FINAL
2017 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

Prepared by:

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Prepared for:

Port of San Diego

March 2018

Amec Foster Wheeler Project No. 1715100603

PORT of
SAN DIEGO
Waterfront of Opportunity

March 29, 2018

California Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700
Attn: Mr. Wayne Chiu

Subject: Submittal of the 2017 Shelter Island Yacht Basin Total Maximum Daily Load Monitoring and Progress Report

Dear Mr. Chiu,

Please find enclosed a hard copy and CD of the 2017 Shelter Island Yacht Basin Total Maximum Daily Load Monitoring and Progress Report.

Following submission of this report, the Port and the Shelter Island Master Leaseholders Group would like to meet with you and go over the report, address any of your questions, and discuss direction regarding the final compliance phase of the TMDL.

I will be following up shortly to schedule a meeting at your convenience.

Please feel free to contact me at (619) 686-6372 if you have any questions on the information provided above.

Respectfully,

Kelly Tait

Kelly Tait
Senior Environmental Specialist
Environmental Protection
San Diego Unified Port District

KT/aa
Attachments: 2017 Shelter Island Yacht Basin Total Maximum Daily Load Monitoring and Progress Report & CD
cc: Jason H. Giffen
  John Carter
D2# 1505120

March 2018

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Karen Holman
Director
Environmental Protection
San Diego Unified Port District

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ACRONYMS AND ABBREVIATIONS

303(d) list	Clean Water Act Section 303(d) list of water quality impaired segments
AB	Assembly Bill
AFP	antifoulant paint
AFS	antifouling strategy
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc. (formerly AMEC Environment & Infrastructure, Inc.)
Basin Plan	Water Quality Control Plan for the San Diego Basin – Region 9
BLM	biotic ligand model
BMP	best management practice
CCC	criterion continuous concentration
CCR	California Code of Regulations
CMC	criterion maximum concentration
COC	chain-of-custody
CTR	California Toxics Rule
CTD	conductivity, temperature, and depth
CWA	Clean Water Act
DO	dissolved oxygen
DOC	dissolved organic carbon
DPR	Department of Pesticide Regulation
EC_{50}	median effective concentration
ELAP	California Environmental Laboratory Accreditation Program
FAQ	frequently asked question
H_2SO_4	sulfuric acid
HPB	Harbor Police Dock
ID	identification
Investigative Order	Investigative Order No. R9-2011-0036
LC_{50}	median lethal concentration
LID	low-impact development
LOEC	lowest observed effect concentration
MAMPEC	Marine Antifoulant Model to Predict Environmental Concentrations
MAR	marine habitat
MIACC	Marina Inter-Agency Coordinating Committee
Monitoring Plan	SIYB Dissolved Copper TMDL Monitoring Plan
MS4	Municipal Separate Storm Sewer System
N/A	not applicable
Nautilus	Nautilus Environmental Laboratory
NOEC	no observed effect concentration
OAL	Office of Administrative Law
PDF	Portable Data Format
PMSD	percent minimum significant difference
Port	San Diego Unified Port District
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
Regional Board	San Diego Regional Water Quality Control Board
RFP	request for proposal
RHMP	Regional Harbor Monitoring Program
SBE	Sea-Bird Electronics
SIML	Shelter Island Master Leaseholders
SIYB	Shelter Island Yacht Basin
SM	Standard Method
SOP	standard operating procedure
SUSMP	Standard Urban Stormwater Mitigation Plan

ACRONYMS AND ABBREVIATIONS (continued)

SWAMP	Surface Water Ambient Monitoring Program
SWQMP	Stormwater Quality Management Plan
SWRCB	State Water Resources Control Board
Time Series Study	24-Hour Time Series Analysis of Dissolved Copper in SIYB
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TSS	total suspended solids
TST	test of significant toxicity
USEPA	United States Environmental Protection Agency
Weck	Weck Laboratories
Weston	Weston Solutions, Inc.
WILD	wildlife habitat
WQO	water quality objective
YSI	YSI Incorporated

UNITS OF MEASURE

%	percent
±	plus or minus
°C	degree(s) Celsius
~	approximately
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
µ	micron(s)
µg	microgram(s)
µg/cm^2/day	micrograms per square centimeter per day
µg/L	microgram(s) per liter
µm	micrometer(s)
cm^2	square centimeter(s)
ft	feet or foot
kg	kilogram(s)
kg/yr	kilograms per year
kg/yr/vessel	kilograms per year per vessel
L	liter(s)
m	meter(s)
m^2	square meter(s)
mg	milligram(s)
mg/L	milligram(s) per liter
mL	milliliter(s)
pH	hydrogen ion concentration
ppt	part(s) per thousand
yr	year(s)

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

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[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.

