FINAL
2016 SHELTER ISLAND YACHT BASIN DISSOLVED COPPER TOTAL MAXIMUM DAILY LOAD MONITORING AND PROGRESS REPORT

Submitted to:
California Regional Water Quality Control Board
San Diego Region

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EXECUTIVE SUMMARY

This report is the annual Shelter Island Yacht Basin (SIYB) Dissolved Copper Total Maximum Daily Load (TMDL) Monitoring and Progress Report for 2016, which has been prepared in compliance with Investigative Order No. R9-2011-0036 (Investigative Order), issued by the San Diego Regional Water Quality Control Board (Regional Board) to the San Diego Unified Port District (Port) on March 11, 2011. The Investigative Order states that TMDL implementation progress is to be determined by (1) tracking data on the number of vessels that have converted from using copper-based hull antifoulant paints (AFPs) to using alternative AFPs, and (2) monitoring dissolved copper concentrations and toxicity in the water column. Passive leaching of copper from vessel hull paints has been identified as the major source of dissolved copper in SIYB; it composes 93 percent of the total load, according to the TMDL. The dissolved copper load attributed to in-water hull cleaning was identified as second highest source in SIYB.

In 2012, the first TMDL interim compliance target, a 10 percent load reduction, was achieved. The 2016 monitoring period marks the fourth year in the second TMDL interim compliance period, which requires a 40 percent load reduction by the end of 2017. There is no new compliance target for 2016 if the 10 percent load reduction is met and progress continues toward the next interim target. Per the requirements of the Investigative Order, the *SIYB TMDL Monitoring Plan* (Amec Foster Wheeler Environment & Infrastructure, Inc. [Amec Foster Wheeler], 2016a) describes the monitoring program that is used to track the progress of implementing the SIYB Dissolved Copper TMDL and achieving the required dissolved copper load reductions.

This 2016 Monitoring and Progress Report follows the approach described in the most recent Monitoring Plan and reports on best management practice (BMP) implementation in SIYB and San Diego Bay, vessel conversions, and water quality monitoring, as required by the Investigative Order.

Best Management Practice Implementation

The Port and the Shelter Island Master Leaseholders TMDL Group have been implementing a variety of Best Management Practices (BMPs) to reduce dissolved copper loading and improve water quality in SIYB. During 2016, several BMP activities continued or were implemented, including the following:

- On-going education and outreach activities, such as publication and distribution of brochures, outreach events (i.e., the Green and Clean Marina Festival), etc.
- Continuing efforts to encourage the use of low-leach copper paints (i.e., Department of Pesticide Regulation [DPR] Category I paints [i.e., paints with leach rates ≤9.5 micrograms per square centimeter per day [µg/cm^2/day]]) and non-copper alternatives.
- Establishment of the Port's Blue Tech business incubator, which will assist in the creation and development of pilot projects.

Additionally, beginning in July 2018, DPR Category II paints (i.e., paints with leach rates >9.5 µg/cm^2/day) will no longer be available for use in vessels located in California saltwater marinas (DPR Rule).

Vessel Conversions and Reduction of Dissolved Copper

Based on the vessel tracking assumptions discussed in Section 2.3.4 of this report, the transition of a vessel to non-copper hull paint was assumed to reduce annual loading by 0.9 kilogram per year (kg/yr), and the transition to DPR Category I or low-copper hull paints was assumed to reduce loading by 50 percent (i.e., 0.45 kg/yr). Vessel tracking indicates that there has been a reduction of over 41.6 percent (approximately 873 kg/yr) in annual dissolved copper loading to SIYB from vessels when compared with the SIYB TMDL-assumed baseline loading of 2,100 kg/yr[1].

The 41.6 percent dissolved copper load reduction calculated for the 2016 monitoring period is a result of (1) refinement in the vessel tracking and reporting process, and (2) continued transition of vessels to non-copper, Department of Pesticide Regulation (DPR) Category I (low leach), and low-copper hull paints. Based on the 2016 load reduction result (41.6 percent), the SIYB TMDL program is on target to achieve the second interim load target by the end of the second compliance period (the end of 2017).

