/10/2016	33.60086	-117.891009	0.557
NB-RD12403-021016	2/10/2016	33.60086	-117.891009	0.539
NB-RD12404-021016	2/10/2016	33.60086	-117.891009	0.563
NB-RD12405-021016	2/10/2016	33.60086	-117.891009	0.743
NBRD12406-021016	2/10/2016	33.60086	-117.891009	0.579
NBRD12407-021016	2/10/2016	33.60086	-117.891009	0.583

Note:
µg/L microgram per liter

FIGURES



Q:\Jobs\NewportBay_0243\Maps\2016_02\Figure 1 - Random Sample Locations in Newport Bay.mxd cgardner 3/22/2016 3:36:08 PM

ANCHOR QEA

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Figure 1
Random Sample Locations
Frame 1 of 4
Newport Bay Copper Study
City of Newport Beach

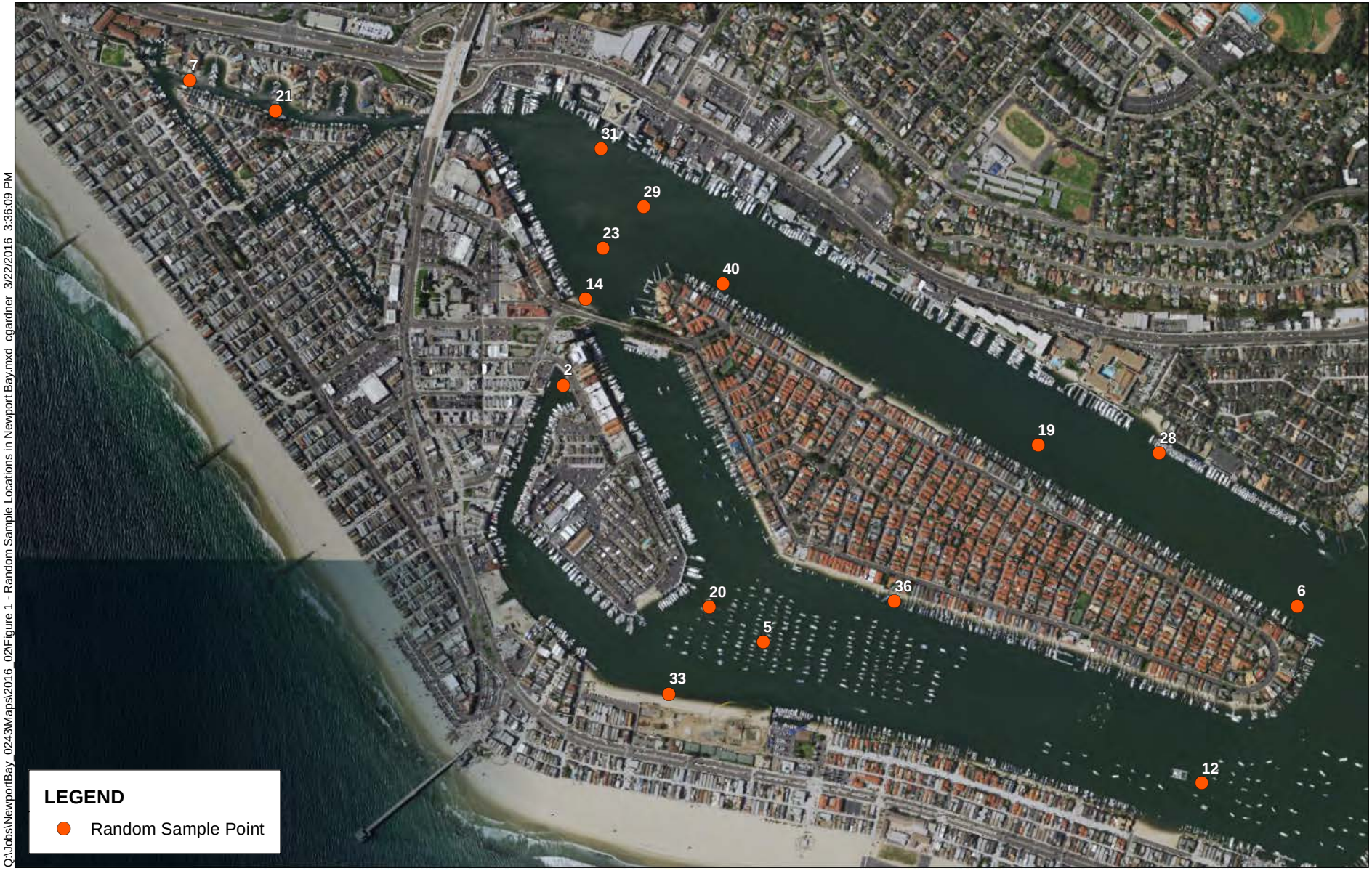

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Figure 1
Random Sample Locations
Frame 2 of 4
Newport Bay Copper Study
City of Newport Beach

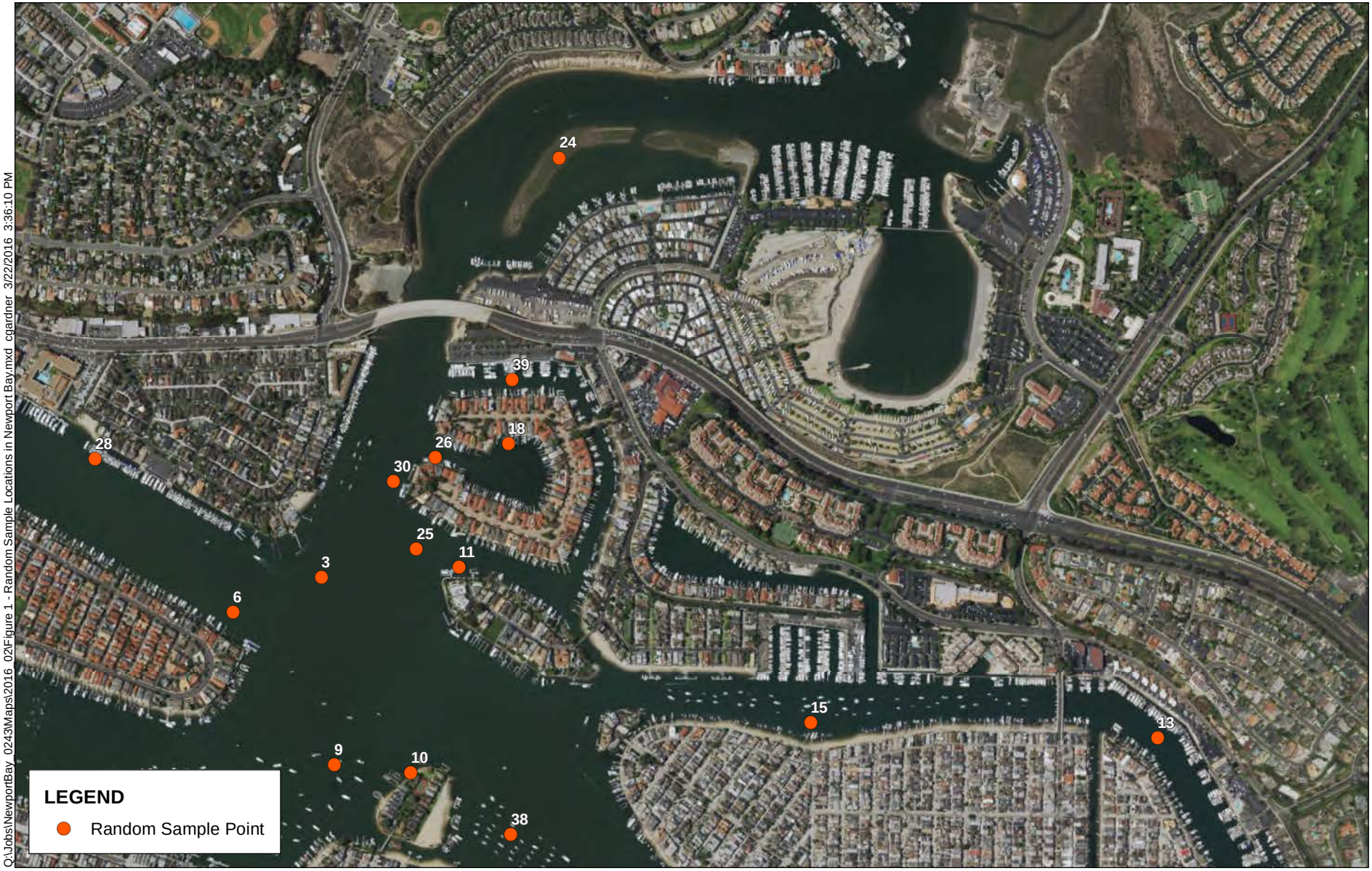

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Figure 1
Random Sample Locations
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City of Newport Beach

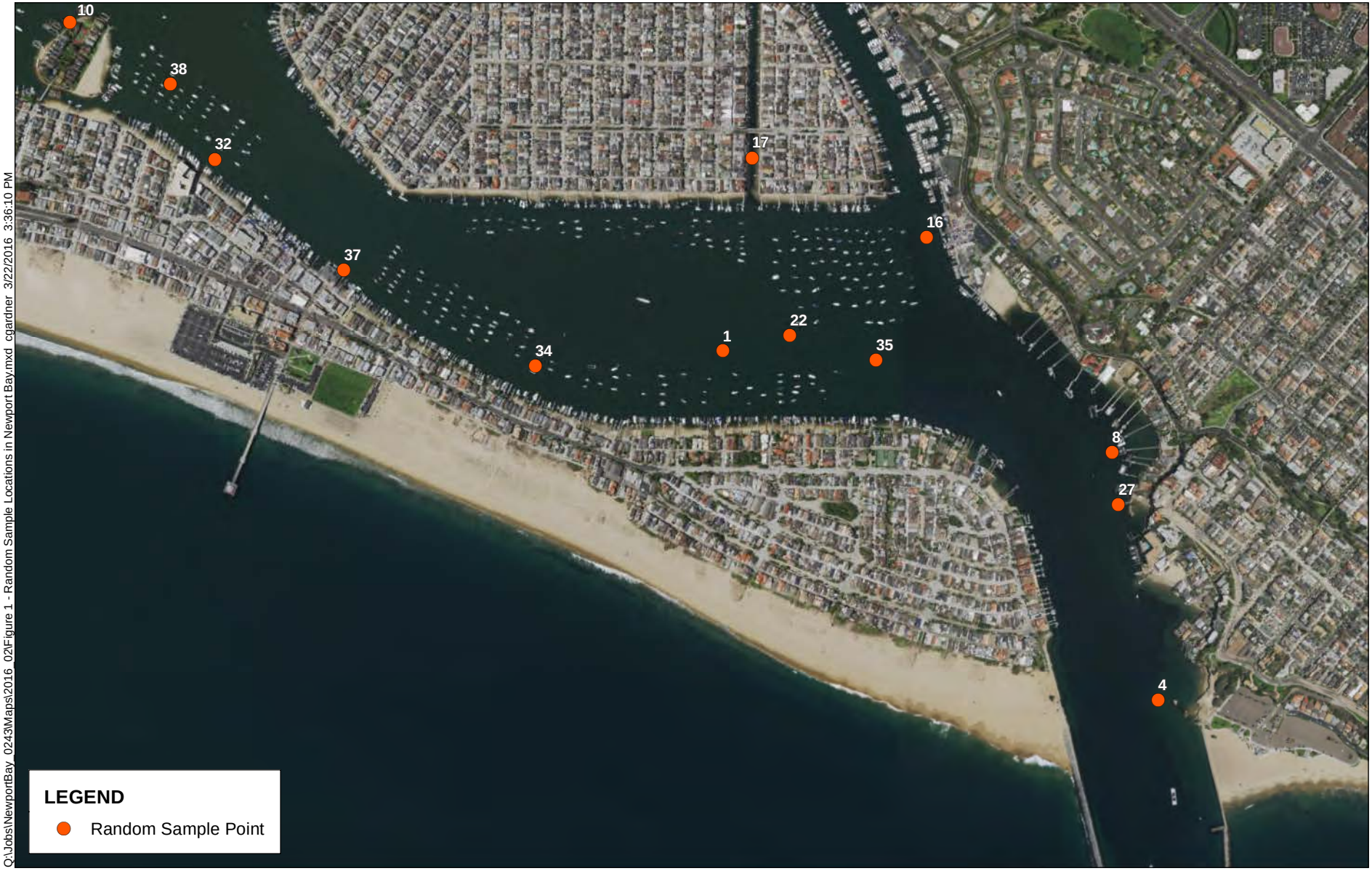

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Figure 1
Random Sample Locations
Frame 4 of 4
Newport Bay Copper Study
City of Newport Beach

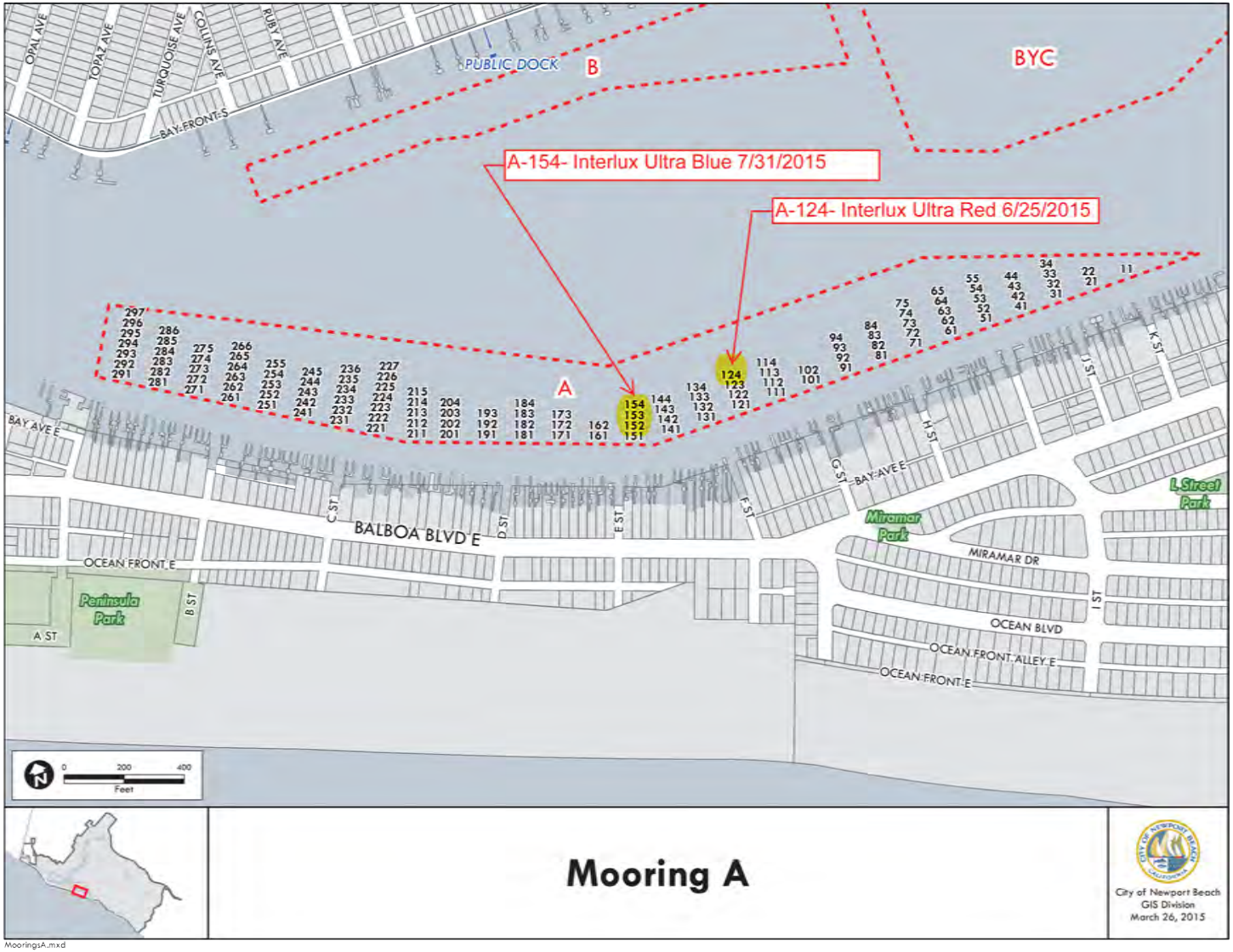

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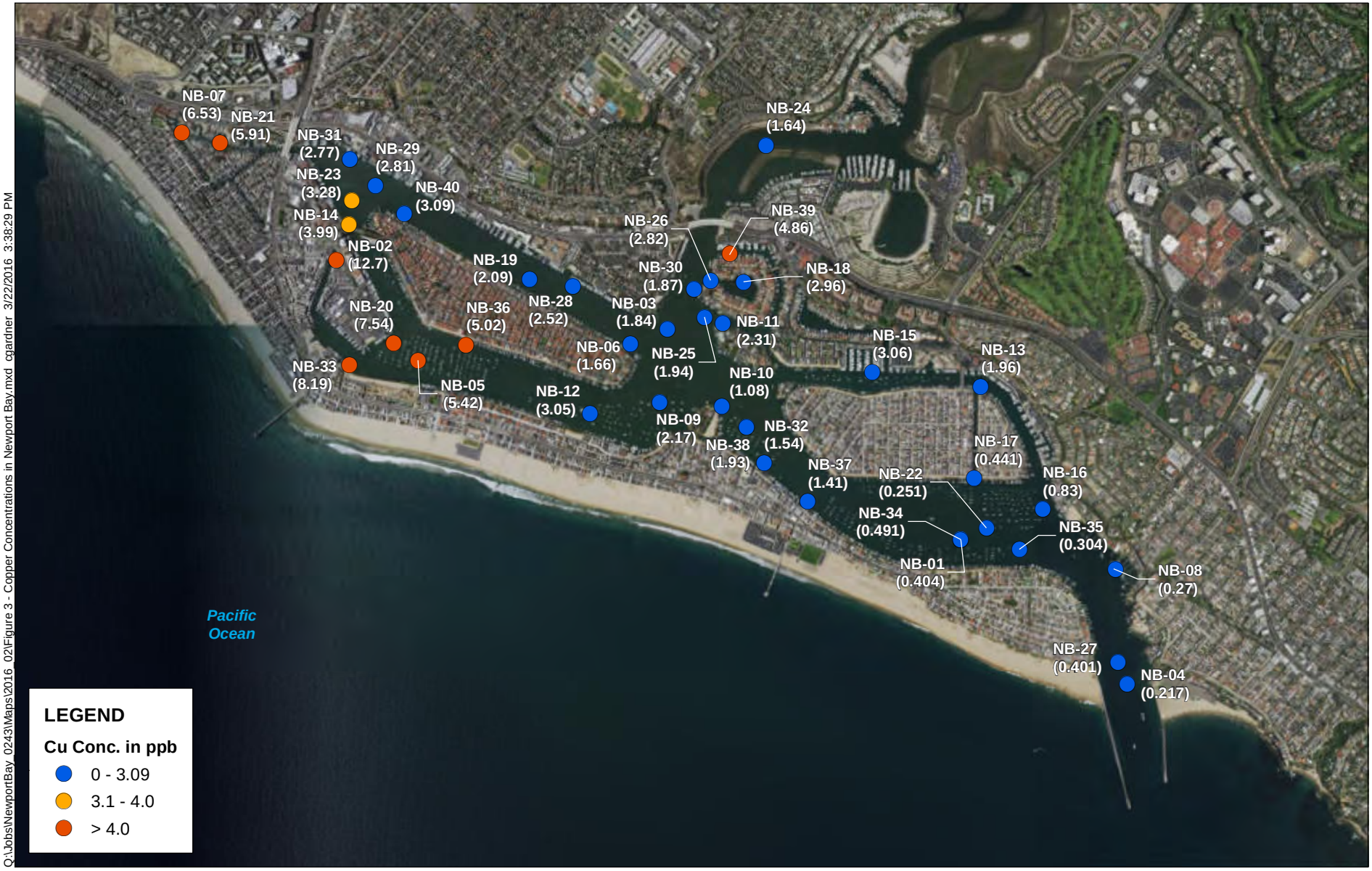
Figure 2
Focused Vessel Mooring Field
Newport Copper Study
City of Newport Beach