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1.0 INTRODUCTION

This report is the annual Shelter Island Yacht Basin (SIYB) Dissolved Copper Total Maximum Daily Load (TMDL) (SIYB 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 (Regional Board, 2011). The Investigative Order, issued under Section 13325 of the Porter-Cologne Water Quality Control Act, requires that the Port provide technical reports on the progress of the SIYB TMDL. The SIYB TMDL implementation progress is to be determined by tracking data on the number of vessel hulls converted from using copper-based antifoulant paints (AFPs) to using non-copper or low-copper alternatives and by monitoring dissolved copper concentrations and toxicity in the water column. These measures are used to assess copper load reductions and to evaluate progress toward attaining water quality objectives (WQOs) and protecting beneficial uses.

1.1 Background

Shelter Island Yacht Basin is a recreational yacht basin near the mouth of San Diego Bay, California, and is composed of marinas and yacht clubs, an anchorage, a fuel dock, and other facilities that support the marine industry. SIYB is in an area where the configuration of the enclosed basin reduces tidal flushing (Figure 1-1).

Copper is commonly used as a biocide in vessel AFPs because of its effectiveness in reducing fouling of vessel hulls. It is currently legal to use copper in vessel paints in the State of California. However, these paints leach copper into the water column. Copper is not only toxic to the targeted fouling organisms on vessel hulls, but may also be toxic to other non-targeted organisms that inhabit the basin.

SIYB waters contain dissolved copper concentrations that have exceeded the dissolved copper numeric WQO as well as the toxicity and pesticides narrative WQOs, and these contaminants threaten and impair the wildlife habitat and marine habitat beneficial uses in the basin. Because of this exceedance, SIYB was placed on the list of impaired water bodies compiled pursuant to federal Clean Water Act (CWA) Section 303(d) (the 303(d) list). The SIYB TMDL was developed to address and resolve this impairment by reducing the loading of dissolved copper to SIYB.

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Figure 1-1. Location of Shelter Island Yacht Basin in San Diego Bay

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1.2 SIYB TMDL Compliance Schedule

Under Resolution R9-2005-0019, the SIYB TMDL requires that loading of dissolved copper into the water column be reduced by 76 percent, from 2,163 kilograms per year (kg/yr) to 567 kg/yr over a 17-year period (Regional Board, 2005). This period extends to 2022, based on the official SIYB TMDL approval date[2] of February 9, 2005. No reductions in dissolved copper loading were required during the initial two-year orientation period (2005–2007). The subsequent 15-year period requires incremental reductions of dissolved copper loading by 10 percent within 7 years (2012); by 40 percent within 12 years (2017); and by 76 percent within 17 years (2022) (Table 1-1).

Table 1-1.
Loading Targets for SIYB TMDL Attainment

Stage	Time Period	Percent Reduction from SIYB TMDL Estimated Loading	Reduction to be Attained by End of Year	Estimated Target Loading (kg/yr of Dissolved Copper)
1	2005–2007	0	N/A	N/A
2	2008–2012	10[a]	2012 (7 years)	1,900
3	2013–2017	40	2017 (12 years)	1,300
4	2018–2022	76	2022 (17 years)	567

Notes:
[a] Loading calculations presented in the 2012 SIYB TMDL Monitoring and Progress Report showed that a 17 percent load reduction had been achieved. Compliance with the 2012 load reduction goal of 10 percent or greater was confirmed by the Regional Board in a letter to the Port dated July 26, 2013.
kg/yr = kilogram(s) per year; N/A = not applicable; SIYB TMDL = Shelter Island Yacht Basin Total Maximum Daily Load

For the first SIYB TMDL compliance year (2012), loading calculation estimates presented in the 2012 Monitoring Report indicated a 17 percent reduction in dissolved copper loading to SIYB, thus exceeding the 10 percent goal. In a letter dated July 26, 2013, the Regional Board stated, "*Based on the data submitted and information provided in the Report [2012 SIYB TMDL Monitoring and Progress Report], the 10 percent reduction in dissolved copper loading required to demonstrate compliance with the SIYB TMDL by the December 1, 2012, compliance date was achieved.*"

The 2017 monitoring period is a compliance year, and the final year of the third interim stage of the TMDL. The fourth and final interim stage begins in 2018.

