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San Diego Regional Water Quality Control Board

TO: Matt O'Malley
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FROM: Cynthia Gorham
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SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

DATE: February 5, 2016

SUBJECT: PROPOSED SITE-SPECIFIC WATER QUALITY OBJECTIVES FOR COPPER AND ZINC IN CHOLLAS CREEK

The following summarizes your concerns expressed to the San Diego Regional Water Quality Control Board regarding proposed site-specific water quality objectives (WQOs) for dissolved copper and dissolved zinc in Chollas Creek:

1. Will increasing the dissolved metals concentrations in Chollas Creek raise metals concentrations at Chollas Creek mouth to a point of significantly impacting key beneficial uses, water quality objectives, or sediment quality objectives?

2. Is it inappropriate to move forward on adopting Chollas Creek water effect ratios (WERs) before completing the Chollas Creek mouth investigative order (IO), which will determine the condition of the sediment and any action needed to remediate for contaminants of concern?

With respect to your first comment, adopting the site- and chemical-specific WERs will not change water quality objectives or sediment quality objectives; and there is no indication that it will negatively impact beneficial uses.

Comparison to Current Conditions

The proposed numeric targets that include the site-specific WERs for dissolved copper and dissolved zinc are lower than current concentrations. Updating the numeric targets to incorporate the site-specific WERs is not expected to increase metals concentrations in Chollas Creek or at the mouth. Numeric targets with site-specific WERs will still require reductions in metals so thus, there will be a decrease in metals concentrations in Chollas Creek and at the mouth.

Comparison to Default WER of 1 (Used in Absence of Site-Specific Data)

The mouth of Chollas Creek is listed as impaired for sediment toxicity and benthic community effects on the Clean Water Act Section 303(d) List of Water Quality Limited Segments (303(d) List). Based on toxicity identification evaluations conducted by Southern California Coastal Water Research Project (SCCWRP) for samples collected at the mouth of Chollas Creek in July 2001, October 2002, and April 2004, metals are not likely to be a source of toxicity in sediments, and dissolved metals in pore water in sediments were generally at levels that were not expected to be toxic (SCCWRP 2011)[1]. This conclusion was also supported by a separate study conducted by SCCWRP and the U.S. Navy (2005)[2] in which it was determined that polychlorinated biphenyls (PCBs), Chlordane, and polycyclic aromatic hydrocarbons (PAHs), and not metals, were likely causes of observed impairments at the mouth of Chollas Creek. Furthermore, this same study indicated low sediment copper and zinc concentrations in Chollas Creek itself and at the mouth of the Creek. Copper and zinc concentrations observed in other locations near the mouth of Chollas Creek were comparable to reference sediment concentrations reported. Thus, even the current loadings of copper and zinc from Chollas Creek do not appear to result in downstream sediment accumulations that would be harmful to aquatic life or wildlife.

The United States Environmental Protection Agency (USEPA) and numerous researchers have demonstrated that metals such as copper and zinc are toxic to aquatic life only when they are bioavailable; i.e., when they exist in the free ionic state as dissolved metals. There is strong evidence indicating that the bioavailability of copper and zinc in Chollas Creek is very limited. This is discussed in a 2014 City of San Diego report titled *Development of Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation of Lead* (WER Study). For both metals, bioavailability is inversely related to the amount of dissolved organic carbon (DOC), suspended solids, pH, and other physicochemical factors. When DOC, suspended solids, or pH are higher in the water, copper and zinc are less toxic to aquatic life. Chollas Creek contains naturally high DOC concentrations, suspended solids, and a neutral pH; pH values of 7.0 or more have been observed in Chollas Creek in over 15 years of monitoring. It is well established that these water quality characteristics of Chollas Creek reduce the potential for deleterious effects on aquatic life.