Water Quality Monitoring

Monitoring of water column dissolved copper and toxicity is required to determine whether and when water quality objectives have been attained, and beneficial uses have been restored. In August 2016, water quality was sampled at six stations in SIYB and at one reference station (adjacent to SIYB near the main San Diego Bay navigation channel) to determine dissolved copper concentrations in the basin, test for acute and chronic toxicity, and assess water quality trends.

Results from the August 2016 monitoring event showed that the basin-wide average dissolved copper level was 7.1 microgram(s) per liter (µg/L), which was approximately 14 percent lower than the 2005–2008 baseline average (8.3 µg/L), and similar to the basin-wide average levels observed in 2015 (6.9 µg/L) and 2014 (7.0 µg/L). Consistent with results of previous years, dissolved copper results at five of the six SIYB sampling stations exceeded the California Toxics Rule (CTR) criterion continuous concentration (CCC) water quality objective (WQO) of 3.1 µg/L. The 2016 monitoring event also showed that dissolved copper concentrations at four of the six stations had exceeded the CTR acute criterion maximum concentration (CMC) WQO (4.8 µg/L). This result is the same as that observed in 2015.

The 2016 monitoring program found that only one station (SIYB-1, the station farthest inside the basin) had statistically significant effects on developing mussel larvae. This finding is consistent with results of previous studies. No toxicity was observed in the fish larvae survival tests.

In addition to the annual TMDL water quality monitoring performed in 2016, a water quality special study was also conducted. This special study involved an expanded assessment of the dissolved copper levels in SIYB waters beyond the six TMDL stations and throughout the water column. The results of the special study showed that exceedances of the CTR dissolved copper objectives were present throughout the basin, whether within marinas or in open water areas.

[1] The total dissolved copper load per the SIYB TMDL equals 2,100 kilograms per year (kg/yr) from vessel paints (the total includes contributions from passive leaching and in-water hull cleaning). The estimated load contributions from background sources, urban runoff, and atmospheric deposition are not included in this total.

The results of the special study are in general agreement with the findings of the 2016 TMDL monitoring program with respect to copper levels and concentration gradients.

Summary

The SIYB TMDL monitoring program results indicate that the 2nd interim target, a 40 percent load reduction, was achieved during 2015, and was repeated in 2016. As such, the program, with continued implementation, appears on track to maintain this load reduction through the 2017 target year. In contrast, dissolved copper levels in SIYB have not been significantly reduced in comparison with baseline levels. The basin-wide levels of dissolved copper (and toxicity) in surface waters have remained relatively constant (not increasing or decreasing) over the previous three monitoring cycles and the SIYB special study found basin-wide concentrations similar to the findings of the TMDL. Although a more complete accounting of actual vessel hull paints types and occupancy rates has allowed for a better estimate of copper loading compared to the baseline load from the TMDL, some of the load reduction improvements may be a function of the accuracy of the annual vessel survey.

For measurable water quality improvements to be realized in SIYB (i.e., reductions in basin-wide dissolved copper levels), additional reductions in copper loading will need to occur. Necessary actions include eliminating the use of high-copper paints, continuing the transition to non-copper and DPR Category I paints, and identifying and implementing additional copper reduction strategies to address passive leaching and in-water hull cleaning. The continued effort by the Port and SIML TMDL Group to implement BMPs coupled with anticipated initiatives from DPR are expected to assist with future load reductions.

The final five-year phase of the SIYB TMDL begins in 2018. For this phase, the Port is proposing to work with the Regional Board and stakeholders to identify copper reduction implementation concepts, strategies, and policy initiatives that will be evaluated for consideration in the final phase of the TMDL. Efforts to meeting the final load reduction target will focus on additional actions that can directly decrease the copper load in the basin and throughout the bay.