1.3 Sources of Dissolved Copper

Based on the Regional Board's source analysis, the total mass load of dissolved copper to SIYB was estimated to be 2,163 kg/yr, of which 98 percent of inputs were attributable to passive leaching of copper from copper-based hull paints on vessels and to hull-cleaning activities (Table 1-2). The total copper load from the SIYB TMDL equals 2,100 kg/yr from vessel paints. The estimated load reduction resulting from background, urban runoff, and atmospheric deposition (which equates to approximately 63 kg/yr) is not included in this total. This report

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[2] For a TMDL to be incorporated into the Water Quality Control Plan for the San Diego Basin – Region 9 (Basin Plan), it must be approved by the Regional Board, State Water Resources Control Board (SWRCB), Office of Administrative Law (OAL), and United States Environmental Protection Agency (USEPA) Region 9. The official TMDL approval date is the OAL approval date.

evaluates the dissolved copper loading based on the vessel-related contribution, totaling 2,100 kg/yr.

Table 1-2.
Sources of Dissolved Copper per the SIYB TMDL

Source	Estimated Mass Load to SIYB (kg/yr)	Contribution to SIYB (Percent Dissolved Copper)
Passive Leaching	2,000	93
Hull Cleaning	100	5
Urban Runoff	30	1
Background	30	1
Direct Atmospheric Deposition	3	<1
Sediment	0	0
Total	2,163	100

Notes:
kg/yr = kilogram(s) per year; SIYB = Shelter Island Yacht Basin

1.4 Water Quality Objective Criteria

The WQO for dissolved copper in SIYB is equal to the National Recommended Water Quality for Aquatic Life of the United States Environmental Protection Agency (USEPA) and the California Toxics Rule (CTR) water quality values for dissolved copper in marine environments (USEPA, 2000). Continuous or chronic exposures may not exceed 3.1 micrograms per liter (µg/L) over a 4-day average; acute exposures may not exceed 4.8 µg/L over a 1-hour average. In addition, numeric WQOs must not be exceeded more than once every three years.

In addition to numeric WQOs, the *Water Quality Control Plan for the San Diego Basin – Region 9* (Basin Plan) established narrative WQOs for toxicity and pesticides (Regional Board, 1994) as follows:

Toxicity Objective – *All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms; analyses of species diversity, population density, and growth anomalies; and bioassays of appropriate duration; or other appropriate methods as specified by the Regional Board.*

Pesticide Objective – *No individual pesticide or combination of pesticides shall be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses. Pesticides shall not be present at levels that will bioaccummulate in aquatic organisms to levels that are harmful to human health, wildlife, or aquatic organisms.*

Two beneficial uses within SIYB are threatened by elevated dissolved copper concentrations: marine habitat (MAR) and wildlife habitat (WILD). The Regional Board indicated that, if numeric WQOs are met for dissolved copper, then narrative WQOs will also be considered to be met. However, because current numeric WQOs are not site-specific, direct assessments of toxicity as well as SIYB biota also directly indicate basin-wide attainment of beneficial uses and narrative WQOs.

1.5 Monitoring Purpose

Because of the proportional contribution of copper loading to SIYB from copper-based hull paints, tracking of vessel conversions from copper to non-copper or lower copper hull paints is the primary method used to assess compliance with interim SIYB TMDL load reduction targets. In addition, water quality monitoring assesses long-term trends in the basin and provides comparisons with the numeric and narrative WQOs, as measured by surface water dissolved copper concentrations and toxicity. As with all TMDL projects, monitoring is a necessary component to ensure that water quality standards are gradually being met. By conducting both vessel tracking and water quality monitoring on an annual basis, the program will eventually be able to evaluate the relationship between load reductions and water quality. Additionally, this approach will provide the data needed to assess the overall effectiveness and success of the SIYB TMDL implementation in attaining both loading reductions and numeric WQOs to protect the basin's MAR and WILD beneficial uses.

1.6 Revision of Monitoring Plan

The Monitoring Plan (Revision 3) was updated for the 2017 monitoring year to include the modification of several field procedures:

- Field filtration of all samples collected for dissolved copper and zinc analyses, in agreement with the USEPA 1640 protocol.
- Performance of a top-to-bottom vertical water quality profile (using a conductivity, temperature, and depth [CTD] profiler) at each station to evaluate pH, temperature, light transmittance, and salinity with depth in the water column.
- Addition of total suspended solids (TSS) analyses.

