EXECUTIVE SUMMARY

This report is the annual Shelter Island Yacht Basin (SIYB) Dissolved Copper Total Maximum Daily Load (TMDL) Monitoring and Progress Report for 2017, 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.

The 2017 monitoring period marks the fifth and final year of the second TMDL interim compliance period, which requires a 40 percent load reduction. Per the requirements of the Investigative Order, the *SIYB TMDL Monitoring Plan* (Amec Foster Wheeler Environment & Infrastructure, Inc. [Amec Foster Wheeler], 2017a) 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 2017 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 BMPs to reduce dissolved copper loading and improve water quality in SIYB. During 2017, several BMP activities continued or were implemented, including the following:

- Ongoing education and outreach activities, such as regular meetings with stakeholders and up-to-date online content.
- 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.
- The acceptance of two proposals pursuing alternative methods for copper reduction in marine waters through the Port's Blue Economy Incubator, which supports the research and development of pilot projects.

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 45.4 percent (approximately 952.7 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 45.4 percent dissolved copper load reduction calculated for the 2017 monitoring period is a result of (1) continuous improvement of the vessel tracking and reporting process, and (2) continued transition of vessels to non-copper DPR Category I (low leach), and low-copper hull paints. Based on the 2017 load reduction result (45.4 percent), the second compliance target of the SIYB TMDL program has been achieved.

Water Quality Monitoring

Monitoring of water column dissolved copper and toxicity is required to determine whether and when water quality objectives have been met, and beneficial uses have been restored. In August 2017, 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 2017 monitoring event showed that the basin-wide average dissolved copper level was 7.9 microgram(s) per liter (µg/L), which was approximately 5 percent lower than the 2005–2008 baseline average (8.3 µg/L), but higher than the basin-wide averages observed during the previous three monitoring events (2016 [7.1 µg/L], 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 2017 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 finding is the same as was observed in 2016.

The 2017 monitoring program found that two stations (SIYB-1 and SIYB-2, the stations 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 2017, a special study examining the potential effect of tidal influence on dissolved copper concentrations of surface water over a full semidiurnal tidal cycle (Time Series Study) was completed in January 2018. This study addressed how a full tidal cycle may influence surface water dissolved copper concentrations. The Time Series Study involved collection of surface water samples at three stations located throughout SIYB at approximately two-hour intervals for the duration of a full tidal cycle (approximately 25 hours). Overall, the results of this study indicated that tidal variations may affect the dissolved copper concentrations in surface waters of SIYB, however

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.

much of what was observed appeared dependent on location within the basin. The technical report summarizing the Time Series Study is included as Appendix E of this report.

Summary

The SIYB TMDL monitoring program results indicate that the second interim compliance target, a 40 percent load reduction by 2017, was reached. Since the initiation of the vessel tracking program in 2008, a load reduction of nearly 953 kilograms (kg) has been achieved (compared to the TMDL load assumption of 2,100 kg). This level of reduction (45.4 percent) exceeds the 2017 TMDL load reduction target. A key factor for the load reduction achievement is the ongoing conversion of vessels from high leach rate copper paints to Category I paints and non-copper alternatives.

Future reductions in the dissolved copper levels in SIYB surface waters will be incumbent on further reducing copper inputs. Substantial reduction of dissolved copper inputs to SIYB waters should occur beginning on July 1, 2018. On this date, the DPR Rule takes effect. This rule mandates that only copper AFPs with a leach rate of ≤9.5 micrograms per square centimeter per day (µg/cm^2/day) (i.e., Category I paints) may be applied to recreational vessels that are berthed in California saltwater marinas. This mandated reduction of copper inputs should complement existing reduction efforts, such as the ongoing transition to non-copper paints and the implementation of BMPs by both the Port and the SIML TMDL Group.