Q:\Jobs\NewportBay_0243\Maps\2016_02\Figure 3 - Copper Concentrations in Newport Bay.mxd cgardner 3/22/2016 3:38:29 PM

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Figure 3
Dissolved Copper Concentrations
Frame 1 of 4
Newport Bay Copper Study
City of Newport Beach

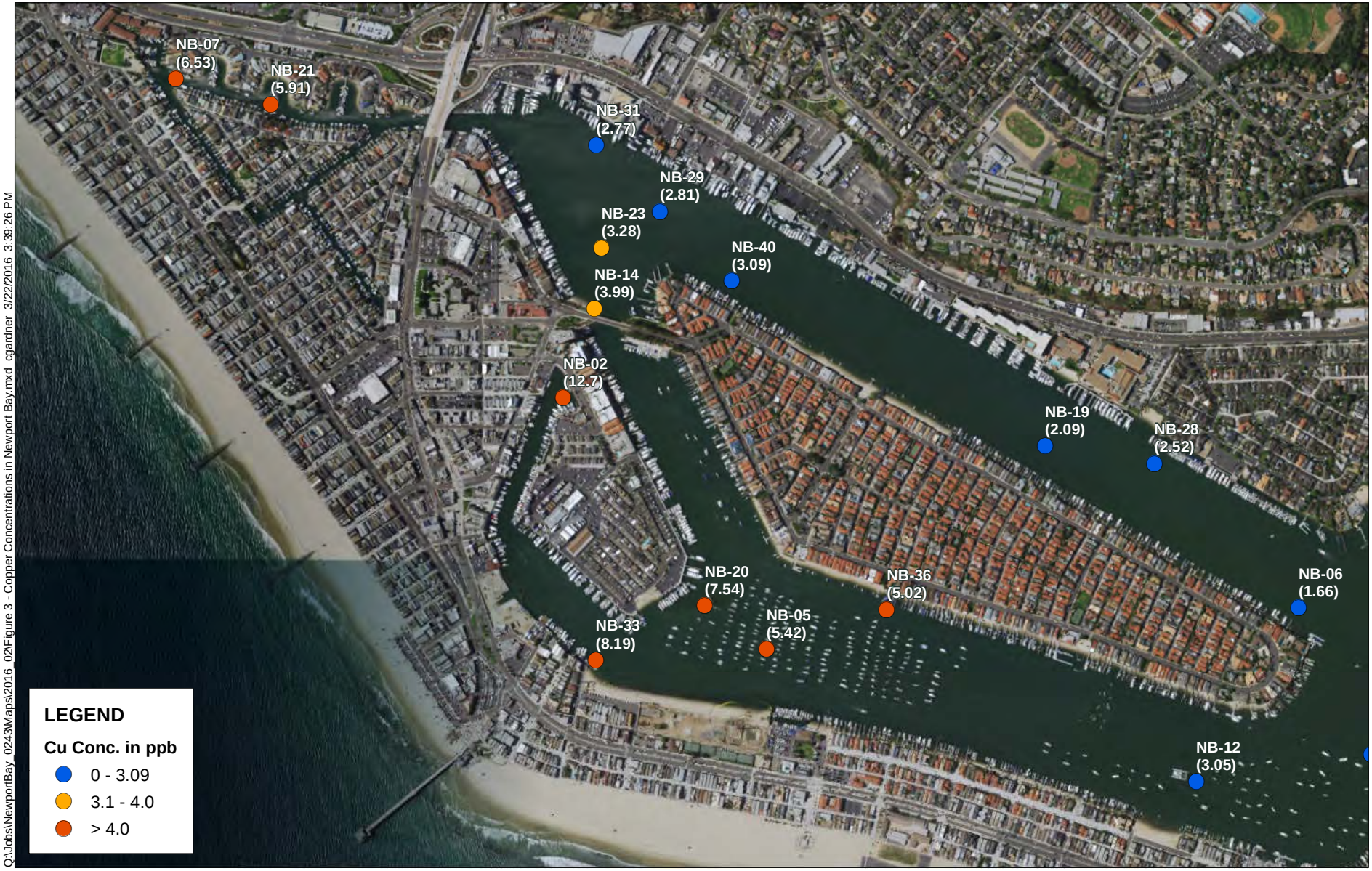

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Figure 3
Dissolved Copper Concentrations
Frame 2 of 4
Newport Bay Copper Study
City of Newport Beach

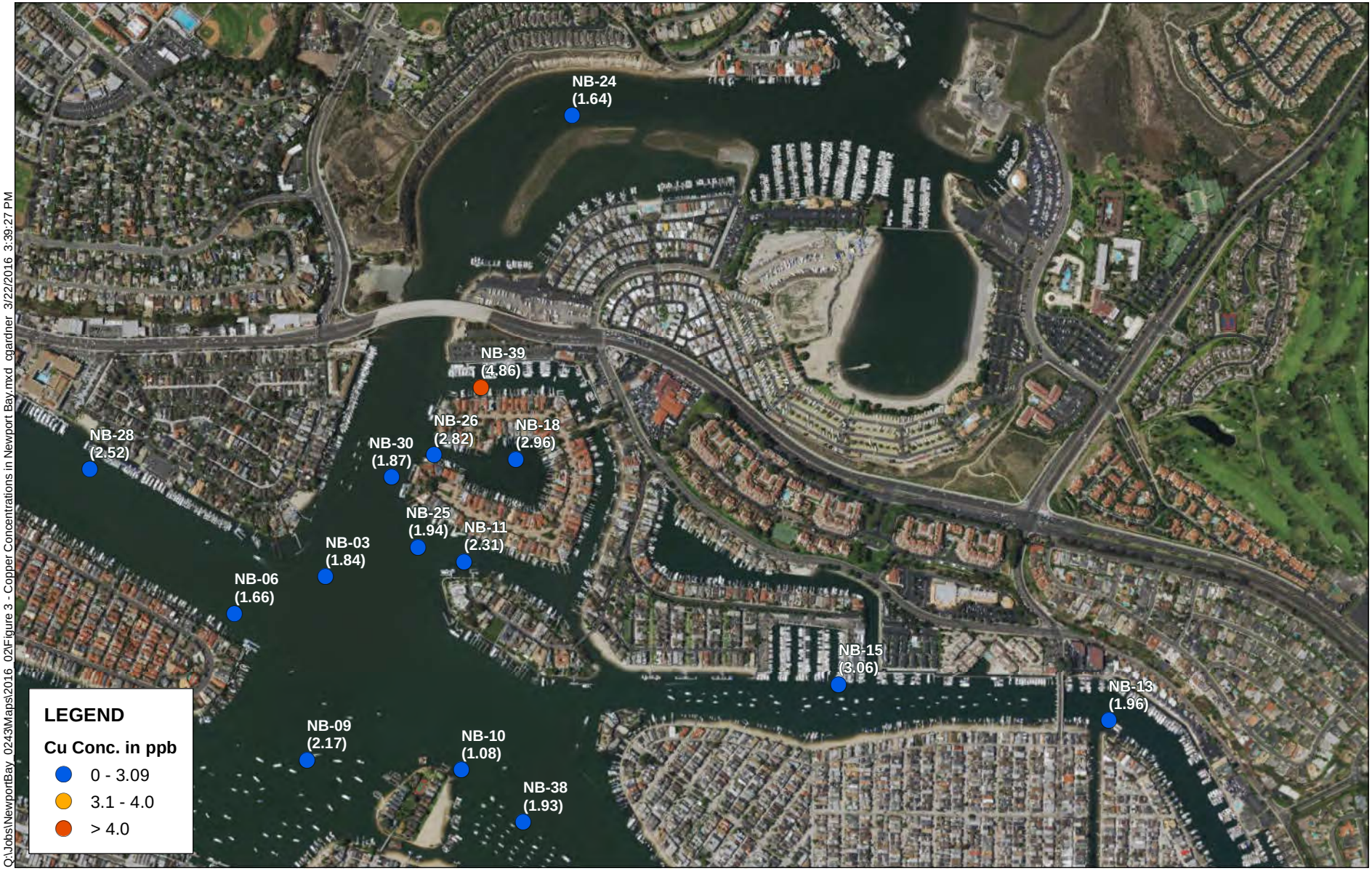

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Figure 3
Dissolved Copper Concentrations
Frame 3 of 4
Newport Bay Copper Study
City of Newport Beach

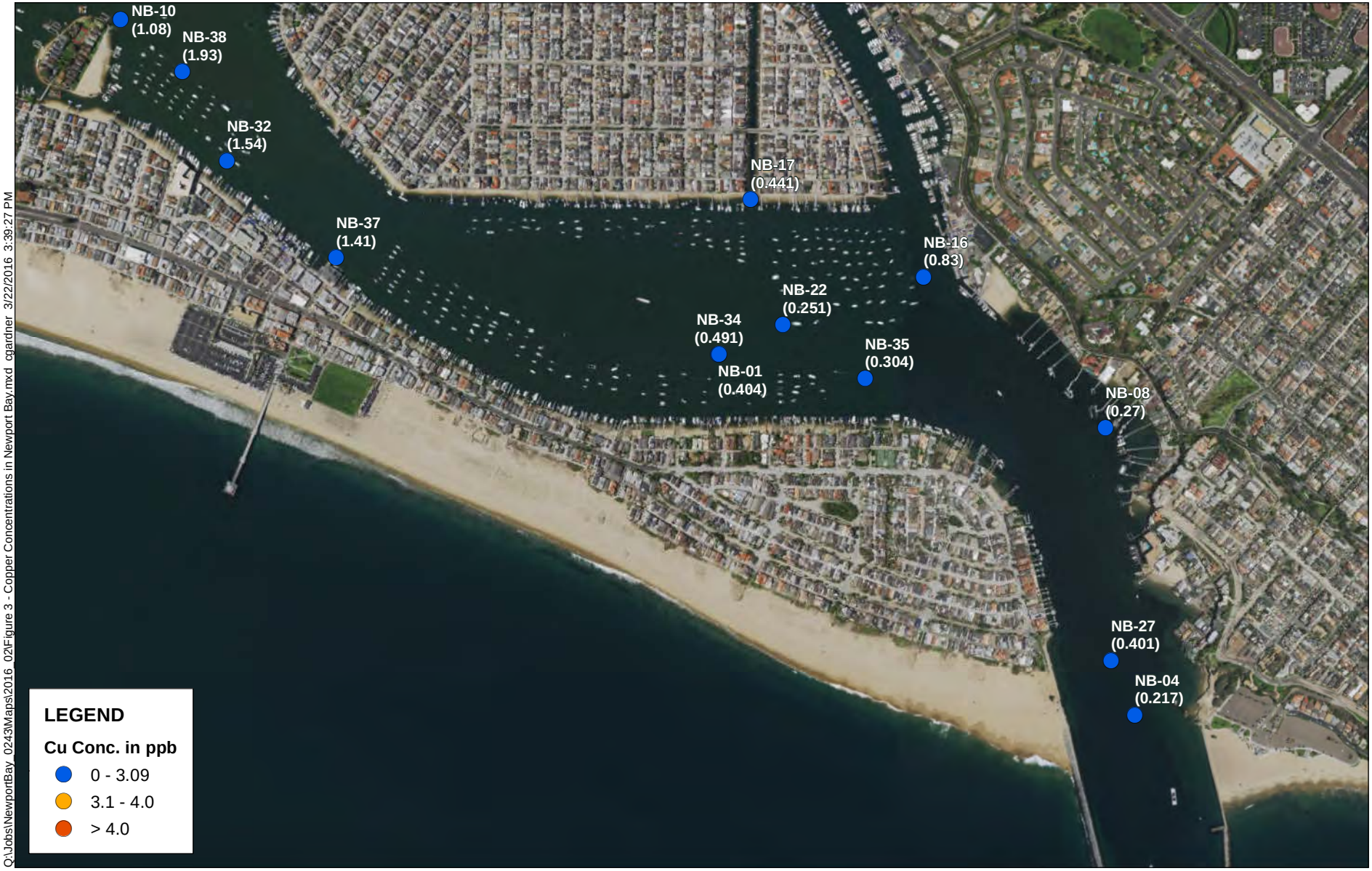

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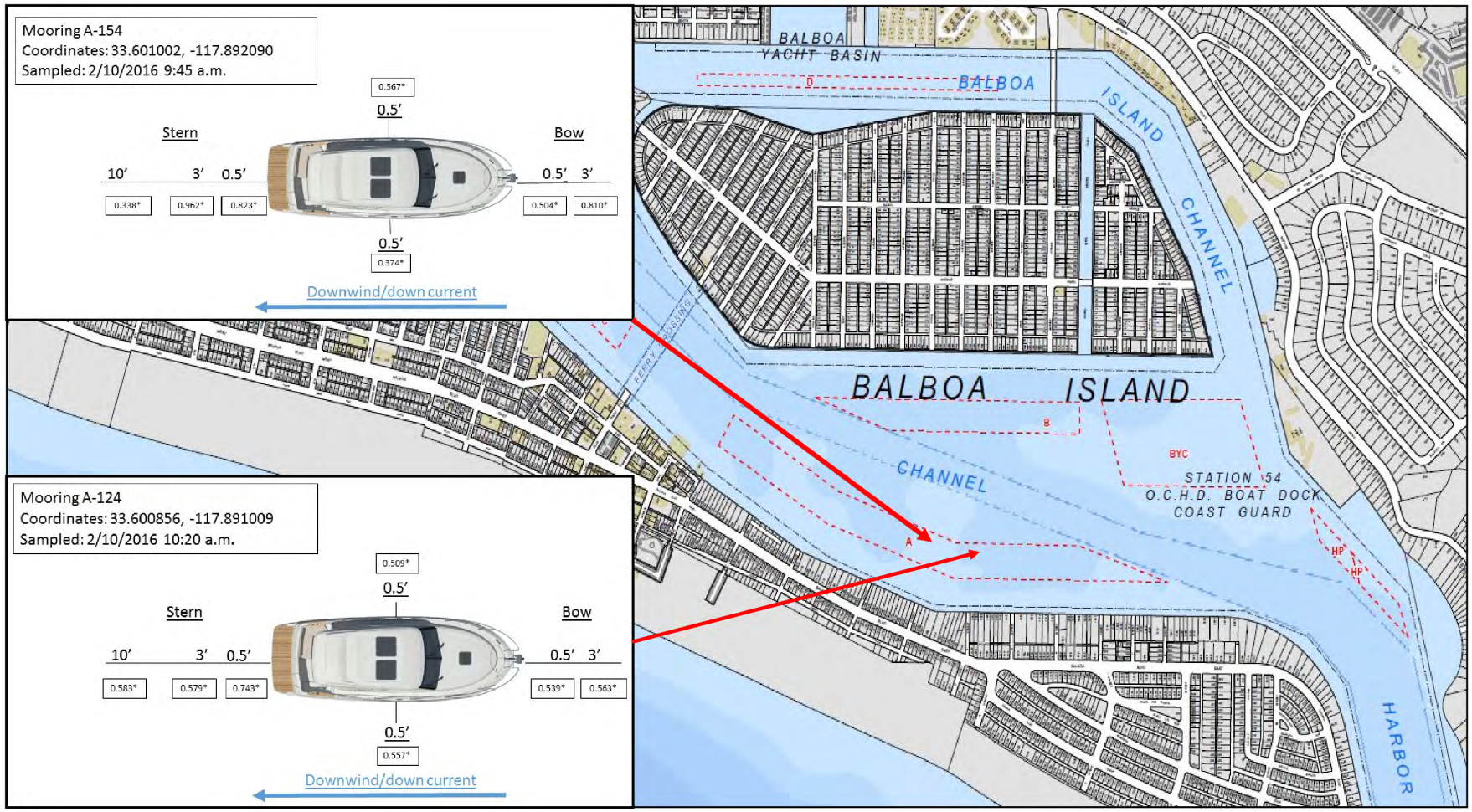
Figure 3
Dissolved Copper Concentrations
Frame 4 of 4
Newport Bay Copper Study
City of Newport Beach