1.7 Implementation of Best Management Practices

The Port has incorporated a copper reduction program and best management practices (BMPs) to reduce copper loads in SIYB and throughout San Diego Bay. The five elements of this program are:

- Testing and research
- Transition to Category I paints and non-copper hull paints
- Policy development and legislation
- Education and outreach to boaters
- Monitoring and data assessment

The Shelter Island Master Leaseholders (SIML) TMDL Group was formed to represent the 11 marinas and yacht clubs in SIYB. The group's purpose is to compile information from marinas and yacht clubs collected from the boat owners in their facilities for SIYB TMDL Investigative Order reporting requirements. In addition, the SIML TMDL Group has developed a BMP program specific to the marinas and yacht clubs in SIYB.

Over the course of the SIYB TMDL program, multiple quality control measures have been integrated to build on previous knowledge and to help effectively implement the SIYB TMDL program.

Additional measures include:

- Meetings between the Port and other stakeholders in SIYB about the SIYB TMDL
- Increased scrutiny of water quality data and analytical methods
- Reassessment of field sampling techniques, including additional oversight of field procedures
- Review of methods used to track the type of hull paints used on vessels in SIYB

These measures were implemented to collect relevant useful data and to enhance communication among all involved parties. The intent of this iterative and collaborative process is to provide transparency to the process and to provide a known and scientifically defensible dataset to support the SIYB TMDL compliance objectives.

1.8 Recent AFP and Copper Initiatives

In addition to the BMP implementation, vessel tracking, and water quality monitoring, this monitoring report also identifies other policy- or legislative-related activities during the reporting period and discusses, where applicable, how these actions factor into this report. These items are summarized below and are discussed further in Section 4.

Department of Pesticide Regulation Actions

The Department of Pesticide Regulation (DPR) is the agency responsible for regulating pesticides, including antifouling paints, throughout the state of California. Over the course of the SIYB TMDL, the DPR has undertaken several actions related to copper AFPs. The following initiatives were ongoing within this reporting period:

- Updated List of Copper-based Antifoulant Paints by Leach Rate Category (DPR, 2017)
- DPR's adoption of section 6190 of Title 3, California Code of Regulations (DPR Rule). This action establishes a maximum allowable copper leach rate for copper-based AFP products registered in California for use on recreational vessels beginning July 1, 2018.

USEPA Actions

The USEPA is responsible for establishing federal water quality standards. During this reporting period, the USEPA opened a comment period for the Registration Review Proposed Interim Decisions for Copper Compounds, Case Number 0636, 0649, 4025, and 4026 (EPA-HQ-QPP-2010-0212). The review process allows for transparency as the USEPA considers the latest science when determining whether current regulations for copper require additional changes from the current legislation.

1.9 SIYB Time Series Study

Since the annual SIYB TMDL monitoring began in 2011, individual surface samples obtained for copper analyses have been collected at one point in the daily tidal cycle.

In an effort to understand how the tides may influence concentrations of dissolved copper in surface waters in SIYB, a 24-hour study was conducted in January 2018 to assess the pattern of surface water dissolved copper concentrations throughout the basin during one full semidiurnal tidal cycle (Time Series Study). The technical memorandum summarizing the findings of the Time Series Study is included as Appendix E and is briefly discussed in Section 4.3.

1.10 Content of Report

This TMDL Monitoring and Progress Report for SIYB presents the monitoring results for 2017 and includes:

- Methods to assess, estimate, and reduce copper loads
- TMDL implementation, including BMPs implemented by the Port in SIYB and throughout San Diego Bay
- A new marina and yacht club copper reduction BMP guidance document prepared by the SIML TMDL Group
- Evaluation, interpretation, and tabulation of data collected by the Port, SIML TMDL Group, yacht clubs, and marinas on vessel tracking and hull paint conversions
- Water quality monitoring data, including chemical and toxicological evaluations of surface water samples collected in August 2017
- Information regarding ongoing copper initiatives germane to the SIYB TMDL
- A summary of the data from the Time Series Study conducted in SIYB in January 2018
- Discussion of the 2017 TMDL monitoring program findings, including other copper-related issues and studies considered germane to the SIYB TMDL
- A summary of the SIYB TMDL monitoring program recommendations