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[1] SCWRRP, 2011. Sediment Toxicity Identification Evaluation for the Mouths of Chollas and Paleta Creek, San Diego. Technical Report 669. November 2011

[2] Southern California Coastal Water Research Project and Space and Naval Warfare Systems Center San Diego, U.S. Navy, 2005. Sediment Assessment Study for the Mouths of Chollas and Paleta Creek, San Diego Phase I Final Report. May 2005

The WER Study confirmed the low toxicity of copper and zinc and USEPA's Biotic Ligand Model (BLM) for copper also confirmed that the proposed site-specific WER for copper is protective of aquatic life in Chollas Creek as well as downstream waters due to the naturally high DOC concentrations and neutral pH of the water. Therefore, copper and zinc concentrations meeting the proposed site-specific WQOs will be protective of beneficial uses in Chollas Creek and downstream waters.

In addition, conditions at the mouth of Chollas Creek also lend themselves to reduced bioavailability of copper and zinc. Chollas Creek flow is primarily wet weather driven, which results in short duration high flows that mix rapidly with the Bay. Oxygenation during the mixing process promotes sorption of the metals to suspended sediments as carbonates, hydroxides, and other insoluble forms. Metals bound to sediments are not readily bioavailable to benthic organisms or other aquatic life because of the neutral pH and presence of natural agents that tightly bind these metals. This was demonstrated by sediment toxicity tests conducted on samples from the mouth of Chollas Creek confirming that the sediment was non-toxic to several species, including mussel embryo-larval development. The blue mussel is one of the most sensitive estuarine species to copper according to USEPA's saltwater copper criteria. The fact that the water and sediments were not toxic to this sensitive species, using an early life stage, indicates that copper and zinc concentrations are not an issue in terms of protection of downstream beneficial uses.

Applying the site-specific copper and zinc WERs would result in increased water quality criteria for these metals. These site-specific WQOs would be no less protective of aquatic life; they would simply be more representative of actual conditions by taking into account the degree to which these metals are bioavailable to aquatic life. In addition, the site-specific WQOs would still require significant reductions of copper and zinc concentrations in the discharges from the Chollas Creek watershed to San Diego Bay compared to current discharges. The WER establishes the appropriate level of metals reduction to be protective of not only Chollas Creek, but downstream water quality as well because the site-specific WQOs take into account downstream water quality characteristics and the bioavailability of copper and zinc at the mouth. The naturally high levels of DOC, neutral pH, oxygenation of the water, and availability of naturally occurring binding agents, greatly limits the bioavailability of copper and zinc in the Creek itself as well as at the mouth and in the Bay. Several studies over the past 10 years have confirmed that copper and zinc are not a likely cause of toxicity in water or sediments at the mouth of Chollas Creek.

Also, as noted above, future loadings will decrease in order to meet the site-specific WQOs. The reduction of copper and zinc loadings into the Chollas Creek watershed are expected to result in a reduction of these metals in the water column, in sediment pore water, and in sediments in San Diego Bay, which would be further protective of aquatic life uses and allow the attainment and maintenance of water quality standards (i.e. beneficial uses and water quality objectives) in San Diego Bay.

With respect to your second comment, as explained above, metals are not likely to be a source of toxicity in sediments. However, in order to achieve a comprehensive assessment, the proposed IO will require metals analysis in addition to the aforementioned contaminants of potential concern. If the IO results or any subsequent risk assessments reveal that dissolved copper or zinc at concentrations prescribed by the California Toxics Rule (CTR) do indeed compromise beneficial uses at the Chollas Creek mouth, the TMDLs for metals in Chollas Creek would have to be revisited. However, as discussed above, this is not likely to be the case because the proposed TMDLs that incorporate site-specific WERs are in compliance with the CTR and in addition, the copper and zinc has limited bioavailability based on the conditions at the mouth of Chollas Creek.

If you have additional concerns or questions, please contact Melissa Valdovinos at (619) 521-8039 or mvaldovinos@waterboards.ca.gov.