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ANCHOR QEA

Figure 4
Focused Vessel Copper Concentrations
Newport Copper Study
City of Newport Beach

ATTACHMENT A
CHEMISTRY REPORTS

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WORK ORDER NUMBER: 16-02-0869

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: ANCHOR QEA, LLC

Client Project Name: Newport Bay Metals TMDL WQ

Attention: Chris Osuch
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691-8306

Kathleen M. Burney FOR

Approved for release on 02/22/2016 by:
Carla Hollowell
Project Manager

ResultLink

Email your PM

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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Work Order Number: 16-02-0869

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Work Order Narrative

Work Order: 16-02-0869 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 02/10/16. They were assigned to Work Order 16-02-0869.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

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Sample Summary

Client:	ANCHOR QEA, LLC 27201 Puerta Real, Suite 350 Mission Viejo, CA 92691-8306	Work Order:	16-02-0869
		Project Name:	Newport Bay Metals TMDL WQ
		PO Number:	
		Date/Time Received:	02/10/16 17:22
		Number of Containers:	34
Attn:	Chris Osuch		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
NB-22-021016	16-02-0869-1	02/10/16 11:51	1	Aqueous
NB-01-021016	16-02-0869-2	02/10/16 11:55	1	Aqueous
NB-34-021016	16-02-0869-3	02/10/16 12:02	1	Aqueous
NB-37-021016	16-02-0869-4	02/10/16 12:07	1	Aqueous
NB-32-021016	16-02-0869-5	02/10/16 12:20	1	Aqueous
NB-38-021016	16-02-0869-6	02/10/16 12:29	1	Aqueous
NB-15-021016	16-02-0869-7	02/10/16 13:42	1	Aqueous
NB-13-021016	16-02-0869-8	02/10/16 13:50	1	Aqueous
NB-39-021016	16-02-0869-9	02/10/16 14:30	2	Aqueous
NB-18-021016	16-02-0869-10	02/10/16 14:39	1	Aqueous
NB-RD124-01-021016	16-02-0869-11	02/10/16 10:20	1	Aqueous
NB-RD124-02-021016	16-02-0869-12	02/10/16 10:20	1	Aqueous
NB-RD124-03-021016	16-02-0869-13	02/10/16 10:20	1	Aqueous
NB-RD124-04-021016	16-02-0869-14	02/10/16 10:20	1	Aqueous
NB-RD124-05-021016	16-02-0869-15	02/10/16 10:20	1	Aqueous
NB-RD124-06-021016	16-02-0869-16	02/10/16 10:20	1	Aqueous
NB-RD124-07-021016	16-02-0869-17	02/10/16 10:20	1	Aqueous
NB-27-021016	16-02-0869-18	02/10/16 11:07	1	Aqueous
NB-08-021016	16-02-0869-19	02/10/16 11:20	1	Aqueous
NB-35-021016	16-02-0869-20	02/10/16 11:31	1	Aqueous
NB-24-021016	16-02-0869-21	02/10/16 08:22	2	Aqueous
NB-17-021016	16-02-0869-22	02/10/16 09:01	1	Aqueous
NB-04-021016	16-02-0869-23	02/10/16 09:25	1	Aqueous
NB-BL15401-021016	16-02-0869-24	02/10/16 09:45	1	Aqueous
NB-BL15402-021016	16-02-0869-25	02/10/16 09:45	1	Aqueous
NB-BL15403-021016	16-02-0869-26	02/10/16 09:45	1	Aqueous
NB-BL15404-021016	16-02-0869-27	02/10/16 09:45	1	Aqueous
NB-BL15405-021016	16-02-0869-28	02/10/16 09:45	1	Aqueous
NB-BL15406-021016	16-02-0869-29	02/10/16 09:45	1	Aqueous
NB-BL15407-021016	16-02-0869-30	02/10/16 09:45	1	Aqueous
NB-26-021016	16-02-0869-31	02/10/16 14:50	1	Aqueous

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 1 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-22-021016	**16-02-0869-1-A**	**02/10/16 11:51**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 19:59**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.251	0.0300	0.00898	1.00	

NB-01-021016	**16-02-0869-2-A**	**02/10/16 11:55**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:07**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.404	0.0300	0.00898	1.00	

NB-34-021016	**16-02-0869-3-A**	**02/10/16 12:02**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:15**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.491	0.0300	0.00898	1.00	

NB-37-021016	**16-02-0869-4-A**	**02/10/16 12:07**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:23**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.41	0.0300	0.00898	1.00	

NB-32-021016	**16-02-0869-5-A**	**02/10/16 12:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:30**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.54	0.0300	0.00898	1.00	

NB-38-021016	**16-02-0869-6-A**	**02/10/16 12:29**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:38**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.93	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 2 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-15-021016	**16-02-0869-7-A**	**02/10/16 13:42**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:46**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	3.06	0.0300	0.00898	1.00	

NB-13-021016	**16-02-0869-8-A**	**02/10/16 13:50**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 20:53**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.96	0.0300	0.00898	1.00	

NB-39-021016	**16-02-0869-9-A**	**02/10/16 14:30**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 06:15**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	4.86	0.0300	0.00898	1.00	

NB-18-021016	**16-02-0869-10-A**	**02/10/16 14:39**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 21:01**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.96	0.0300	0.00898	1.00	

NB-RD124-01-021016	**16-02-0869-11-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 21:40**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.509	0.0300	0.00898	1.00	

NB-RD124-02-021016	**16-02-0869-12-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 21:47**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.557	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 3 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-RD124-03-021016	**16-02-0869-13-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 21:55**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.539	0.0300	0.00898	1.00	

NB-RD124-04-021016	**16-02-0869-14-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:03**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.563	0.0300	0.00898	1.00	

NB-RD124-05-021016	**16-02-0869-15-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:10**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.743	0.0300	0.00898	1.00	

NB-RD124-06-021016	**16-02-0869-16-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:18**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.579	0.0300	0.00898	1.00	

NB-RD124-07-021016	**16-02-0869-17-A**	**02/10/16 10:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:26**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.583	0.0300	0.00898	1.00	

NB-27-021016	**16-02-0869-18-A**	**02/10/16 11:07**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:33**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.401	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 4 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-08-021016	**16-02-0869-19-A**	**02/10/16 11:20**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 22:41**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.270	0.0300	0.00898	1.00	

NB-35-021016	**16-02-0869-20-A**	**02/10/16 11:31**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:20**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.304	0.0300	0.00898	1.00	

NB-24-021016	**16-02-0869-21-A**	**02/10/16 08:22**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 06:23**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.64	0.0300	0.00898	1.00	

NB-17-021016	**16-02-0869-22-A**	**02/10/16 09:01**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:27**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.441	0.0300	0.00898	1.00	

NB-04-021016	**16-02-0869-23-A**	**02/10/16 09:25**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:35**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.217	0.0300	0.00898	1.00	

NB-BL15401-021016	**16-02-0869-24-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:43**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.567	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 5 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-BL15402-021016	**16-02-0869-25-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:50**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.374	0.0300	0.00898	1.00	

NB-BL15403-021016	**16-02-0869-26-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 23:58**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.504	0.0300	0.00898	1.00	

NB-BL15404-021016	**16-02-0869-27-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/12/16 00:06**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.810	0.0300	0.00898	1.00	

NB-BL15405-021016	**16-02-0869-28-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/12/16 00:13**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.823	0.0300	0.00898	1.00	

NB-BL15406-021016	**16-02-0869-29-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/12/16 00:21**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.962	0.0300	0.00898	1.00	

NB-BL15407-021016	**16-02-0869-30-A**	**02/10/16 09:45**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/12/16 01:00**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	0.338	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 6 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-26-021016	**16-02-0869-31-A**	**02/10/16 14:50**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/12/16 01:07**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.82	0.0300	0.00898	1.00	

Method Blank	**099-15-823-183**	**N/A**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 18:35**	**160211L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	ND	0.0300	0.00898	1.00	

Method Blank	**099-15-823-184**	**N/A**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 18:50**	**160211L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	ND	0.0300	0.00898	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
NB-39-021016	**Sample**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 06:15**	**160211S01**
NB-39-021016	**Matrix Spike**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 06:31**	**160211S01**
NB-39-021016	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 07:09**	**160211S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	4.857	0.5000	5.086	4X	5.586	4X	50-150	4X	0-20	Q

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
NB-24-021016	**Sample**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 06:23**	**160211S02**
NB-24-021016	**Matrix Spike**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 07:17**	**160211S02**
NB-24-021016	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/17/16 07:25**	**160211S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	1.644	0.5000	2.558	183	2.701	211	50-150	5	0-20	3

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-823-183	**LCS**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 19:05**	**160211L01F**
099-15-823-183	**LCSD**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 19:13**	**160211L01F**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	0.5000	0.5374	107	0.5279	106	70-130	2	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

ANCHOR QEA, LLC		Date Received:	02/10/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0869
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-823-184	**LCS**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 19:21**	**160211L02F**
099-15-823-184	**LCSD**	**Aqueous**	**ICP/MS 05**	**02/11/16**	**02/11/16 19:29**	**160211L02F**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	0.5000	0.5178	104	0.5230	105	70-130	1	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Glossary of Terms and Qualifiers

Work Order: 16-02-0869

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **16-02-0869**

DATE: 2/10/16

PAGE: 1 OF 4

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin, N. Kennedy

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:
Report down to the MDL
Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
1	NB-22-021016	2/10/16	1157	WAT	1	X			X	
2	NB-01-021016		1155		1	X			X	
3	NB-34-021016		1202		1	X			X	
4	NB-37-021016		~~1285~~ 1200		1	X			X	
5	NB-32-021016		1220		1	X			X	
6	NB-38-021016		1229		1	X			X	
7	NB-15-021016		1342		1	X			X	
8	NB-13-021016		1350		1	X			X	
9	NB-39-021016		1430		2	X			X	X
10	NB-1B-021016		1439		1	X			X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
N. Kennedy	[illegible]	2/10/16	1722
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 16-02-0869

DATE: 2/10/16

PAGE: 2 OF 4

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

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☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

Report down to the MDL

Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
11	NB-RD-BC124-01-021016	2/10/16	1020	WAT	1	X			X	
12	NB-RD-BC124-02-021016		1020		1	X			X	
13	NB-RD-BC124-03-021016		1020		1	X			X	
14	NB-RD-BC124-04-021016		1020		1	X			X	
15	NB-RD-BC124-05-021016		1020		1	X			X	
16	NB-RD-BC124-06-021016		1020		1	X			X	
17	NB-RD-BC124-07-021016		1020		1	X			X	
18	NB-27-021016		1107		1	X			X	
19	NB-08-021016		1120		1	X			X	
20	NB-35-021016		1131		1	X			X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature]	[signature]	2/10/16	1722
[signature] 2/10/16	[signature]		15 2/10/16

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 16-02-0869

DATE: 2/10/16

PAGE: ~~7~~ 3 OF ~~3~~ 4

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin, N. Kennedy

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☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☑ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:
Report down to the MDL
Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
21	NB-24-021016	2/10/16	0822	WAT	2				X	X
22	NB-17-021016	↓	0901	↓	1				X	
23	NB-04-021016		0925		1				X	
24	NB-BL15401-021016		0945		1				X	
25	NB-BL15402-021016		0945		1				X	
26	NB-BL15403-021016		0945		1				X	
27	NB-BL15404-021016		0945		1				X	
28	NB-BL15405-021016		0945		1				X	
29	NB-BL15406-021016		0945		1				X	
30	NB-BL15407-021016	↓	0945	↓	1				X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature]	[signature] CAL	2/10/16	1722
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 16-02-0869

DATE: 2/10/16

PAGE: 4 OF 4

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ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

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PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin, N. Kennedy

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☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

Report down to the MDL

Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
31	N13-26-021016	2/10/16	1456	WAT	1	Y			X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature]	[signature] EY	2/10/16	1722
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

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WORK ORDER NUMBER: 16-02- 0869

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Anchor QEA

DATE: 02 / 10 / 2016

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC4B (CF: +0.3°C); Temperature (w/o CF): 2.7 °C (w/ CF): 3.0 °C; ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

☐ Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: ☐ Air ☐ Filter

Checked by: 836

CUSTODY SEAL:

Cooler	☐ Present and Intact	☐ Present but Not Intact	☑ Not Present	☐ N/A	Checked by: 836
Sample(s)	☐ Present and Intact	☐ Present but Not Intact	☑ Not Present	☐ N/A	Checked by: 836

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Sampling date ☐ Sampling time ☐ Matrix ☐ Number of containers			
☐ No analysis requested ☐ Not relinquished ☐ No relinquished date ☐ No relinquished time			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☐	☑	☐
Sample container(s) intact and in good condition	☑	☐	☐
Proper containers for analyses requested	☑	☐	☐
Sufficient volume/mass for analyses requested	☑	☐	☐
Samples received within holding time	☑	☐	☐
Aqueous samples for certain analyses received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfide ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation chemical(s) noted on COC and/or sample container	☑	☐	☐
Unpreserved aqueous sample(s) received for certain analyses			
☐ Volatile Organics ☐ Total Metals ☐ Dissolved Metals			
Container(s) for certain analysis free of headspace	☐	☐	☑
☐ Volatile Organics ☐ Dissolved Gases (RSK-175) ☐ Dissolved Oxygen (SM 4500)			
☐ Carbon Dioxide (SM 4500) ☐ Ferrous Iron (SM 3500) ☐ Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE: (Trip Blank Lot Number: _____)

Aqueous: ☐ VOA ☐ VOA**h** ☐ VOA**na$_2$** ☐ 100PJ ☐ 100PJ**na$_2$** ☐ 125AGB ☐ 125AGB**h** ☐ 125AGB**p** ☐ 125PB ☐ 125PB**znna** ☐ 250AGB ☐ 250CGB ☐ 250CGB**s** ☑ 250PB ☐ 250PB**n** ☐ 500AGB ☐ 500AGJ ☐ 500AGJ**s** ☐ 500PB ☐ 1AGB ☐ 1AGB**na$_2$** ☐ 1AGB**s** ☐ 1PB ☐ 1PB**na** ☐ _____ ☐ _____ ☐ _____ ☐ _____

Solid: ☐ 4ozCGJ ☐ 8ozCGJ ☐ 16ozCGJ ☐ Sleeve (_____) ☐ EnCores® (_____) ☐ TerraCores® (_____) ☐ _____

Air: ☐ Tedlar™ ☐ Canister ☐ Sorbent Tube ☐ PUF ☐ _____ **Other Matrix** (_____): ☐ _____ ☐ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO_3, **na** = NaOH, **na$_2$** = $Na_2S_2O_3$, **p** = H_3PO_4, **s** = H_2SO_4, **u** = ultra-pure, **znna** = $Zn(CH_3CO_2)_2$ + NaOH

Labeled/Checked by: 836

Reviewed by: 1064

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WORK ORDER NUMBER: 16-02- 0809

SAMPLE ANOMALY REPORT

DATE: 02 / 10 / 2016

SAMPLES, CONTAINERS, AND LABELS:

- ☐ Sample(s) NOT RECEIVED but listed on COC
- ☑ Sample(s) received but NOT LISTED on COC
- ☐ Holding time expired (list client or ECI sample ID and analysis)
- ☐ Insufficient sample amount for requested analysis (list analysis)
- ☐ Improper container(s) used (list analysis)
- ☐ Improper preservative used (list analysis)
- ☐ No preservative noted on COC or label (list analysis and notify lab)
- ☐ Sample container(s) not labeled
- ☐ Client sample label(s) illegible (list container type and analysis)
- ☐ Client sample label(s) do not match COC (comment)
  - ☐ Project information
  - ☐ Client sample ID
  - ☐ Sampling date and/or time
  - ☐ Number of container(s)
  - ☐ Requested analysis
- ☐ Sample container(s) compromised (comment)
  - ☐ Broken
  - ☐ Water present in sample container
- ☐ Air sample container(s) compromised (comment)
  - ☐ Flat
  - ☐ Very low in volume
  - ☐ Leaking (not transferred; duplicate bag submitted)
  - ☐ Leaking (transferred into ECI Tedlar™ bags*)
  - ☐ Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

(-32) Received 1-250ml plastic container, labeled as WB-16-021016, 2/10/16@1139 (not on COC)

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments:

Reported by: 1054

Reviewed by: 836

** Record the total number of containers (i.e., vials or bottles) for the affected sample.

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WORK ORDER NUMBER: 16-02-0975

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: ANCHOR QEA, LLC

Client Project Name: Newport Bay Metals TMDL WQ

Attention: Chris Osuch
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691-8306

Approved for release on 02/24/2016 by:
Carla Hollowell
Project Manager

ResultLink

Email your PM

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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Work Order Number: 16-02-0975

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3 Client Sample Data. 5
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4 Quality Control Sample Data. 9
4.1 MS/MSD. 9
4.2 LCS/LCSD. 11

5 Glossary of Terms and Qualifiers. 13

6 Chain-of-Custody/Sample Receipt Form. 14

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Work Order Narrative

Work Order: 16-02-0975 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 02/11/16. They were assigned to Work Order 16-02-0975.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