The report also includes several appendices with additional supporting data. Appendix A is the 2017 SIYB TMDL Monitoring Plan. Appendix B contains BMP plans for both the Port and the SIML TMDL Group. Appendix C is the vessel tracking data spreadsheet (including information for each available slip) for the entire SIYB. Appendix D contains the water quality monitoring results for the August 2017 sampling event, including field-collected data, the analytical chemistry report, and the toxicity testing report. Appendix E contains a technical memorandum that presents the data of the Time Series Study conducted in SIYB in January 2018. Appendix F includes 2017 SIYB-related correspondence between the Port and other agencies and other pertinent information.

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2.0 METHODS

This section describes in detail the BMP plans in place to reduce copper loads, methods used to estimate load reductions (e.g., vessel hull paint tracking), field program methods to assess dissolved copper levels in SIYB, and project-specific quality assurance (QA) and quality control (QC) procedures used during water quality monitoring and data analysis.

2.1 SIYB Implementation of Best Management Practices

The Port has developed a comprehensive copper reduction program and maintains a cumulative list of copper reduction BMPs implemented in support of the TMDL since 2007 (Appendix B). In addition, the SIML TMDL Group selected and implemented BMPs that contribute to dissolved copper load reductions in SIYB. Selection, implementation, and effectiveness assessments of BMPs were at the discretion of each party. In compliance with Investigative Order reporting requirements, the SIML TMDL Group submits information annually to the Port that details the BMPs and actions implemented throughout the year to reduce dissolved copper loads to SIYB. The Port's BMP plan and the SIML TMDL Group's BMP plan are presented in Appendix B.

2.2 San Diego Bay-Wide Implementation of BMPs

The report in Appendix B also describes BMPs or other actions implemented by the Port to reduce dissolved copper discharges from vessel hulls into harbors or marinas within San Diego Bay. The Port reported the actions that were taken to reduce dissolved copper discharges to marinas beyond San Diego Bay, including actions with statewide or national applicability.

2.3 Dissolved Copper Load Analysis

This section describes the methods and procedures used to estimate dissolved copper loading into SIYB during 2017, including vessel tracking methodologies and estimates of the contribution of dissolved copper into SIYB attributable to in-water hull cleaning. This section also addresses how these two factors were combined to estimate the annual dissolved copper load to SIYB in 2017.

2.3.1 SIYB Hull Paint Guidance List

The comprehensive SIYB Hull Paint Guidance List (Port, 2017) originally prepared by the Port was used to assist with vessel tracking efforts. This guidance list groups individual AFPs by DPR leach rate categories and contains relevant product information such as paint name, product number, copper content, and DPR registration number. The list also includes new products available since 2012, or other non-copper biocide AFPs (i.e., zinc, Irgarol, etc.) or non-biocide (i.e., foul-release) coatings and products.

This guidance tool was developed to help marina operators compile their annual vessel data census more accurately. It is also intended to help demonstrate transparency in reporting the updated vessel tracking, enhance vessel tracking and reporting efforts, and reduce variability in vessel data.

2.3.2 Vessel Tracking

Annual reduction of copper loading was assessed by tracking conversions of hull paints from copper to non-copper or lower copper products (i.e., either by leach rate or copper content) for vessels moored in SIYB.

Yacht club and marina operators collected vessel-tracking data by distributing a survey form to all SIYB vessel owners. The survey, a standard form developed by the SIML TMDL Group, was given to all marina and yacht clubs in SIYB to distribute. An example of the survey form is in Appendix C. Although vessel owner response to the survey was not mandatory at all facilities, if no response was initially received, the yacht club and marina operator made follow-up attempts to gather the information by telephone calls and emails. The SIML TMDL Group self-reports and submitted the 2017 vessel tracking data to the Port in mid-January 2018. Prior to submittal to the Port, the SIML TMDL Group conducted a QC check of the survey results. New for the 2017 reporting period, the Port notified each marina that they must self-certify their data for accuracy and completeness. Marinas were asked to return a signed self-certification statement verifying the data that was submitted (see Appendix F for certification letters).

Once the survey results were received by the Port, each marina's annual hull survey data were crossed-checked against the product and registration numbers in the SIYB Hull Paint Guidance List. If the information conformed to the SIYB Hull Paint Guidance List, the vessel's paint was tracked as identified in the aforementioned categories. The vessel tracking information that is collected by the SIML TMDL Group during the hull survey is listed in Table 2-1. Vessel tracking data submitted to the Port by the SIML TMDL Group are in Appendix C.

