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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 μg/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 µg/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.