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Sample Summary

Client:	ANCHOR QEA, LLC 27201 Puerta Real, Suite 350 Mission Viejo, CA 92691-8306	Work Order:	16-02-0975
		Project Name:	Newport Bay Metals TMDL WQ
		PO Number:	
		Date/Time Received:	02/11/16 14:34
		Number of Containers:	23
Attn:	Chris Osuch		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
NB-07-021116	16-02-0975-1	02/11/16 08:52	1	Aqueous
NB-21-021116	16-02-0975-2	02/11/16 08:58	1	Aqueous
NB-02-021116	16-02-0975-3	02/11/16 09:20	1	Aqueous
NB-33-021116	16-02-0975-4	02/11/16 09:30	1	Aqueous
NB-05-021116	16-02-0975-5	02/11/16 09:40	1	Aqueous
NB-20-021116	16-02-0975-6	02/11/16 09:49	1	Aqueous
NB-36-021116	16-02-0975-7	02/11/16 10:00	2	Aqueous
NB-14-021116	16-02-0975-8	02/11/16 10:10	1	Aqueous
NB-23-021116	16-02-0975-9	02/11/16 10:18	1	Aqueous
NB-31-021116	16-02-0975-10	02/11/16 10:33	1	Aqueous
NB-25-021116	16-02-0975-11	02/11/16 11:55	1	Aqueous
NB-11-021116	16-02-0975-12	02/11/16 12:00	1	Aqueous
NB-29-021116	16-02-0975-13	02/11/16 10:29	1	Aqueous
NB-40-021116	16-02-0975-14	02/11/16 10:40	1	Aqueous
NB-19-021116	16-02-0975-15	02/11/16 10:50	1	Aqueous
NB-28-021116	16-02-0975-16	02/11/16 10:52	1	Aqueous
NB-06-021116	16-02-0975-17	02/11/16 11:03	1	Aqueous
NB-03-021116	16-02-0975-18	02/11/16 11:07	1	Aqueous
NB-12-021116	16-02-0975-19	02/11/16 11:17	1	Aqueous
NB-09-021116	16-02-0975-20	02/11/16 11:25	1	Aqueous
NB-10-021116	16-02-0975-21	02/11/16 11:30	1	Aqueous
NB-30-021116	16-02-0975-22	02/11/16 11:49	1	Aqueous

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-07-021116	**16-02-0975-1-A**	**02/11/16 08:52**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 18:32**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	6.53	0.0300	0.00898	1.00	

NB-21-021116	**16-02-0975-2-A**	**02/11/16 08:58**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:10**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	5.91	0.0300	0.00898	1.00	

NB-02-021116	**16-02-0975-3-A**	**02/11/16 09:20**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:18**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	12.7	0.0300	0.00898	1.00	

NB-33-021116	**16-02-0975-4-A**	**02/11/16 09:30**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:26**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	8.19	0.0300	0.00898	1.00	

NB-05-021116	**16-02-0975-5-A**	**02/11/16 09:40**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:33**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	5.42	0.0300	0.00898	1.00	

NB-20-021116	**16-02-0975-6-A**	**02/11/16 09:49**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:41**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	7.54	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 2 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-36-021116	**16-02-0975-7-B**	**02/11/16 10:00**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 17:45**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	5.02	0.0300	0.00898	1.00	

NB-14-021116	**16-02-0975-8-A**	**02/11/16 10:10**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:49**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	3.99	0.0300	0.00898	1.00	

NB-23-021116	**16-02-0975-9-A**	**02/11/16 10:18**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 19:57**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	3.28	0.0300	0.00898	1.00	

NB-31-021116	**16-02-0975-10-A**	**02/11/16 10:33**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 20:04**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.77	0.0300	0.00898	1.00	

NB-25-021116	**16-02-0975-11-A**	**02/11/16 11:55**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 20:12**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.94	0.0300	0.00898	1.00	

NB-11-021116	**16-02-0975-12-A**	**02/11/16 12:00**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 00:27**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.31	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 3 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-29-021116	**16-02-0975-13-A**	**02/11/16 10:29**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 00:34**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.81	0.0300	0.00898	1.00	

NB-40-021116	**16-02-0975-14-A**	**02/11/16 10:40**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 00:42**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	3.09	0.0300	0.00898	1.00	

NB-19-021116	**16-02-0975-15-A**	**02/11/16 10:50**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:21**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.09	0.0300	0.00898	1.00	

NB-28-021116	**16-02-0975-16-A**	**02/11/16 10:52**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:29**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.52	0.0300	0.00898	1.00	

NB-06-021116	**16-02-0975-17-A**	**02/11/16 11:03**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:36**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.66	0.0300	0.00898	1.00	

NB-03-021116	**16-02-0975-18-A**	**02/11/16 11:07**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:44**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.84	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
		Units:	ug/L
Project: Newport Bay Metals TMDL WQ			Page 4 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
NB-12-021116	**16-02-0975-19-A**	**02/11/16 11:17**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:52**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	3.05	0.0300	0.00898	1.00	

NB-09-021116	**16-02-0975-20-A**	**02/11/16 11:25**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 01:59**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	2.17	0.0300	0.00898	1.00	

NB-10-021116	**16-02-0975-21-A**	**02/11/16 11:30**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 02:07**	**160217L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.08	0.0300	0.00898	1.00	

NB-30-021116	**16-02-0975-22-A**	**02/11/16 11:49**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/19/16 02:15**	**160217L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	1.87	0.0300	0.00898	1.00	

Method Blank	**099-15-823-188**	**N/A**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:05**	**160217L01F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	ND	0.0300	0.00898	1.00	

Method Blank	**099-15-823-187**	**N/A**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:20**	**160217L02F**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Copper	ND	0.0300	0.00898	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
16-02-1063-1	**Sample**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 17:38**	**160217S01**
16-02-1063-1	**Matrix Spike**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 17:53**	**160217S01**
16-02-1063-1	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 18:01**	**160217S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	1.789	0.5000	2.279	98	2.386	119	50-150	5	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
NB-36-021116	**Sample**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 17:45**	**160217S02**
NB-36-021116	**Matrix Spike**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 18:09**	**160217S02**
NB-36-021116	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 18:16**	**160217S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	5.020	0.5000	5.230	4X	5.430	4X	50-150	4X	0-20	Q

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-823-188	**LCS**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:28**	**160217L01F**
099-15-823-188	**LCSD**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:36**	**160217L01F**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	0.5000	0.5768	115	0.5827	117	70-130	1	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

ANCHOR QEA, LLC		Date Received:	02/11/16
27201 Puerta Real, Suite 350		Work Order:	16-02-0975
Mission Viejo, CA 92691-8306		Preparation:	EPA 3005A Filt.
		Method:	EPA 1640
Project: Newport Bay Metals TMDL WQ			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-823-187	**LCS**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:44**	**160217L02F**
099-15-823-187	**LCSD**	**Aqueous**	**ICP/MS 05**	**02/17/16**	**02/18/16 16:51**	**160217L02F**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Copper	0.5000	0.5802	116	0.5394	108	70-130	7	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Glossary of Terms and Qualifiers

Work Order: 16-02-0975

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **16-02-0975**

DATE: 2/11/16

PAGE: 1 OF 3

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin, N. Kennedy

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:
Report down to the MDL
Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
1	NB-07-021116	2/11/16	0852	WAT	1				X	
2	NB-21-021116		0858		1				X	
3	NB-02-021116		0920		1				X	
4	NB-33-021116		0930		1				X	
5	NB-05-021116		0940		1				X	
6	NB-20-021116		0949		1				X	
7	NB-30-021116		1000		2				X	X
8	NB-14-021116		1010		1				X	
9	NB-23-021116		1018		1				X	
10	NB-31-021116		1033		1				X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
N Kennedy	EEI	2/10/16 11 AM	1345
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
	ECL	021116	1434
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

06/02/14 Revision

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 6-02-0975

DATE: 2/11/16

PAGE: 2 OF 3

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin K. Kennedy

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

Report down to the MDL

Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
11	NB-25-021116	2/11/16	1155	WAT	1				X	
12	NB-11-021116	↓	1200	↓	1				X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
K Kennedy	[illegible] ECI	2/11/16	1345
[illegible]	[illegible] ECI	021116	1434

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 16-02-0975

DATE: 2/11/16

PAGE: 3 OF 3

LABORATORY CLIENT: Anchor QEA

ADDRESS: 27201 Puerta Real, Suite 350

CITY: Mission Viejo STATE: CA ZIP: 92691

TEL: 949.347.2780 E-MAIL: cosuch@anchorqea.com

CLIENT PROJECT NAME / NUMBER: Newport Bay Metals TMDL WQ

P.O. NO.: 150243-01.04

PROJECT CONTACT: Chris Osuch

SAMPLER(S): (PRINT) C. Dolphin, K. Kennedy

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

Report down to the MDL

Filter at laboratory upon receipt

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	EPA 1640 Dissolved Cu	MS/MSD
13	NB-29-021116	2/11/16	1029	WAT	1				X	
14	NB-40-021116		1040		1				X	
15	NB-19-021116		1050		1				X	
16	NB-28-021116		1052		1				X	
17	NB-04-021116		1103		1				X	
18	NB-03-021116		1107		1				X	
19	NB-12-021116		1117		1				X	
20	NB-09-021116		1125		1				X	
21	NB-10-021116		1130		1				X	
22	NB-30-021116		1149		1				X	

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
K. Kennedy	Abe Leyva ECI	2/11/16	1845
Abe Leyva	ECI	021116	1434

06/02/14 Revision

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WORK ORDER NUMBER: 16-02- 0975

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: ANCHOR QEA

DATE: 02 / 11 / 2016

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC4B (CF: +0.3°C); Temperature (w/o CF): 3-8 °C (w/ CF): 4.1 °C; ☒ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

☐ Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: ☐ Air ☐ Filter Checked by: 678

CUSTODY SEAL:

Cooler	☐ Present and Intact	☐ Present but Not Intact	☒ Not Present	☐ N/A	Checked by: 678
Sample(s)	☐ Present and Intact	☐ Present but Not Intact	☒ Not Present	☐ N/A	Checked by: 1054

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	☒	☐	☐
COC document(s) received complete	☒	☐	☐
☐ Sampling date ☐ Sampling time ☐ Matrix ☐ Number of containers			
☐ No analysis requested ☐ Not relinquished ☐ No relinquished date ☐ No relinquished time			
Sampler's name indicated on COC	☒	☐	☐
Sample container label(s) consistent with COC	☒	☐	☐
Sample container(s) intact and in good condition	☒	☐	☐
Proper containers for analyses requested	☒	☐	☐
Sufficient volume/mass for analyses requested	☒	☐	☐
Samples received within holding time	☒	☐	☐
Aqueous samples for certain analyses received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfide ☐ Dissolved Oxygen	☐	☐	☒
Proper preservation chemical(s) noted on COC and/or sample container	☒	☐	☐
Unpreserved aqueous sample(s) received for certain analyses			
☐ Volatile Organics ☐ Total Metals ☒ Dissolved Metals			
Container(s) for certain analysis free of headspace	☐	☐	☒
☐ Volatile Organics ☐ Dissolved Gases (RSK-175) ☐ Dissolved Oxygen (SM 4500)			
☐ Carbon Dioxide (SM 4500) ☐ Ferrous Iron (SM 3500) ☐ Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	☐	☐	☒

CONTAINER TYPE: **(Trip Blank Lot Number:** _____**)**

Aqueous: ☐ VOA ☐ VOA**h** ☐ VOA**na$_2$** ☐ 100PJ ☐ 100PJ**na$_2$** ☐ 125AGB ☐ 125AGB**h** ☐ 125AGB**p** ☐ 125PB

☐ 125PB**znna** ☐ 250AGB ☐ 250CGB ☐ 250CGB**s** ☒ 250PB ☐ 250PB**n** ☐ 500AGB ☐ 500AGJ ☐ 500AGJ**s**

☐ 500PB ☐ 1AGB ☐ 1AGB**na$_2$** ☐ 1AGB**s** ☐ 1PB ☐ 1PB**na** ☐ _____ ☐ _____ ☐ _____ ☐ _____

Solid: ☐ 4ozCGJ ☐ 8ozCGJ ☐ 16ozCGJ ☐ Sleeve (_____) ☐ EnCores® (_____) ☐ TerraCores® (_____) ☐ _____

Air: ☐ Tedlar™ ☐ Canister ☐ Sorbent Tube ☐ PUF ☐ _____ **Other Matrix** (_____): ☐ _____ ☐ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO_3, **na** = NaOH, **na$_2$** = $Na_2S_2O_3$, **p** = H_3PO_4, **s** = H_2SO_4, **u** = ultra-pure, **znna** = $Zn(CH_3CO_2)_2$ + NaOH

Labeled/Checked by: 1054

Reviewed by: 836

Return to Contents

Analytical Resources, Incorporated
Analytical Chemists and Consultants

March 15, 2016

Chris Osuch
Anchor QEA
350 Puerta Real, Suite 350
Mission Viejo, CA 92691

RE: Project: Newport Bay Metals TMDL WQ, 150243-01.04
ARI Job No.: AWS3

Dear Mr. Osuch:

Please find enclosed the Chain of Custody records (COCs), sample receipt documentation, and the final results for samples the project referenced above. Ten water samples were removed from archive and logged under ARI job AWS3. For details regarding sample receipt, please refer to the enclosed Cooler Receipt Forms.

The samples were analyzed for dissolved organic carbon, per email request.

One filter blank analyzed on February 29, 2016 had a result greater than the reporting limit due to carry-over from previously analyzed contaminated samples. No filter blank volume remained for analysis. Sample results associated with this filter blank were re-analyzed on March 3, 2016. All data have been reported as is. No corrective action was taken.

There were no other anomalies associated with the analysis of these samples.

An electronic copy of this package will remain on file with ARI. Should you have any questions or problems, please feel free to contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

cc: eFile: AWS3

Enclosures

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Subject: Newport Bay DOC Samples
From: Claire Dolphin <cdolphin@anchorqea.com>
Date: 2/26/2016 10:07 AM
To: "cheronneo@arilabs.com" <cheronneo@arilabs.com>
CC: Cindy Fields <cfields@anchorqea.com>, Chris Osuch <cosuch@anchorqea.com>

Hi Cheronne,
As mentioned on the phone, we are ready to run the DOC analyses on the samples shipped to you two weeks ago. We will only run 10 of the samples and those are:
NB-2-021116
NB-5-021116
NB-7-021116
NB-14-021116
NB-20-021116
NB-21-021116
NB-23-021116
NB-33-021116
NB-36-021116
NB-39-021016
Please also run the MS/MSD on station 39, and hold on to the rest of the samples.
Feel free to reach out with any questions.
Thank you,
Claire

Claire Dolphin
Environmental Scientist

ANCHOR QEA, LLC
cdolphin@anchorqea.com
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691
T 949.347.2780
D 949.334.9615

ANCHOR QEA, LLC
www.anchorqea.com
Please consider the environment before printing this email.
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AWS3 : 00002

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: AVZ1	Turn-around Requested:
ARI Client Company: Anchor QEA, LLC	Phone: 949-347-2780
Client Contact: Chris Osuch 350 Puerta Real Suite 350, Mission Viejo, CA 92691	
Client Project Name: Newport Bay Metals TMDL WQ	
Client Project #: 150243-01.04	Samplers:

Date: 2/11/14

Page: 1 of 3

No. of Coolers: 1 Cooler Temps: 4.3°C

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	DOC	MS/MSD							Notes/Comments
NB-07-021116	2/11/14	0852	WAT	1	X								
NB-21-021116		0855		1	X								
NB-02-021116		0920		1	X								
NB-33-021116		0930		1	X								
NB-05-021116		0940		1	X								
NB-20-021116		0949		1	X								
NB-36-021116		1000		2	X	X							
NB-14-021116		1010		1	X								
NB-23-021116		1018		1	X								
NB-31-021116		1033		1	X								

Comments/Special Instructions

Filter and preserve upon receipt, then withhold from analysis until further notice

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Nick Kennedy	Printed Name: Tyler Rankin	Printed Name:	Printed Name:
Company: Anchor QEA	Company: ARI	Company:	Company:
Date & Time: 2/11/14 1230	Date & Time: 2-12-16 1535	Date & Time:	Date & Time:

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

AWS3 : 55555

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested:
ARI Client Company: Anchor QEA, LLC	Phone: 949-347-2780
Client Contact: Chris Osuch 350 Puerta Real Suite 350, Mission Viejo, CA 92691	
Client Project Name: Newport Bay Metals TMDL WQ	
Client Project #: 150243-01.04	Samplers:

Date: 2/11/16
Page: 2 of 3
No. of Coolers: 1 Cooler Temps: 4.3°C

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	DOC	MS/MSD							Notes/Comments
NB-29-021116	2/11/16	1029	WAT	1	X								
NB 40-021116		1040		1	X								
NB-19-021116		1050		1	X								
NB-28-021116		1052		1	X								
NB-06-021116		1103		1	X								
NB-03-021116		1107		1	X								
NB-12-021116		1117		1	X								
NB-09-021116		1125		1	X								
NB-10-021116		1130		1	X								
NB-30-021116		1149		1	X								

Comments/Special Instructions
Filter and preserve upon receipt, then withhold from analysis until further notice

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Nick Kennedy	Printed Name: Tyler Rankin	Printed Name:	Printed Name:
Company: Anchor QEA	Company: ARI	Company:	Company:
Date & Time: 2/11/16	Date & Time: 2-12-16 1535	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

AMS3 00001

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested:
ARI Client Company: Anchor QEA, LLC	Phone: 949-347-2780
Client Contact: Chris Osuch	350 Puerta Real Suite 350, Mission Viejo, CA 92691
Client Project Name: Newport Bay Metals TMDL WQ	
Client Project #: 150243-01.04	Samplers:

Date: 2/11/16
Page: 3 of 3
No. of Coolers: 1 Cooler Temps: 4.3°C

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	DOC	MS/MSD							Notes/Comments
NB-25-021116	2/11/16	1155	WAT	1	1								
NB-11-021116	2/11/16	1200	WAT	1	1								

Analysis Requested

Comments/Special Instructions
Filter and preserve upon receipt, then withhold from analysis until further notice

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
Printed Name: Nick Kennedy	Printed Name: Tyler Rankin	Printed Name:	Printed Name:
Company: Anchor QEA	Company: ARI	Company:	Company:
Date & Time: 2/11/16 1230	Date & Time: 2-12-16 1535	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

AWS3 : 00005

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anchor

COC No(s): _____ (NA)

Assigned ARI Job No: AVZI

Project Name: Newport Bay Metals

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: 8726 7209 7896 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 4-3 ___ ___ ___ ___
Time: _____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005276

Cooler Accepted by: TR Date: 2-12-16 Time: 1535

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? ... (Bubble Wrap) (Wet Ice) (Gel Packs) Baggies Foam Block Paper Other: _____			
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
Were all bottles sealed in individual plastic bags?		YES	(NO)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	NA	* (YES)	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: AV Date: 2/12/16 Time: 1605

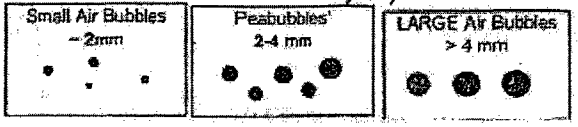
***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

Taken to Conventionals to be filtered into preserved bottles.
2/12/16 @ 1605 NB-07-021116 lid received cracked, no sample volume lost.