Table 2-1.
Vessel Survey Data Collected in 2017

Vessel Tracking Data Fields	
1.	Name of Marina or Yacht Club
2.	Slip/Mooring Reference Number
3.	Percentage of Time Occupied
4.	Vessel Type (power or sail)
5.	Vessel Length
6.	Vessel Beam Width
7.	Paint Type (Copper, DPR Category I, Low-copper, or Non-copper)
8.	Paint Product Name
9.	Paint Product Number
10.	Boatyard Name or Purchase Date
11.	Painting Date (month)
12.	Painting Date (year)[a]
13.	Percent Copper
14.	DPR Category I Registration Number

Notes:
a. Aged-copper paints are determined by the painting date. To be considered an aged paint for the 2017 survey, the vessel would have had to be painted on or prior to December 31, 2014.
DPR = Department of Pesticide Regulation

Vessel tracking data from SIYB included the percentage of time that slips were unoccupied or were occupied by vessels with copper, lower copper (DPR Category I and low-copper paints), aged-copper paints, non-copper, or unknown hull paints, as required by the Investigative Order (Table 2-2). As indicated by the SIYB TMDL Group, the occupancy rate at most yacht clubs and marinas in SIYB was calculated using a nightly count of empty slips. The annual percentage of time that the slip was occupied was determined by dividing the total number of days occupied by 365 days.

Table 2-2.
Vessel Tracking Data Collected for 2017

Vessel Tracking Data Fields	
1.	Total number of slips or buoys in facility available to be occupied by vessels
2.	Number of unoccupied slips or buoys and length of time unoccupied during each year
3.	Number of vessels confirmed with copper-based hull paints and approximate length of time occupying a slip or buoy in facility each year
4.	Number of vessels confirmed with aged-copper-based hull paints[a] and approximate length of time occupying a slip or buoy in facility each year
5.	Number of vessels confirmed with DPR Category I paints[b] and approximate length of time occupying a slip or buoy in facility each year
6.	Number of vessels confirmed with alternative hull paints, by hull paint type, and approximate length of time occupying a slip or buoy in facility each year
7.	Number of vessels with unconfirmed information about hull paints and approximate length of time occupying a slip or buoy in facility each year
8.	Estimate of the dissolved copper load reduction achieved for the year (kg/yr and percent)

Notes:
[a]. Per 2013 Regional Board letter
[b]. Per Regional Board email dated October 21, 2015
DPR = Department of Pesticide Regulation; kg/yr = kilogram(s) per year

The SIML TMDL Group submitted vessel tracking data to the Port for the yacht clubs and marinas in SIYB, including confirmation of the category of hull paint reported for boaters who responded to the survey. Lower copper (DPR Category I or low-copper) and non-copper hull paints were considered to be confirmed if the required supporting data that were provided (i.e., all of the required data fields were completed) for a given hull paint confirmed the DPR registration number or product number of a reported paint (Table 2-1). Vessels stored out of the water (e.g., on HydraHoists®) or in slip liners, or reported to have no bottom paint, were also confirmed as having non-copper paint for that slip. For vessels to be considered as having hulls with aged-copper paints, the painting date submitted must have been on or before December 31, 2014, for the 2017 monitoring year.

To be conservative, loading was calculated for unconfirmed paints, assuming that paint was copper-based if the vessel owner did not know the paint's DPR registration number or product number. These data were used to calculate the annual dissolved copper load to SIYB from vessels under both confirmed and unconfirmed scenarios, as described further in Section 2.3.4.

2.3.3 Annual Copper Loads from Passive Leaching and In-Water Hull Cleaning

To estimate dissolved copper loads attributed to vessels for the SIYB TMDL monitoring program, the in-water hull-cleaning load (100 kg/yr) and passive leaching load (2,000 kg/yr) identified in Appendix 2 of the SIYB TMDL Technical Report[3] were combined to form a total vessel-related load of 2,100 kg/yr. This vessel-related baseline load was divided by the total vessel population identified in the TMDL (2,363 vessels), which resulted in an annual per vessel load of 0.89 kg/yr (rounded to 0.9 kg/yr). Therefore, any reference to the annual per vessel dissolved copper load is considered to be 0.9 kg/yr.

The dissolved copper load attributed to in-water hull cleaning was identified in Appendix 2 of the SIYB TMDL (Regional Board, 2005) as approximately 100 kg/yr. As part of this Regional Board's load estimation, it was assumed that all SIYB vessel hulls were painted with copper paint, all hulls were cleaned approximately monthly, and in-water hull-cleaning BMPs were used during half of the cleaning events.

As recommended in the 2015 Monitoring and Progress Report, starting in 2016 and continuing in 2017, the copper loads from passive leaching and in-water hull cleaning are presented separately. As discussed above, the annual per-vessel dissolved copper load is 0.9 kg/yr. This total annual per vessel load is composed of the load from passive leaching (approximately 0.86 kg/yr) and in-water hull cleaning[4] (approximately 0.04 kg/yr) per Appendix 2 of the SIYB TMDL (Regional Board, 2005). The copper loading estimates in Section 3.1.5 present separate load estimate calculations for passive leaching and in-water hull cleaning contributions using the TMDL assumption.

2.3.4 Annual Dissolved Copper Load

The SIYB TMDL copper load reduction is assessed by tracking the number of vessel hulls with copper paint, lower copper paint (DPR Category I or low-copper), aged-copper paint, or non-copper paint, as well as by counting the number of vacant slips in SIYB. Vessels that have aged-copper paint are considered to have a lower copper load (i.e., 0.45 kg/yr), but are tracked separately.

The vessel tracking program estimates loading reductions conservatively. If the hull paint name and type were unknown, the paint was assumed to be copper-based. Additionally, if the latest painting date was unknown, the vessel was assumed to be painted recently. Lastly, if the occupancy time of a slip or mooring was not reported, the slip or mooring was assumed to be occupied 100 percent of the time (i.e., 365 days per year). Data on paint categories for transient vessels visiting the Port-operated transient vessel dock and temporary anchorage were not available; therefore, these vessels were assumed to have copper hull paints.

The assumptions below were used by the Regional Board to derive the baseline copper loading identified in Appendix 2 of the SIYB TMDL Technical Report (Regional Board, 2005). Loading reductions for the 2017 SIYB TMDL monitoring program were calculated based on comparisons with these baseline conditions:

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[3] Appendix 2 of the SIYB TMDL is at the following website address: http://www.waterboards.ca.gov/sandiego/water_issues/programs/watershed/souwatershed.shtml

[4] The annual copper load contribution from in-water hull cleaning (0.04 kg/yr) presented in this report is based on the TMDL load assumption of 5 percent.

- All 2,363 SIYB slips or buoys were occupied by a number of vessels (N_v).
- All 2,363 recreational vessels moored within SIYB have copper-based paints 100 percent of the time.
- Annual loading from passive leaching basin wide (L_p) equals 2,000 kg/yr.
- Annual loading from hull cleaning (L_h) equals 100 kg/yr.
- Average annual loading per vessel (L_v) with copper hull paint equals 0.9 kg/yr, where $L_v = (L_p + L_h)/N_v$.

In accordance with the SIYB TMDL, this loading reduction analysis assumed an average loading reduction of approximately 0.9 kg/yr for every vessel in SIYB that converted from copper-based to non-copper-based paints. The use of lower copper hull paints was also recognized in the SIYB TMDL as a viable means of reducing copper loading to the basin. Lower copper paints are identified as DPR Category I paints and paints having a copper content of less than 40 percent (i.e., low-copper). This loading reduction analysis also assumed that, on average, each vessel that transitioned to lower copper hull paints reduced annual dissolved copper loading by 50 percent (0.43 kg/yr for passive leaching + 0.02 kg/yr for in-water hull cleaning). Aged-copper paints also were considered as a 0.45-kg/yr load if they were applied prior to December 31, 2014.

The assumptions for the calculations of annual dissolved copper loading are in Table 2-3.