By: AV Date: 2/12/16



Small → "sm" (< 2 mm)	
Peabubbles → "pb" (2 to < 4 mm)	
Large → "lg" (4 to < 6 mm)	
Headspace → "hs" (> 6 mm)	

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: AVV3	Turn-around Requested:
ARI Client Company: Anchor QEA, LLC	Phone: 949-347-2780
Client Contact: Chris Osuch 350 Puerta Real Suite 350, Mission Viejo, CA 92691	
Client Project Name: Newport Bay Metals TMDL WQ	
Client Project #: 150243-01.04	Samplers:

Date: 2/10/16

Page: 3 of 4

No. of Coolers: Cooler Temps:

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	DOC	MS/MSD							Notes/Comments
N13-35-021016	2/10/16	1131	WAT	1	X								
N13-16-021016		1139		1	X								
N13-22-021016		1151		1	X								
N13-01-021016		1155		1	X								
N13-34-021016		1202		1	X								
N13-37-021016		1205		1	X								
N13-32-021016		1220		1	X								
N13-38-021016		1225		1	X								
N13-15-021016		1342		1	X								
N13-13-021016		1350		1	X								

Comments/Special Instructions
Filter and preserve upon receipt, then withhold from analysis until further notice

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Nick Kennedy	Printed Name: Francisco G	Printed Name:	Printed Name:
Company: Anchor QEA	Company: ARI	Company:	Company:
Date & Time: 2/10/16 1520	Date & Time: 02/11/2016 10:15	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

AWS3 : 000001

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: AVV3	Turn-around Requested:
ARI Client Company: Anchor QEA, LLC	Phone: 949-347-2780
Client Contact: Chris Osuch 350 Puerta Real Suite 350, Mission Viejo, CA 92691	
Client Project Name: Newport Bay Metals TMDL WQ	
Client Project #: 150243-01.04	Samplers:

Date: 2/10/16
Page: 4 of 4
No. of Coolers: Cooler Temps:

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	DOC	MS/MSD							Notes/Comments
NB-39-021016	2/10/16	1430	WAT	2	X	X							
NB-18-021016		1439		1	X								
NB-26-021016		1450		1	X								
NB-													

Comments/Special Instructions
Filter and preserve upon receipt, then withhold from analysis until further notice

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)	(Signature)	(Signature)	(Signature)
Printed Name: Nick Kennedy	Printed Name: Francisco	Printed Name:	Printed Name:
Company: Anchor QEA	Company: ARI	Company:	Company:
Date & Time: 2/10/16 1520	Date & Time: 02/11/2016 10:15	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

AVS3 : 000008

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Anchor

COC No(s): _____ NA

Assigned ARI Job No: AVV3

Project Name: Newport Bay Metals TMDL WQ

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: 0200 8726 7209 7889 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 4.1

Time: 1015

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D0052 76

Cooler Accepted by: Francisco Date: 02/11/2016 Time: 10:15

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA	_____	

Was Sample Split by ARI: NA YES Date/Time: _____ Equipment: _____ Split by: _____

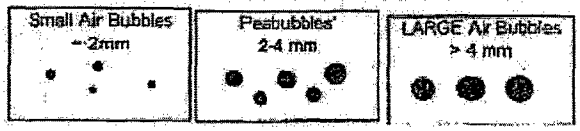
Samples Logged by: TR Date: 2-11-16 Time: 1431

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:



Small → "sm"	(< 2 mm)
Peabubbles → "pb"	(2 to < 4 mm)
Large → "lg"	(4 to < 6 mm)
Headspace → "hs"	(> 6 mm)

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Conventionals Laboratory Analyst Notes

ARI Job No.: AVV1, AVV3, AVZ1

Client ID:

Parameter: DOC

Client Project:

List problems, concerns, corrective actions and any other pertinent information
All samples filtered and preserved w 0.5ml 9N H_2SO_4 to pH <2.0 and filter blanks. Samples returned to login for Holding.

Analyst Initials:	CPK	Date:	2-15-16

6147F

Revision 007
6/11/10

AW53 : 00010

PRESERVATION VERIFICATION 02/29/16
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **AWS3**

PC: Cheronne
VTSR: 02/12/16

Inquiry Number: NONE
Analysis Requested: 02/29/16
Contact: Osuch, Chris
Client: Anchor QEA, LLC
Logged by: TR
Sample Set Used: Yes-481
Validatable Package: LV4
Deliverables:

Project #: 150243-01.04
Project: Newport Bay Metals TMDL WQ
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	~~TOC~~ DOC* <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
16-3203 **AWS3A**	NB-39-021016											P					Y*					
16-3204 **AWS3B**	NB-07-021116											P										
16-3205 **AWS3C**	NB-21-021116											P										
16-3206 **AWS3D**	NB-02-021116											P										
16-3207 **AWS3E**	NB-33-021116											P										
16-3208 **AWS3F**	NB-05-021116											P										
16-3209 **AWS3G**	NB-20-021116											P										
16-3210 **AWS3H**	NB-36-021116											P										
16-3211 **AWS3I**	NB-14-021116											P										
16-3212 **AWS3J**	NB-23-021116											P										

P=pass

*2-29-16 CRL

Checked By TR Date 2-29-16

AWS3 0001

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: AWS3
Client: Anchor QEA, LLC
Project Event: 150243-01.04
Project Name: Newport Bay Metals TMDL WQ

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	NB-39-021016	AWS3A	16-3203	Water	02/10/16 14:30	02/12/16 15:35
2.	NB-07-021116	AWS3B	16-3204	Water	02/11/16 08:52	02/12/16 15:35
3.	NB-21-021116	AWS3C	16-3205	Water	02/11/16 08:58	02/12/16 15:35
4.	NB-02-021116	AWS3D	16-3206	Water	02/11/16 09:20	02/12/16 15:35
5.	NB-33-021116	AWS3E	16-3207	Water	02/11/16 09:30	02/12/16 15:35
6.	NB-05-021116	AWS3F	16-3208	Water	02/11/16 09:40	02/12/16 15:35
7.	NB-20-021116	AWS3G	16-3209	Water	02/11/16 09:49	02/12/16 15:35
8.	NB-36-021116	AWS3H	16-3210	Water	02/11/16 10:00	02/12/16 15:35
9.	NB-14-021116	AWS3I	16-3211	Water	02/11/16 10:10	02/12/16 15:35
10.	NB-23-021116	AWS3J	16-3212	Water	02/11/16 10:18	02/12/16 15:35

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 2/14/2011

Inorganic Data

U — Indicates that the target analyte was not detected at the reported concentration

* — Duplicate RPD is not within established control limits

B — Reported value is less than the CRDL but ≥ the Reporting Limit

N — Matrix Spike recovery not within established control limits

NA — Not Applicable, analyte not spiked

H — The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L — Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U — Indicates that the target analyte was not detected at the reported concentration

* — Flagged value is not within established control limits

B — Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J — Estimated concentration when the value is less than ARI's established reporting limits

D — The spiked compound was not detected due to sample extract dilution

E — Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q — Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

AWS3 : 00013

S — Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA — The flagged analyte was not analyzed for

NR — Spiked compound recovery is not reported due to chromatographic interference

NS — The flagged analyte was not spiked into the sample

M — Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

M2 — The sample contains PCB congeners that do not match any standard Aroclor pattern. The PCBs are identified and quantified as the Aroclor whose pattern most closely matches that of the sample. The reported value is an estimate.

N — The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y — The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC — Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C — The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P — The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X — Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z — Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

AWS3:00015

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: WDC
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/10/16
Date Received: 02/12/16

Client ID: NB-39-021016
ARI ID: 16-3203 AWS3A

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	03/03/16 030316#1	EPA 9060	mg/L	1.00	1.67

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: CDG
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-07-021116
ARI ID: 16-3204 AWS3B

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	1.51

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: WDC
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-21-021116
ARI ID: 16-3205 AWS3C

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.10

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: ava
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-02-021116
ARI ID: 16-3206 AWS3D

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.11

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: CDL
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-33-021116
ARI ID: 16-3207 AWS3E

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	1.54

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: ASL
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-05-021116
ARI ID: 16-3208 AWS3F

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.20

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: CAS
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-20-021116
ARI ID: 16-3209 AWS3G

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.10

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: ak
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-36-021116
ARI ID: 16-3210 AWS3H

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	1.44

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: WCh
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-14-021116
ARI ID: 16-3211 AWS3I

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.24

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: CDL
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/11/16
Date Received: 02/12/16

Client ID: NB-23-021116
ARI ID: 16-3212 AWS3J

Analyte	Date Batch	Method	Units	RL	Sample
Dissolved Organic Carbon	02/29/16 022916#1	EPA 9060	mg/L	1.00	2.06

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/10/16
Date Received: 02/12/16

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: AWS3A Client ID: NB-39-021016							
Dissolved Organic Carbon	EPA 9060	03/03/16	mg/L	1.67	20.5	20.0	94.2%
ARI ID: AWS3H Client ID: NB-36-021116							
Dissolved Organic Carbon	EPA 9060	02/29/16	mg/L	1.44	21.2	20.0	98.8%

REPLICATE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: WL
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: 02/10/16
Date Received: 02/12/16

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: AWS3A Client ID: NB-39-021016						
Dissolved Organic Carbo	EPA 9060	03/03/16	mg/L	1.67	1.49	11.4%
ARI ID: AWS3H Client ID: NB-36-021116						
Dissolved Organic Carbo	EPA 9060	02/29/16	mg/L	1.44	1.59	9.9%

METHOD BLANK RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: WDL
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Dissolved Organic Carbon	EPA 9060	02/29/16	mg/L	< 0.50 U	
		02/29/16		1.25	FB
		02/29/16		< 0.50 U	
		02/29/16		< 0.50 U	FB
		03/03/16		< 0.50 U	

FB Filtration Blank

STANDARD REFERENCE RESULTS-CONVENTIONALS
AWS3-Anchor QEA, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized: MC
Reported: 03/15/16

Project: Newport Bay Metals TMDL WQ
Event: 150243-01.04
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Dissolved Organic Carbon	EPA 9060	02/29/16	mg/L	20.5	20.0	102.5%
ERA #1217-15-04		02/29/16		20.5	20.0	102.5%
		03/03/16		19.5	20.0	97.5%

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Leonie Mulvihill and Chris Miller, City of Newport Beach	**Date:**	October 14, 2016
From:	Shelly Anghera, Ph.D., Anchor QEA, LLC	**Project:**	160243-03.01
Re:	Technical Comments Submitted by the City of Newport Beach		

This memorandum summarizes our 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).

Location	Comment
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.
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.
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. 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.
4.1.2	The use of the California Toxic Rule (CTR) copper value is overly conservative as a tool for predicting adverse impacts to marine organisms within Marina del Rey. We believe a site-specific numeric target should be developed for use in the TMDL. The use of CTR

Location	Comment
	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.). 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, footnote d 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.
4.1.5	The Staff Report provides a discussion regarding federal revisions to the coper 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.
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

Location	Comment
	consideration of site-specific 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.
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.
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 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.

Location	Comment
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) – 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 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.

Location	Comment
	• 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.
Section 4.2.2	OC Coastkeeper & Candelaria (2014) support the lack of metals impairment to sediments. • 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]).
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: o 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 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

Location	Comment
	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). o 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. o 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

Location	Comment
	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). o 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 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).
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) o 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) o 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.

Location	Comment
	• Bioaccumulation Fish Tissue Study (Allen et al. 2004) o 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 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.
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).
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 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

Location	Comment
	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). 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.
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.

Location	Comment
	We believe sufficient data are available to delist sediment toxicity. We believe there is insufficient data to support listing of metals in sediments and tissues for all of Newport Bay.
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.
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.
4.3 Table 4-15	Toxicity in water and sediment have not demonstrated impairment and therefore should be removed from table.
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

Location	Comment
	▪ 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.
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 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 (µg/cm^2/day). It further determined that 58% of these AFP products were greater than the recommended maximum leach rate of 9.5 µg/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 2014 memorandum recommended a maximum leach rate of 9.5 µg/cm^2/day provided that boat hull cleaning used suitable BMP methods (soft

Location	Comment
	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.
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.
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.
5.4	The City has a hydrodynamic model that can more accurately assess the loading capacity for copper. It should be used.
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 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.
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).
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.
5.6.2.1	Reginal Board outreach was not sufficient. The TMDL was a surprise to most named responsible parties.

Location	Comment
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.
7.0 and BPA Implementation Plan	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 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.
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.
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.
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.

707 Wilshire Blvd., 24th Floor
Los Angeles, California 90017
tel (213) 626-2906
fax (213) 626-0215
www.meyersnave.com

Gregory J. Newmark
Attorney at Law
gnewmark@meyersnave.com

meyers | nave

October 14, 2016

Dave Kiff
City Manager
City of Newport Beach
100 Civic Center Drive, 2nd Floor, Bay E
Newport Beach, CA 92660

Re: Comments Regarding Basin Plan Amendments for Copper TMDLs and Non-Metals Action Plans for Zinc, Mercury, Arsenic and Chromium in Newport Bay, California

Dear Mr. Kiff:

This law firm has been retained by the City of Newport Beach (City) to provide comments on legal deficiencies in the Basin Plan Amendments for Copper TMDLs and Non-Metals Action Plans for Zinc, Mercury, Arsenic and Chromium in Newport Bay, California, (Copper TMDL) being considered for adoption by the California Regional Water Quality Control Board, Santa Ana Region (Regional Board). Our comments are set forth in this letter.

I. Introduction

We understand that the City appreciates the time and effort Regional Board staff has devoted to meeting with stakeholders and developing the proposed Copper TMDL. Unfortunately, notwithstanding these efforts, the Copper TMDL is subject to numerous legal defects such that it cannot be lawfully adopted in its current form. First, the Copper TMDL is based upon an implementation plan that would require the City and other local agencies to ban Copper Anti-Fouling Paint even though the Legislature has expressly forbidden regulation of registered pesticide use by any agency other than the Department of Pesticide Regulation. Second, the Copper TMDL unlawfully requires nearly all the boats in Newport Bay to convert to nontoxic anti-fouling paints even though viable alternative products are essentially unavailable. Third, the Copper TMDL's margin of safety is too large and is unsupported. Fourth, the implementation schedule unlawfully requires early investments that may prove unnecessary. Fifth, the Copper TMDL would impose unfunded state mandates on the City that the state is constitutionally required to reimburse. Sixth, even if a TMDL is

to be adopted, it is unlawful to regulate all of Newport Bay when only isolated areas even arguably exceed California Toxics Rule requirements. Finally, the Substitute Environmental Document does not comply with the California Environmental Quality Act (CEQA).

II. 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 Anti-Fouling Paint

The Copper TMDL is unlawful because it explicitly relies on an implementation plan that requires local agencies to take actions the Legislature has prohibited and because the Regional Board purports to usurp the authority of the Department of Pesticide Regulation to govern the use of Copper Anti-Fouling Paint. This approach ignores legal impediments to implementation and fails to grapple with the conflict between public policy objectives of improving water quality on the one hand and providing effective pesticides on the other hand. Ignoring the legal impossibility of the implementation measures required by the Copper TMDL does not make the regulation attainable. It makes the TMDL unlawful, and it should not be adopted as currently drafted.

A. The Legislature Explicitly Preempted Any Attempts by Local Government Agencies Such as the City to Regulate the Use of Registered Pesticides Such as Copper Anti-Fouling Paint

In bold italics, the Copper TMDL Staff Report Proclaims that "[t]his TMDL cannot be met unless Cu loading from boats is reduced or eliminated." (Staff Report, p. 68, emphasis deleted.). In order to accomplish this objective, the Staff Report indicates that "Dischargers responsible for reducing and/or eliminating Cu discharges from AFPs to meet the TMDL load allocation (LA) include . . . the City of Newport Beach . . . .". (*Id.* at p. 69.) Given that the Legislature has declared actions by the City do so are "void and of no force or effect," it is obvious that the Copper TMDL is fatally flawed and must be revised. (Food & Agr. Code, § 11505.1, subd. (a).)

The Legislature clearly and unambiguously stated its intent to preempt any and all attempts by other government agencies to regulate the use of pesticides in Food and Agriculture Code section 11501.1, subdivision (a):

> This division and Division 7 (commencing with Section 12501) are of statewide concern and occupy the whole field of regulation regarding the registration, sale, transportation, or use of pesticides

> to the exclusion of all local regulation. Except as otherwise specifically provided in this code, no ordinance or regulation of local government, including, but not limited to, an action by a local governmental agency or department, a county board of supervisors or a city council, or a local regulation adopted by the use of an initiative measure, may prohibit or in any way attempt to regulate any matter relating to the registration, sale, transportation, or use of pesticides, and any of these ordinances, laws, or regulations are void and of no force or effect.

The statutory language establishes that the Legislature invoked the broadest doctrine of preemption, field preemption. "If the subject matter or field of the legislation has been fully occupied by the state, there is no room for supplementary or complementary local legislation, even if the subject were otherwise one properly characterized as a 'municipal affair.' [Citations.]" (*Lancaster v. Municipal Court* (1972) 6 Cal.3d 805, 808.)

In addition, the Legislature's intent to preempt local regulation is stated expressly, so there is no need to evaluate if a comprehensive regulatory scheme implies an intent to occupy the field. Indeed, in an unrelated implied preemption case, the California Supreme Court noted section 11501.1 was adopted to overturn the High Court's decision in *People v. County of Mendocino* (1984) 36 Cal.3d 476 that California's pesticide regulation program did not impliedly occupy the filed such that local regulation would be preempted. (*IT Corp. v. Solano County Bd. of Supervisors* (1991) 1 Cal.4th 81, 93, fn. 9.)

As the Staff Report acknowledges, Copper Anti-Fouling Paints are regulated as pesticides by the Department of Pesticide Regulation as "the lead state agency." (Staff Report, p. 71.) Thus, Food and Agriculture Code section 11501.1 applies, express and complete preemption is imposed, and no action by the City "may prohibit or in any way attempt to regulate any matter relating to the . . . use of pesticides." Any such actions would be "void and of no force or effect."

Further, the Regional Board's attempts to force the City to regulate the use of Copper Anti-Fouling Paints notwithstanding preemption by the Food and Agriculture Code would expose Newport Beach to lawsuits by the Department of Pesticide Regulation and potentially private entity lawsuits. In Food and Agriculture section 11501.1, subdivision (b), the Legislature imposed a mandatory duty on the Department of Pesticide Regulation to sue any local government entity that, after notification, does not repeal a preempted ordinance or regulation. (Food & Agr. Code, §

11505.1, subd. (b) ["the director *shall* maintain an action for declaratory relief to have the ordinance or regulation declared void and of no force or effect, and *shall* also bring an action to enjoin enforcement of the ordinance or regulation." (Italics added)].) Likewise, if the City is forced flout the preemptive effect of section 11505.1, it may be exposed to lawsuits by private parties affected by City actions to ban Copper Anti-Fouling Paints. In either case, the City would contend the Regional Board is a necessary party and must be joined in the action as a defendant, but it is nonetheless inappropriate to subject Newport Beach to such potential litigation.

B. The Copper TMDL Unlawfully Infringes on the Department of Pesticide Regulation's Jurisdiction By Attempting to Force the City to Undermine the Department's Quasi-Legislative Determination on How to Regulate Copper Anti-Fouling Paint

The Copper TMDL unlawfully attempts to usurp the Department of Pesticide Regulation's exclusive authority under state law to regulate the use of registered pesticides because the TMDL is designed to do just that: the Staff Report states that "boats must be converted from Cu to nontoxic AFPs to achieve the Cu TMDLs." (Staff Report, p. 59.) Indeed, the Staff Report acknowledges that "[t]he California Department of Pesticide Regulation (DPR) and USEPA have the authority to restrict the sale and use of Cu AFPs." (Staff Report, p. 69.) Even though, as the Staff Report states, the Regional Board has "the authority to regulate the discharge of Cu into waters," it is unlawful for the Regional Board to exercise that authority in a manner that effectively bans the use of Copper Anti-Fouling Paints when the Department of Pesticide Regulation, the agency with rightful authority to govern the use of such registered pesticides, declined to adopt just such a ban. "To be valid, [quasi-legislative] administrative action must be within the scope of authority conferred by the enabling statute." (*Association for Retarded Citizens v. Department of Developmental Services* (1985) 38 Cal.3d 384, 391 [citations omitted].) The Copper TMDL violates this basic principle of administrative law.

The Legislature has plainly granted exclusive authority to the Department of Pesticide Regulation to regulate the use of registered pesticides like Copper Anti-Fouling Paint. As noted, the Department's comprehensive regulatory scheme is expressly intended to "occupy the whole field of regulation regarding the . . . use of pesticides." (Food & Agr. Code, § 11505.1, subd. (a).) Further, AB 425 and its legislative history demonstrate that the Legislature entrusted the Department of Pesticide Regulation to exercise its policy judgment balancing the water quality impacts of Copper Anti-Fouling Paint use against the important

benefits provided by this effective product. Specifically, the Legislature required the Department to establish a maximum allowable leach rate and to make recommendations for mitigation measures to protect aquatic environments. The Department exercised its judgment on these matters, and issued its *Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints Per AB 425* on January 30, 2014. Indeed, if the Department had attempted to establish an outright ban on use of Copper Anti-Fouling Paints, instead of establishing a maximum leach rate, that action would have been overturned as inconsistent with the legislature's direction. (*Association for Retarded Citizens*, *supra*, 38 Cal.3d at 391 ["Thus, if the court concludes that the administrative action transgresses the agency's statutory authority, it need not proceed to review the action for abuse of discretion; in such a case, there is simply no discretion to abuse. [Citations]."].)

The Copper TMDL's requirements that boats stop using lawfully registered pesticides is inconsistent with acts of the Legislature. "Administrative action that is not authorized by, or is inconsistent with, acts of the Legislature is void." (*Association for Retarded Citizens*, *supra*, 38 Cal.3d at 391.)

C. It is Unlawful for the Regional Board to Attempt to Coerce the City Into Banning Copper Anti-Fouling Paints Instead of Pursuing the Established Dispute Resolution Process with the Department of Pesticide Regulation

It is inappropriate and unlawful for the Regional Board to abdicate its responsibility to resolve conflicts with the Department of Pesticide Regulation under an existing agreement and, instead, attempt to force the City to ban Copper Anti-Fouling Paints because the Regional Board failed to convince its sister state agency to do so. The Staff Report references the 1997 Management Agency Agreement between the two state agencies, but it fails to mention that the agreement includes a dispute resolution provision:

> It is the desire of both agencies to establish as speedy, efficient, and informal method for resolving interagency conflicts. Conflicts among staff of the State and Regional Boards, DPR, and the Commissioners, which cannot otherwise be informally resolved, will be referred to the Executive Director of the State Board and the Director of DPR. Conflicts which cannot be resolved at this level may be referred to the Secretary for Environmental Protection. [¶] The Executive Director of the State Board and the Director of DPR will each appoint one staff member to assist in resolving conflicts.

(Management Agency Agreement, p. 14.) Thus, the Regional Board has a procedure available to resolve its conflict with the Department of Pesticide Regulations. It would be arbitrary and capricious, and contrary to law, to end-run that process by compelling local governments to regulate the use of registered pesticides in a manner contrary to the Department of Pesticide Regulation's legislative judgment.

III. The Copper TMDL is Unlawful Because Alternatives to Copper Anti-Fouling Paint are Not Effective or Available

The Copper TMDL is unlawful because it depends upon an illusory compliance strategy. In order to implement the TMDL, according to the Staff Report, almost all of the boats in Newport Bay will have to be converted from Copper Anti-Fouling Paints to nontoxic alternatives. The Staff Report admits that "This conversion depends on the availability, efficacy and cost of nontoxic AFPs/coatings." (Staff Report, p. 80.) While the Staff Report discusses studies that purportedly found these alternative paints are "available and cost-effective, it does not directly state that alternative products are actually commercially available so that the paint conversion required by the Copper TMDL could actually happen.

Even if the Staff Report did make such a finding, it could not be supported by evidence. In fact, the record will show that alternative paints are not commercially available, are not effective and are not affordable. Moreover, as explained in Section VIII, below, the only alternative paints with any degree of effectiveness are not recommended by US EPA's technical contractor because they present serious environmental hazards.

IV. The Margin of Safety is Too Large and is Unsupported

The Copper TMDL is improperly and artificially lowered because the Regional Board proposes a margin of safety that is unreasonably large and unsupported. Under Clean Water Act section 303(d)(1)(C), TMDLs must include "a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." The same requirement is repeated without elaboration in the applicable regulation. (40 C.F.R. § 130.7(c)(1).) The Copper TMDL Staff Report incorrectly summarizes this specific federal requirement by stating that the margin of safety is more generally "to address uncertainty in the analysis." (Staff Report, p. 10.)

The Staff Report does not include any explanation of why such a large margin of safety is appropriate, and none is apparent. The Copper TMDL calculations and analysis rely on multiple layers of "conservative" assumptions, and the

California Toxics Rule is further based upon extremely conservative assumptions. There is no justification to add a margin of safety amounting to one fifth of the TMDL on top of all the other conservative assumptions, especially when the observed "impairment" are alleged and isolated technical exceedances of the chronic water quality criterion with little to no actual observed toxicity. Moreover, and importantly, there is no explanation of how the 20% proposed margin of safety "takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality," as required by the Clean Water Act. (33 U.S.C. § 303(d)(1)(C).) As a result, the TMDL and its load allocations are unlawfully and unreasonably low.

V. The Phased Implementation Schedule is Unreasonable, Unsupported and Would Force Substantial Early Investments That May Be Unnecessary

The Copper TMDL requires phased reductions in copper loading from boats beginning almost immediately, with a 20% reduction by the end of year 3, 50% by the end of year seven and so on to an 83% reduction by the end of year 15. (Staff Report, pp. 91-92.) This phased reduction schedule is unreasonable, unsupported and unlawful because it is too short and fails to allow time at the beginning of the schedule to address the many problems with the TMDL and its implementation.

Given that neither the Regional Board nor any of the entities regulated by the TMDL may legally restrict the use of Copper Anti-Fouling Paint, the Regional Board's acknowledgment that the Copper TMDL cannot be achieved without such a restriction, and the Regional Board's further conclusion that "voluntary compliance in Newport Bay is difficult," (Staff Report, p. 82) there is no justification for the failure to provide a reasonable period of time of at least five years when no reductions are required. This time period is necessary since there is currently no mechanism in place to require the conversion of boats to nontoxic anti-fouling paints or coatings. The current plan to develop a program to "restrict the sale and use of Cu antifouling paints" is for "Regional Board staff and dischargers to *work with* DPR . . . ." (Staff Report, p. 102 [italics added].) The City submits that it will likely take considerable time for this vague plan to work, and the Regional Board's failure to allow for such time in its implementation schedule is improper.

Similarly, though the Staff Report asserts that the phased implementation schedule allows for the development of site-specific objectives for copper that would supercede the California Toxics Rule criteria, it would wastefully and unnecessarily require costly and controversial efforts to achieve early reductions in copper loading while these efforts are ongoing. Given that water quality

trends already show improvement and there is little evidence of actual toxicity notwithstanding isolated exceedances, there is no justification for forcing these early efforts.

The lack of available, effective and affordable Copper Anti-Fouling Paint alternatives also demands that a reasonable time period be provided at the beginning of the implementation period. The Regional Board apparently intends to force development of new technologies and to create a new market for alternative products. Even so, it is irrational to adopt a schedule that does not allow the proposed new market time to respond and develop.

VI. The Copper TMDL Imposes Unfunded State Mandates the State Must Reimburse under the California Constitution

The Copper TMDL, if adopted, will impose unfunded state mandates that the state will be constitutionally obligated to reimburse. Article XIII B, Section 6, of the California Constitution, provides that "[w]henever . . . any state agency mandates a new program or higher level of service on any local government, the State shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service . . . ." The Copper TMDL will trigger this subvention obligation.

Though the regional boards and State Water Resources Control Board commonly argue that their programs are exempt from the reimbursement requirement under Government Code section 17513, that argument would not be well taken in this case. Federal law does not require the Regional Board to ban the use of Copper Anti-Fouling Paints. Indeed, the Staff Report acknowledges, as it must, that Congress chose to exempt discharges from recreational boats from any permitting requirement under the Clean Water Act. (Staff Report, p. 75, citing 33 U.S.C. 1342(r).) While US EPA is developing a best management practices program under the Clean Boating Act, implementation "is considered to be a 'long term action'" with no time schedule. (Staff Report, p. 91.) Thus, there currently is no federal requirement to ban Copper Anti-Fouling Paints and US EPA permits regulating commercial vessels actually allow the use of Copper Anti-Fouling Paints subject to some conditions. (See Staff Report, p. 76.)

The Copper TMDL would represent a discretionary decision by the state to impose requirements beyond those mandated by federal law. This would be a "true choice" by the state to impose the mandate (*Hayes v. Comm'n on State Mandates* (1992) 11 Cal.App.4th 1593) and subvention will be required.

VII. It is Improper to Promulgate a TMDL for Entire Bay When Only Certain Water Bodies Within the Bay May Be Even Arguably Elevated Above California Toxics Rule Levels

The Copper TMDL improperly proposes to establish TMDLs for all of Newport Bay notwithstanding the fact that only small areas of the Bay even arguably exceed the California Toxics Rule Criterion Continuous Concentration for copper. Federal regulations governing TMDLs require states to identify "water quality limited segments." (40 C.F.R §§ 130.1(j), 130.7(c)(1) ["Each State shall establish TMDLs for the water quality limited segments identified" on its 303(d) list].) The Clean Water Act does not require the development of a TMDL regulating an entire group of water segments when only a few arguably exceed water quality standards, nor is it proper to do so. Indeed, California's 303(d) list contains numerous examples of water quality limited segments within larger geographic water bodies. To use an example frequently cited in the Staff Report, the San Diego Regional Board developed a Total Maximum Daily Load for Dissolved Copper in the Shelter Island Yacht Basin, not all of San Diego Bay.

Evidence before the Regional Board on the Copper TMDL shows that only small and unique water segments within Newport Bay even arguably exceed the Criterion Continuous Concentration for copper. As demonstrated in technical memoranda submitted with the City's comments (*Newport Bay Copper Study: Winter 2016* (Anchor QEA, March 25, 2016); *Random Sample Points Methodology* (Anchor QEA, July 10, 2015), areas of Newport Bay that were observed to exceed 3.1 µg/L of copper were limited to restricted, closed and often dead end channels like West Newport, the Rhine Channel and Linda Isle. Though it would be improper for the Regional Board to adopted the Copper TMDL for the many reasons explained throughout the City's comments, if a TMDL is to be adopted, there is no basis to develop and implement a TMDL for the entire Newport Bay under these circumstances.

VIII. The Substitute Environmental Document Fails to Comply with CEQA

As a preliminary matter, the Substitute Environmental Document (SED) is inadequate since its analysis of impacts uses an invalid "baseline."

Environmental analysis under Certified Regulatory Programs such as that applicable to the Regional Board are subject to general principles applicable to CEQA review. One such general principle is that significance of environmental impacts is determined in comparison with a "baseline" that generally consists of the environmental conditions that exist at the time of environmental review. It

is legal error to determine significance of impacts in comparison with a non-existent hypothetically "permitted" condition.

The Regional Board's SED violates this principle throughout the document, repeatedly concluding that the proposed project will have "no" or less than significant impacts in comparison to a baseline that assumes implementation of the US EPA TMDL. (see, e.g., SED at pps. 44, 45, 49, 56, 57.) Since the US EPA's TMDL is not currently being implemented, the SED must be revised to determine impact significance in comparison to a baseline that does not assume the US EPA's TMDL is (or will be) enforced.

More particularly, the SED's impact analysis is flawed because it fails to properly account for or analyze the foreseeable significant impacts of a key part of its recommended compliance program: the conversion of boats from Copper Anti-Fouling Paint to allegedly "non-toxic" alternative paints. The SED does not identify any such "non-toxic" non-Cu AFPs. In fact, the Washington State Department of Ecology has concluded that there are no currently available non-toxic alternatives to Cu AFPs:

> "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."

(Washington State Department of Ecology, Assessing Alternatives to Copper Antifouling Paint: Piloting the Interstate Chemicals Clearinghouse (IC2) Alternatives Assessment Guide (2014), page i.)

The Washington State Department of Ecology concluded that all non-Copper Anti-Fouling Paints analyzed should be categorized as "Benchmark 1" chemicals, i.e., chemicals that have a combination of either high persistence in the environment, high bioaccumulation potential, or high human toxicity or ecotoxicity, and avoidance of all of those products should be recommended.

In the absence of currently available non-toxic non-Copper Anti-Fouling Paints, the SED's assumption that foreseeable implementation will include use of "non-toxic" anti-fouling paint is erroneous and unsupported, which fatally undercuts all analysis in the SED based on that assumption. The SED must be revised to address the likelihood that reasonably foreseeable implementation of the Copper TMDL will involve application of toxic anti-fouling paints, and to analyze the environmental impacts of application of those toxic paints. These revisions must include analysis of potential impacts to both humans and the environment,

including but not necessarily limited to impacts in the areas of Biological Resources and Hazards and Hazardous Materials.

Additionally, the SED is invalid for failing to analyze a reasonable range of alternatives, as it is required to do under CEQA's provisions for Regulatory Programs. Apart from the No Project alternative, the SED analyzes only one "action" alternative – a purported "Modified TMDLs and Action Plans, Modified Regulatory Approach" alternative. The SED's discussion of this alternative is completely without value, however, as it does not actually describe an alternative to the proposed project. Rather, the discussion of that alternative consists entirely of conclusory and unsupported statements that the proposed project is the "most scientifically and technically defensible approach."

Since the SED does not actually describe any "action" alternative to the proposed project, it also fails to disclose the potential environmental impacts and benefits of such an alternative. The failure of the SED to identify or analyze any actual "action" alternative to the proposed project fatally undercuts the requirement that the document adequately inform decision makers and the public of a reasonable range of alternatives to the project.

In particular, the SED should describe and analyze an alternative under which reduction in copper loading would be achieved on a statewide basis, by the state of California, pursuant to the exclusive authority of the California Department of Pesticide Regulation (DPR) to regulate pesticides, including Copper Anti-Fouling Paints. The SED additionally should describe and analyze an alternative under which implementation methods would be targeted at the limited areas of Newport Bay that are arguably exceed California Toxics Rule requirements for copper, rather than regulating the entire Bay. Such focused implementation must be discussed as an alternative, as it is likely to result in fewer environmental impacts than the project as proposed.

The SED also fails to comply with CEQA because it does not include an economic factors analysis. In fact, the SED is misleading at best when it states:

> The Regional Board has analyzed the costs of implementing reasonably foreseeable BMPs to comply with the TMDLs and Action Plans. These economic factors have been considered in this environmental analysis and are summarized in the Staff Report (Section 8.3).

(SED, p. 28.) There is no such summary in Section 8.3 of the Staff Report. In fact, the only information to be gleaned from Section 8.3 is that there will be

costs but the Board will make no attempt to quantify those costs. Such short shrift of its obligations under CEQA is unprecedented and contrary to law.

IX. Conclusion

Because of the many legal deficiencies described in this letter, the Copper TMDL cannot be lawfully adopted in its current form.

Sincerely,

/s/ Gregory J. Newmark

Gregory J. Newmark
Attorney at Law

c: Leonie Mulvihill, Esq.

GJN:GJN
2719136.1

DECLARATION OF CHRIS MILLER

I, Chris Miller, declare as follows:

1. I have personal knowledge of the following facts and matters.

2. I have been continuously employed by the City of Newport Beach (hereafter "City") since 2003 and have been the Harbor Resources Manager for the City since 2008.

3. My essential duties as the City's Harbor Resources Manager include, but are not limited to, the following:

    a. Act for and assist the City Manager in administering the provisions of the City's Harbor Code.

    b. Administer the harbor-related policies adopted by the City Council and the Harbor Commission, and maintaining files and records of all pier permits issued.

    c. Conduct regular inspections of both public and private facilities and structures located upon or over the waters of Newport Harbor or the Pacific Ocean or any other water where the tide ebbs and flows within the City.

    d. Issue approvals in concept for development located on tidelands or submerged lands pursuant to the City's Municipal Code.

4. As part of my job duties, I am responsible for all docking, anchorage, berthing and mooring of boats in Newport Harbor, which means that I am responsible for designating areas where such activities are permitted and for issuing permits for such activities.

5. I have reviewed an aerial survey which documents the vessels berthed or moored in Newport Harbor in February 2014 ("Aerial Survey").

6. Based on my review of the Aerial Survey and the City's permit records, there are 800 off-shore moorings in Newport Harbor. The average length of a vessel in an off-shore mooring is between 35' and 40'.

7. Based on my review of the Aerial Survey and the City's permit records, there are 400 on-shore moorings in Newport Harbor. The maximum length for any vessel in an on-shore mooring is 18 feet. Based on the aerial survey, I estimate that half of the City's on-shore moorings, or 200, are occupied by small recreational vessels with bottom paint and 18 feet or less in length.

8. Based on my review of the Aerial Survey and the City's permit records, there are 1,925 slips in commercial marinas. Included in this figure are the 172 slips located in the Balboa Yacht Basin, which is a commercial marina owned and operated by the City.

9. Based on my review of the Aerial Survey and the City's permit records, there are 1,600 vessels at residential slips.

10. The City maintains four boats for use by its Lifeguard and Harbor Resources Department. The County maintains nine boats for use by its Harbor Patrol.

11. My review and analysis indicates that there are 4,470 vessels in Newport Harbor that have bottom paint. Of these, an overwhelming majority use copper antifouling paint.

Executed on October 12, 2016, at Newport Beach, California.

Chris Miller

EXHIBIT A

Exhibit A

Newport Beach GIS

0 2,000 4,000
Feet

Disclaimer: Every reasonable effort has been made to assure the accuracy of the data provided, however, The City of Newport Beach and its employees and agents disclaim any and all responsibility from or relating to any results obtained in its use.

Imagery: 2009-2013 photos provided by Eagle Imaging www.eagleaerial.com

10/12/2016

CITY OF NEWPORT BEACH
100 Civic Center Drive
Newport Beach, California 92660
949 644-3311 | 949 644-3308 FAX
newportbeachca.gov/HarborResources

September 16, 2016

DELIVERED Via WEBSITE UPLOAD: http://www.regulations.gov/docket?D=EPA-HQ-OW-2016-0332 ***and EMAIL:*** Elias.mike@epa.gov

U.S. Environmental Protection Agency
Ecological Risk Assessment Branch | Health and Ecological Criteria Division
Office of Science and Technology | Office of Water
Attn: Mike Elias | Biologist
1200 Pennsylvania Avenue, NW, Washington, DC 20460

Mr. Elias,

The City of Newport Beach respectfully submits the following comments on the Revised Federal Standards Proposed for Copper in Marine Waters.

Thank you,

Chris Miller
Harbor Manager
City of Newport Beach
cmiller@newportbeachca.gov
(949) 644-3043

CC: Shelly Anghera, Anchor QEA

Revised Federal Standard Proposed for Copper in Marine Waters Technical Comments

Comment 1: Uncertainty resulting from a single abalone test used to derive the Draft Criteria results in an overly conservative criteria for copper.

The proposed Draft Criteria are ultimately driven[1] by results from a single red abalone toxicity test published in 1989[2], although data from numerous other saltwater toxicity tests (including 171 saltwater mussel toxicity tests) were compiled and summarized. Using one value to derive criteria does not account for the variability in this abalone species' sensitivity to copper and the influence of water chemistry variability known to affect toxicity test results. Further, this species is only present in cool West Coast waters in or near kelp forest habitats and is not relevant to enclosed-shallow water bays and harbors of California or the Gulf and East Coasts of the United States.

Recommendations:

- Additional abalone data should be collected prior to adoption of the Draft Criteria to provide a more robust and defensible data set, which is needed to provide the scientific basis for the Draft Criteria development. This is a reasonable request as the red abalone is a species approved by EPA for use in marine/estuarine toxicity tests and is commonly used for such purposes[3].
- The saltwater BLM should include flexibility for considering different habitat types and regions (e.g., the Gulf, enclosed bays, harbors, saltmarshes, etc.).

Comment 2: Uncertainty associated with normalizing the laboratory-derived toxicity test results to an assumed and un-validated DOC value results in an overly conservative criteria for waters with naturally low DOC.

EPA assumed a DOC concentration of 2 mg/L for all unknown natural seawater test conditions. More than 33% of the mussel toxicity test data were assumed to be tested in water with 2 mg/L DOC, and the single abalone test findings (reported EC_{50} of 8.8 µg/L) were also assumed to be tested in water with 2 mg/L DOC, even though there were no DOC measurements recorded. The result of the normalization procedure on the toxicity test results is that the actual effects concentrations (i.e., EC_{50} and LC_{50} values) are reduced by approximately one half (on average).

For example, the single abalone effects concentration (EC_{50} = 8.8 µg/L) was reduced to a normalized EC_{50} of 3.94 µg/L, from which the Draft Criteria were derived. This normalization

[1] Because the criteria seek to protect a representation of the entire population of marine organisms, they can be affected by one or more very sensitive species. In this case, a single test conducted with red abalone resulted in the criteria being "driven" downward.

[2] Hunt, J.W., B.S. Anderson, S.L. Turpen, A.R. Coulon, M. Martin, F.H. Palmer, and J.J. Janik, 1989. *Experimental evaluation of effluent toxicity testing protocols with giant kelp, mysids, red abalone, and topsmelt*. Division of Water Quality Report No. 89-5WQ.

[3] Chapman, G., D. Denton, and J. Lazorchak, 1995. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. U.S. Environmental Protection Agency, Washington, D.C., EPA/600/R-95/136 (NTIS PB96261665). Available from: https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=46584.

procedure is not scientifically justified due to lack of supporting DOC data for many saltwater toxicity tests used in the derivation, and is particularly not appropriate for the single abalone test on which the Draft Criteria are most affected. In California, where the mussels and abalone are native, it is common to have DOC values below 1 mg/L in natural seawater rather than over 2 mg/L. The low DOC is typically measured in dry, summer conditions in temperate regions like Southern California. Consequently, it is likely that toxicity tests with actual, and likely lower, DOC than that assumed by EPA would result in higher normalized effects concentrations and consequently higher Draft Criteria. The effects of this normalization on the resulting adjusted effects concentration is most obvious in the 50 most sensitive species tests.

Recommendations:

- All Granite Canyon and Scripps Pier water quality data inputs should be modified to represent accurate conditions for all tests conducted with these natural seawater sources.
- However, it is preferable that only toxicity tests paired with the actual water quality measurements (including DOC) should be included in the data set that is normalized to DOC to define the acute and chronic criteria using the saltwater BLM.
- The toxicity test data set that is modified by the BLM should only include species and test conditions known to occur in U.S. waters. Currently, the data set includes seawater samples from all over the world, many of which have very high DOC levels; these data are not relevant and further skew the normalization of the effects concentrations.

Comment 3: Uncertainty in calculation of the ACR value results in an overly conservative chronic criterion for copper.

The ACR of 3.022 was calculated as the geometric mean of the genus mean ACRs for five sensitive freshwater genera, *Ceriodaphnia* (3.268), *Daphnia* (4.057), *Oncorhynchus* (3.630), *Acipenser* (5.757), and *Cottus* (2.075), along with the two estuarine/marine genus mean ACRs for *Cyprinodon* (1.475) and *Brachionus* (1.229). Eliminating the freshwater species and using the two marine species to calculate the mean ACR changes the ACR from 3.02 to 1.35. When applied to the current abalone-based FAV of 3.94, it results in a final chronic criterion of 2.92 µg/L. This is a significant difference from the 1.3 µg/L that is currently proposed. This alternate chronic criterion (CCC) is predicted to be higher than the acute criterion (CMC) from the model, further illustrating the overly conservative model-predicted criteria.

Recommendations:

- Chronic criterion derivation should exclude freshwater species ACR data and only the actual values for the two estuarine/marine species should be used.
- Additional paired acute and chronic marine/estuarine toxicity tests should be conducted to support the development of a new, scientifically-based saltwater FACR.

Comment 4: Confirmation that site specific objectives for copper derived through approved USEPA guidance will still be upheld.

It is recognized by USEPA that the national criteria for dissolved metals including those for copper, lead, and zinc may be more or less protective than anticipated, depending on the site specific characteristics including diversity of aquatic life and water quality measurements (i.e., hardness, pH, dissolved organic matter, total suspended particulates, and concentrations of contaminants of concern) (USEPA, 1994). As a consequence, USEPA has developed the Water Effects Ratio (WER) as one of several procedures for deriving a site specific objectives.

Recommendations:

- Please confirm that studies conducted using EPA guidance[4] will still be supported by the EPA even if the results are not consistent with the revised national copper criteria.

Summary:

If all uncertainties indicated above are removed (i.e., remove single abalone test currently driving the Draft Criteria, normalizing based on more accurate DOC data—or not normalizing at all, and revising the saltwater FACR to a number based only on saltwater species), this would likely result in a lowered FAV similar to that used in 2003 of approximately 6.2 µg/L to protect the commercial Blue Mussel (*Mytilus edulis*), and an acute criterion of 3.1 µg/L (no change from 2003). Additional data would be needed to set and estimate an accurate saltwater FACR and a chronic criterion. Further support that the resulting criteria are overly conservative can be found in that the proposed standard is less than what the State of California considers to be background seawater concentrations for copper (California Ocean Plan[5]), where many of the species being protected thrive. In particular, we believe the Draft Criteria will be most difficult for enclosed bays and harbors, where circulation with ocean water is limited, and in arid regions where naturally low DOC occurs, like Southern California.

[4] United States Environmental Protection Agency (USEPA). 1994. Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. EPA-823-B-94-001. February.

[5] State Water Resources Control Board, 2012. *California Ocean Plan. Water Quality Control Plan. Ocean Waters of California*. Effective August 19, 2013. Adopted October 16, 2012. Resolution No. 2012-0056. Available from: http://www.waterboards.ca.gov/water_issues/programs/ocean/docs/cop2012.pdf.

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.
4	Supplemental Staff Report, Key Points,	The Supplemental Staff report states the Regional Board's implementation plan for the action plan is for the City and County to

Comment	Location	Comment
	Finding 10	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/cm$_2$/d to achieve compliance with the dissolved Cu CTR criterion".* The only required BMPs for using paints at 9.5 µg/cm$_2$/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 paints; the findings were determined to be a data gap. The four best performing paints were biocidal.

Comment	Location	Comment
		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 fluoropolymers (e.g., Intersleek 1100). Fluorocarbon is a general term for a family of substances that are being

Comment	Location	Comment
		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 till 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 impact boatyard availability to Newport Bay vessels. The City is requesting the TMDL be extended.

Comment	Location	Comment
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 foreseeable methods of compliance is conducted at a programmatic level. As specific projects are proposed, the local lead agency (ies) need to complete

Comment	Location	Comment
		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.
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

Comment	Location	Comment
		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

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: o 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
		o 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. o 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). o 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)
		  o 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)
		  o 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)
		  o 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 summar y 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 Consider ations	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

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 which 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 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.

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

[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.

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 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 Commerical 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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moffatt & nichol

555 Anton Blvd., Ste. 400
Costa Mesa, CA 92626

657) 261-2699
www.moffattnichol.com

MEMORANDUM

To: John Kappeler, Senior Engineer, City of Newport Beach

From: Shelly Anghera, Ph.D. and Bryce Corlett, Ph.D., Moffatt & Nichol

Date: August 11, 2021

Re: Review of Non-copper-based Alternative Antifouling Paints to Support Discussion on Implementation Strategies for Reducing Copper by Boat-Paint Conversions

Boat owners, marina operators, marina owners, cities, counties, and other stakeholders have been advised to replace copper-based antifouling paints (AFPs) with non-copper nontoxic (i.e., non-biocidal) AFP to meet water quality objectives. These discussions have been ongoing in Marina del Rey, Newport Bay, and Shelter Island. The City of Newport Beach and other stakeholders have maintained concerns from boaters that alternative nontoxic boat paints are not yet proven to be dependable alternatives. However, Regional Water Quality Control Board (RWQCB) staff continue to assert that alternative nontoxic AFP are readily available (Los Angeles RWQCB 2015; San Diego RWQCB 2005; Santa Ana RWQCB 2021).

In response to the claims of readily-available non-biocidal paints, as well as the potential use of alternative biocidal AFPs, this memorandum reviews the findings of five studies commissioned by the USEPA, CalEPA Department of Toxic Substances Control (DTSC), and Washington State Department of Ecology (Ecology) over the past decade. Together, these studies demonstrate continued concerns regarding the availability, proven effectiveness, and safety of alternative AFP. These concerns include the following:

1. **No Single Alternative AFP will Work.** 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. The most supported non-biocidal paints currently available are Intersleek 900 (now Intersleek 1100SR) and Hempasil X3. However, these soft-non-biocidal paints may not be suitable for recreational boaters, as they were developed for large commercial vessels which operate at high speeds for long durations to slough off fouling organisms. Very few recreational boaters use their vessels at the frequency required to have the paints perform optimally. In addition, soft-non-biocidal paints are prone to damage and typically require professional application, making these paints expensive to apply and to care for.

2. **Boat Paint Formulations Are Constantly Changing.** 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, but new paints are

constantly added to the market and old paints are frequently discontinued. Out of the six alternative AFPs recommended in the reviewed studies, only one has not been discontinued or modified.

3. **Non-Biocidal Paint Safety Has Not Been Confirmed.** All AFP contain hazardous chemicals, and their safety to human health or other receptors in the environment has not been confirmed. The environmental safety of AFP formulations are currently difficult to determine, as AFP ingredients and safety information are often not disclosed due to proprietary rights, and inactive ingredients (which may have detrimental environmental effects) are not listed in mandatory disclosures. Furthermore, these paints are not regulated as biocides and, therefore, have not been tested to determine if high usage of these paints in enclosed waterbodies will result in water quality related impacts. Several of the best performing non-biocidal AFPs provide immediate concern as they contain a slime-resistant coating composed of fluoropolymers (e.g., Intersleek 1100SR). These compounds can bioaccumulate, and several are known to the State of California to cause reproductive toxicity in humans[1]. However, the leach rates and environmental impacts of fluoropolymer (e.g., PFOA/PFAS) compounds in the marine environment are unknown.

4. **The State of Washington Has Delayed Halting Copper-Based AFP Because No Feasible, Reasonable and Readily-Available Alternative Paint Exists.** Due to findings of several studies, Ecology recommended the Washington State Legislature delay halting copper-based AFP until January 1, 2026, to allow for "feasible, reasonable, and readily-available" alternatives to copper-based AFP (SSB 6210); this recommendation was accepted on June 30, 2020.

[1] The California Safe Drinking Water and Toxics Enforcement Act of 1986, codified at Health and Safety Code Section 25249.5 et seq., and often referred to as Proposition 65.

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**: This paint contains no biocides, but instead contains 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**: This 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 that 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 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 contain zinc-oxide; the zinc acts as a catalyst in the formation of hydrogen peroxide. Zinc-oxide is not regulated as a biocide (Northwest Green Chemistry 2017).

Containing biocide:

- **Zinc biocidal paint**: This 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 biocidal paint**: This paint often contains Tralopyril/Econea, an organic biocide that has emerged in the last several years and generally contains zinc-oxide.
- **Zinc/organic biocide combination paint**: This paint often contains Cybutryne/Irgarol 1051, a “booster” biocide that is currently prohibited for sale or use within the European Union (EU 2018), or DCOIT/Sea-Nine, a “broad spectrum” biocide designed to be used in combination with another biocide.

Evaluations of Non-copper AFPs

Non-copper AFPs were evaluated as alternatives to copper-based paint in a series of five studies commissioned by the USEPA, CalEPA DTSC, and Ecology over the past decade. First, a USEPA study (**1**) was conducted in collaboration with the Port of San Diego (2011). This study evaluated 46 paints, including copper and zinc biocidal AFP and non-biocidal AFP. A CalEPA 2011 study (**2**) immediately followed, comparing newly-developed non-biocidal AFP to the USEPA-recommended non-biocidal AFPs. Based on the USEPA and CalEPA studies, Ecology (2014) commissioned a study to further evaluate six potential paints and compare their performance and risks to copper-based AFP (**3**). After 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 (**4**). Following the publication of the 2017 Northwest Green Chemistry report, Ecology (2019) was directed by the Washington State Legislature to further review recent AFP risk assessments and scientific studies; the resulting Ecology AFP report was published in 2019 (**5**).

Most of these studies included evaluations of non-copper biocidal AFPs (e.g., zinc-based paints); however, this memorandum only includes the findings for non-biocidal AFPs, as the RWQCB is expected to recommend the use of non-biocidal coatings (Santa Ana RWQCB 2018). Findings from each of the five studies are summarized below.

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

The Institute for Research and Technical Assistance (IRTA), in collaboration with 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 a summary the evaluation of the 8 non-biocidal paints.

The study concluded that Intersleek 900 and Hempasil X3 were the best alternative paints tested in the study. Both soft non-biocidal paints ranked high in the performance evaluation of the hull testing, were cost effective over the long-term, and were available on the retail market. Note that both Intersleek 900 and Hempasil X3 are multi-component coating systems. Application of these products requires both a tie coat (to bind paint to the hull) and a primer (to be applied prior to the application of a topcoat). The Intersleek 900 coating 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. The currently-available alternative, Intersleek 1100SR, consists of multiple Intersleek products, some of which were not available at the time of the study.[2]

These products were designed for larger oceangoing vessels. A representative from 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 (e.g., 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, which may remain docked for months at a time.

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	Hempasil X3 (87500)	Yes	Yes[1]	Yes[2]
	Intersleek 900	Yes	Yes[1]	Yes, but formulation changed[3]
	Klear N' Klean XP-A100	Yes	No	-
	Phase Coat Bare Bottom	No[4]	No	-
	PropSpeed	No[4]	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)*

[2] For more details regarding Intersleek 1100SR, see https://www.international-marine.com/product/intersleek-1100sr

[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] *Available for purchase from Hempel (USA), Inc. as of July 23, 2020*
[3] *The exact Intersleek 900 tested in the study is no longer available because the manufacture changed formulations. Intersleek 1100SR is available for purchase from International Paint Company, LLC. as of July 23, 2020. For more details regarding Intersleek 1100SR see https://www.international-marine.com/product/intersleek-1100sr*
[4] *Boat removed from study due to ineffectiveness of product as applied to the boat or delaminating from hull*

2. CalEPA 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). 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 soft non-biocidal paints performed better than the hard non-biocidal paints and other non-biocidal paints (Table 2) primarily because they were much easier to clean. The performance of the hard non-biocidal paints and the other non-biocidal paints in the panel testing is difficult to evaluate and compare because hard non-biocidal paints require periodic or routine cleaning with a power tool and are not effectively cleaned with hand tools underwater. The additional costs associated with the required haul out for cleaning make these paints less desirable than other alternatives.

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, Hempasil 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 the 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 other emerging non-biocidal paints. XZM 480 did not adhere to the hull properly for 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.

Out of the six highest-performing paints of the study, only Hempasil X3 is currently available in the same form. Intersleek 900 has changed formulations; the current form is offered for sale as Intersleek 1100SR. XP-A101 contains an ingredient that has since been removed from the market (USEPA 2011), so it cannot be offered for sale. XA 278, BottomSpeed, and Sher-Release have since been removed from the market as well.

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	Klear N' Klean XP-A100	Yes	No	No	-
	Klear N' Klean Plus XP-A101	Yes	Yes	Yes	No
	Sher-Release (or Surface Coat Part A-Black)	Yes	Yes	Yes	No
	XZM 480	No	Yes	No	-
	Hempasil XA 278	Yes	Yes	Yes	No
	Hempasil XA 284	Yes	No	No	-
	XQQ075	Yes	No	No	-
	Intersleek 900	No	Yes	Yes[1]	Yes, but formulation changed[2]
	Hempasil X3	No	Yes	Yes[1]	Yes[3]
	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[4]	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

Notes:

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

[1] *Intersleek 900 and Hempasil X3 were reviewed positively in the study but were not explicitly named in the discussion, which was limited to recently developed (or "emerging") non-biocidal paints. For this review, the positive findings were implied as recommended.*

[2] *The exact Intersleek 900 tested in the study is no longer available because the manufacture changed formulations. Intersleek 1100SR is available for purchase from International Paint Company, LLC. as of July 23, 2020. For more details regarding Intersleek 1100SR see https://www.international-marine.com/product/intersleek-1100sr*

[3] *Hempasil X3 is available for purchase from Hempel (USA) Inc. as of July 23, 2020*

[4] *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*

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

Ecology commissioned a study (Ecology 2014) to evaluate non-biocidal paints using the Interstate Chemicals Clearinghouse (IC2) Guide. The IC2 Guide was an alternative assessment tool 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 uses four different assessments to evaluate alternatives: 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 CalEPA 2011 studies and compared to one copper-based paint as a control (Table 3). Three different groups of assessors conducted the evaluation of these seven paints via one of three alternative assessment frameworks (sequential, simultaneous, and hybrid); each assessment was conducted independently. 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 when handling issues related to the elimination of paints and data gaps in the hazard evaluations. As a result, selected preferable alternatives differ among the three frameworks.

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.[3] A summary of all evaluated paints is provided in Table 3.

Despite selecting three preferred non-biocidal paints, the study concluded that the safety of the test paints was uncertain and none of the tested non-biocidal paints were ideal alternatives to copper-based paint. As discussed in the hazard assessment in detail, all formulations contain hazardous chemicals that pose human health and/or

[3] BottomSpeed and Surface Coat Part A are no longer available.

environmental risks and are categorized to be avoided.[4] Furthermore, the hazard assessment was limited and incomplete due to the undisclosed chemicals in the primers and the paints. As stated in Ecology (2014; pg. 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."*

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	Surface Coat Part A – Black (Sher-Release)	Yes[1,2]	No
	Intersleek 900	Yes[1,3]	Yes, but formulation changed[4]
	BottomSpeed TC Base Coat/Top Coat Clear	Yes[1,5]	No
	XZM480 International	No	-
	Hempasil XA278	No	No
	Klear N' Klean Plus XP-A101 White Topcoat	No	-
Copper-based paint	Pettit Marine Paint Trinidad Pro Antifouling Bottom Paint 1082 Blue	Control for 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. From Ecology (2014; pg. i), "the selection of preferred alternatives does not constitute an endorsement because significant reservations remain"*

[2] *The hybrid framework concluded that Surface Coat Part 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. Intersleek 1100SR is available for purchase from International Paint Company, LLC. as of July 23, 2020. For more details regarding Intersleek 1100SR see 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*

[4] 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.

4. 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 identify and evaluate alternatives to copper antifouling boat paints. In the resulting 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 cost and availability of the paints.

The alternatives analysis determined paint performance by using information previously collected as part of the USEPA 2011 study (Study #1 discussed above) and a Practical Sailor panel and hull test (Practical Sailor 2017). To support the objectives of this memorandum, only the findings on performance of the non-biocidal AFPs are discussed here. Of the four non-biocidal paints evaluated in the Northwest Green Chemistry analysis, only ePaint EP-21 was field-tested (Practical Sailor 2017 and USEPA 2011). This paint performed poorly in the USEPA (2011) study, coming off the vessel at the waterline in 7 months[5] (Table 1).

The alternatives assessment confirmed that less hazardous alternatives to copper AFPs are available, but the report did not recommend any particular paint because of the diversity of boater needs. In addition, three of the non-biocide paints were found to have data gaps, with no available data to assess performance, and one paint (EP-21) was found to have mixed results (Table 4).

[5] It is acknowledged that the formula may have changed since this study in 2010.

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 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*

5. Ecology 2019 Study: *Antifouling Paints in Washington State: Report and Recommendations*

Ecology was directed by the Washington State Legislature to review recent risk assessments and scientific literature regarding alternatives to copper-based AFPs. Unlike previously-discussed assessments, the Ecology 2019 report focused on the toxicity and availability of *types* of alternative AFPs rather than specific products. The report included assessments of biocidal and non-biocidal AFPs, as well as non-coating antifouling measures. However, to support the objectives of this memorandum, only findings related to the safety and performance of non-biocidal AFPs are discussed here.

Recent studies and risk assessments of non-biocidal AFPs have primarily focused on silicone- and/or fluorine-based (e.g., Teflon) coatings. Ecology (2019) found that silicone-based coatings are most effective at limiting biofouling; however, these coatings do not prevent the growth of diatom-based brown slimes (RVIM 2018). Silicone-based coatings also damage easily and require professional application. Recent studies have also suggested that silicone-based coatings leach silicone compounds into the surrounding water. Silicone is a persistent chemical in the environment (Ecology 2017 and 2019), yet the environmental implications of silicone leaching have not been examined.

Fluorinated polymer-based coatings, which use PTFE (Teflon), PFOA, and PFAS compounds, have similar data gaps. Studies have shown that these compounds are stable despite changes in pH, salinity, temperature, and sunlight. However, these compounds can be bioaccumulative, and the leach rates and environmental impacts of PFOA/PFAS compounds in the marine environment are unknown (Ecology 2019).

Ecology was unable to recommend either silicone- or fluorine-based non-biocidal coatings due to continuing research regarding the environmental impacts of these compounds in marine environments. Consequently, recent recommendations regarding copper AFPs have emphasized non-coating alternatives (such as routine brushings, floating docks, and out-of-water storage) rather than non-copper AFPs, and have encouraged the delay of restrictions on copper-based AFPs for further development and toxicity studies of viable alternatives.

Summary of Alternative AFP Evaluations

In response to the claims of readily-available nontoxic (i.e., non-biocidal) paints and the potential use of alternative biocidal AFPs, a summary of the findings from five studies commissioned by the USEPA, CalEPA, and Ecology were reviewed.

1. **In the USEPA 2011 study, only two paints were found to be effective in replacing copper-based paints: Intersleek 900 and Hempasil X3. Neither was designed for small, and mostly stationary, recreational vessels.** 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 limitation also applies to Hempasil X3, the other soft non-biocidal paint recommended in the study.
2. **Only one of the best-performing non-biocidal paints in the CalEPA 2011 study, Hempasil X3, is currently available in the same form.**
3. **The Ecology 2014 study concluded that the safety of the test paints was uncertain, and none of the tested non-biocidal paints were ideal alternatives to copper-based paint.** One non-biocidal paint, Intersleek 900, showed somewhat positive results. However, a hazard assessment conducted as a part of the same study revealed that all tested formulations contained hazardous chemicals that could pose human health and/or environmental risks as a result of their use. Furthermore, the hazard assessment was limited and incomplete due to undisclosed chemicals in the primers and paints.
4. **The Northwest Green Chemistry 2017 alternatives assessment did not recommend any particular paint because of the diversity of boater needs.** The report confirmed that less hazardous alternatives to copper AFPs are available, but sufficient information was not available for the four evaluated non-biocidal coatings to determine the performance of these paints. Furthermore, Ecology (2017) acknowledged that there is little data to show how the few available non-biocidal AFP affect aquatic life or water quality.
5. **The Ecology 2019 review found that adequate information regarding the environmental safety of non-biocidal alternatives is not currently available**; in addition, many of the available alternatives to copper-based AFP may cause greater environmental harm.

Following the recommendations of Ecology (2017 and 2019), the **Washington State Legislature has delayed halting copper-based AFPs until January 1, 2026**, pending "feasible, reasonable, and readily-available" alternatives to copper-based AFPs by June 30, 2024 (SSB 6210).

Concerns Regarding Alternative AFP Availability and Safety

This review demonstrates continued concerns regarding the availability and proven effectiveness and safety of alternative AFP. There are only two non-biocidal paints tested in these studies that are still available (Table 5) and were recommended in one or more studies. Only one of these paints is still available with the tested formulation. Both paints are designed for commercial vessels and must be applied by professionals. Even though the paints are recommended as alternatives to copper, Ecology (2014, 2017, and 2019) maintains concerns over hazardous chemicals within the paints that could pose risks to humans and the marine environment. These concerns extend to many of the paints evaluated, which do not have full disclosure of ingredients because of proprietary rights and use compounds which have not been tested for use in marine systems.

Table 5. Summary of Non-biocidal Paints Recommended in USEPA (2011), CalEPA (2011), or Ecology (2014), and Available as of July 23, 2020

Paint	Reference
Hempel (USA), Inc.'s Hempasil X3 (87500)	USEPA 2011, CalEPA 2011
International Paint LLC's Intersleek 900 (*currently 1100SR*)	USEPA 2011, CalEPA 2011, Ecology 2014

Use of Commercial Paint on Recreational Vessels

Concerns regarding the applicability of these paints (which were designed for commercial use) to the recreational boating industry remain. 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. These paints are soft coatings that will be damaged by bumping and scratching, which will limit their effectiveness at sloughing organisms.

Furthermore, 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 authors 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 large 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 Northwest Green Chemistry 2017 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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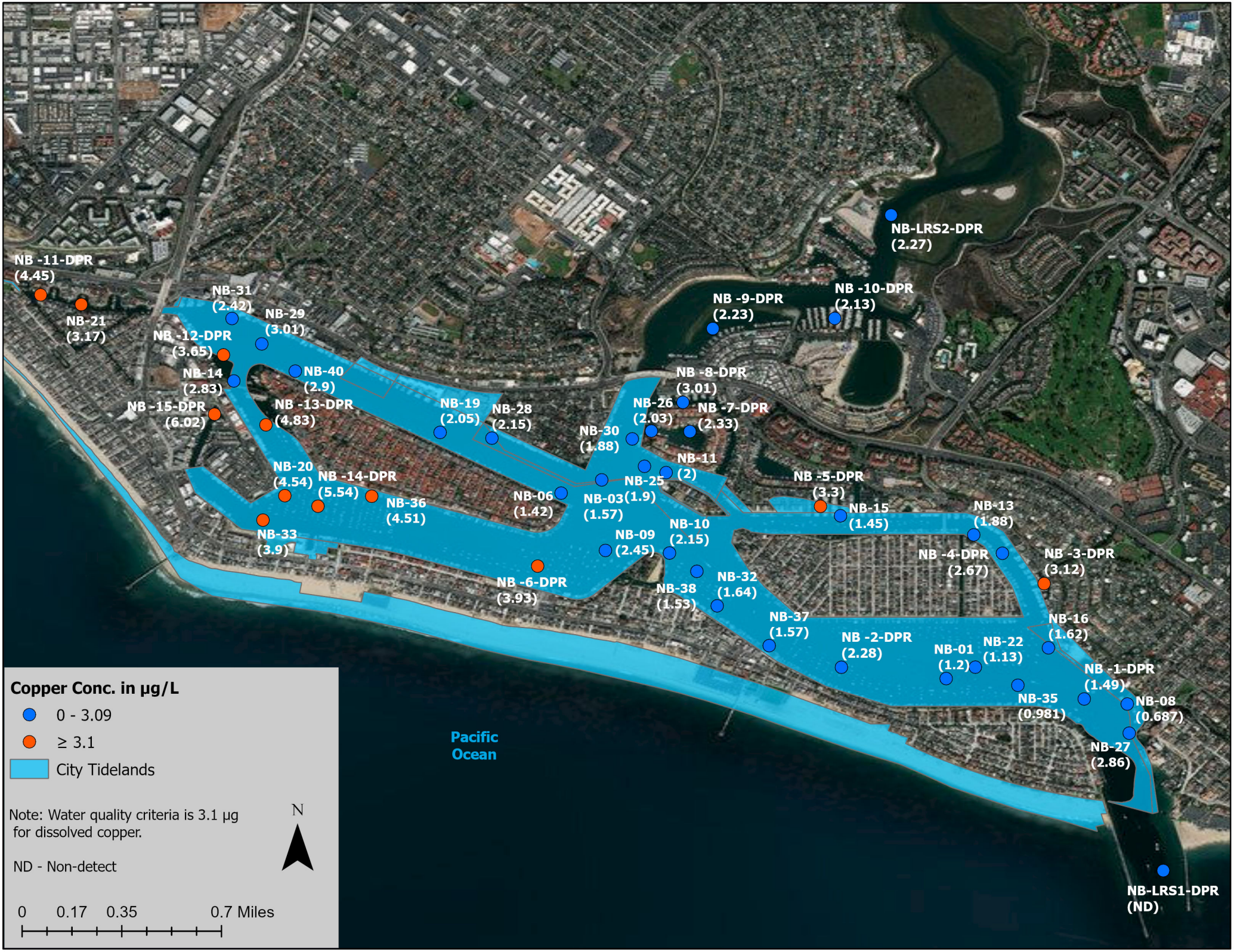
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NB-03 (1.57)
NB-30 (1.88)
NB-26 (2.03)
NB -8-DPR (3.01)
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NB -9-DPR (2.23)
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NB-13 (1.88)
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NB -3-DPR (3.12)
NB-16 (1.62)
NB -2-DPR (2.28)
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NB -1-DPR (1.49)
NB-35 (0.981)
NB-08 (0.687)
NB-27 (2.86)
NB-LRS1-DPR (ND)
Pacific Ocean
Copper Conc. in µg/L
0 - 3.09
≥ 3.1
City Tidelands
Note: Water quality criteria is 3.1 µg for dissolved copper.
ND - Non-detect
N
0 0.17 0.35 0.7 Miles