Table 2-3.
Dissolved Copper Loading Calculation Assumptions

Dissolved Copper Loading Assumptions	
1.	All vessels moored in SIYB at the enactment of the TMDL had copper hull paints.
2.	Average annual dissolved copper load from a vessel with copper paint equals 0.9 kg/yr.
	a. The passive leaching load from a vessel with copper paint equals 0.86 kg/yr.
	b. The cleaning load from a vessel with copper paint equals 0.04 kg/yr.
3.	Vessels with unknown hull paints have copper paint
4.	Slips/moorings for which occupancy data are not provided are considered to be 100-percent occupied.
5.	Annual dissolved copper load from a vessel with non-copper hull paint equals 0 kg/yr.
6.	DPR Category I paints are paints with leach rates ≤9.5 µg/cm²/day. These paints are considered as lower copper.
7.	Low-copper hull paints are paints with less than 40-percent copper. These paints are also considered as lower copper.
8.	Average annual dissolved copper load from a vessel with lower copper paint equals 0.45 kg/yr
	a. The passive leaching load from a vessel with lower copper paint equals 0.43 kg/yr.
	b. The cleaning load from a vessel with lower copper paint equals 0.02 kg/yr.
9	Vessels determined to have aged-copper paint (i.e., copper paint applied to a vessel hull prior to December 31, 2014[a]) will have an annual dissolved copper load equal to 0.45 kg/yr.
10.	Annual loads will be normalized by the percent of time vessels are docked in SIYB.

Notes:
a. December 31, 2014, is the cutoff date for vessels to be considered to have aged-copper paint for the 2017 annual monitoring and progress report load calculation. This cutoff date will advance by one -year for each subsequent annual load calculation.
µg/cm²/day = micrograms per square-centimeter per day; DPR = Department of Pesticide Regulation; kg/yr = kilogram(s) per year; SIYB = Shelter Island Yacht Basin; TMDL = total maximum daily load

Annual loading was calculated for each slip by multiplying the reported dissolved annual loading for a given hull paint category by the percentage of time a slip was reported to be occupied (e.g., the product of 0.9 kg/yr for copper hull paints and 90 percent occupancy results in an annual loading of 0.81 kg/yr). In the case of the Port-operated anchorage, data on the number of three-day permits issued weekly were used to calculate annual occupancy and loading. For each issued permit, it was assumed that the vessel occupied the anchorage for an average of three days, and because no hull paint data were collected, all vessels were assumed to have copper paints. Therefore, annual dissolved copper loading due to passive leaching and hull cleaning was calculated by multiplying the annual dissolved copper load (0.9 kg/yr) by the average number of vessels occupying the anchorage weekly in 2017 and the average percentage of time that slips were occupied.

2.4 Water Quality Monitoring

Water quality was sampled to measure the average concentration of dissolved copper in the basin. The monitoring used methods consistent with those of prior studies conducted by the Regional Board in SIYB, as reported in Appendix 6 of the SIYB TMDL Technical Report (Regional Board, 2005). To be consistent with these prior studies, water quality was monitored at six stations in SIYB and at one reference station in the main channel of San Diego Bay adjacent to SIYB. These station locations were similar to those sampled by the Regional Board and met the Investigative Order requirement of spatially representing dissolved copper concentrations in SIYB, as described in the original Monitoring Plan and most recent update (Weston Solutions, Inc. [Weston], 2011; Amec Foster Wheeler, 2017a).

As required in the SIYB TMDL, dissolved copper concentrations were compared with the surface water baseline level of 8.28 ± 1.36 µg/L (mean ± standard error). This value was calculated using surface water quality data collected between 2005 and 2008 from stations in the immediate vicinity of the Regional Board monitoring station network (Weston, 2011).

2.4.1 Sampling Station Locations

The SIYB water quality monitoring station network was composed of six stations within SIYB (i.e., SIYB-1 to SIYB-6) and one reference station in the main channel of San Diego Bay outside of the mouth of the basin (SIYB-REF) (Table 2-4 and Figure 2-1). To the greatest extent possible, samples were collected within approximately ±3 meters of the target coordinates.

Table 2-4.
Sampling Station Coordinates

Station	Target		Actual	
	Latitude	Longitude	Latitude	Longitude
SIYB-1	32.71821	-117.22601	32.71821	-117.22603
SIYB-2	32.71412	-117.22921	32.71416	-117.22922
SIYB-3	32.71550	-117.22989	32.71554	-117.22997
SIYB-4[a]	32.71683	-117.23203	32.71657	-117.23117
SIYB-5	32.71217	-117.23297	32.71205	-117.23297
SIYB-6	32.70858	-117.23514	32.70877	-117.23511
SIYB-REF	32.70406	-117.23232	32.70409	-117.23199

Note:
[a] For safety and sampling schedule reasons, SIYB-4 was collected approximately 85 meters away from the proposed location due to high winds and a prevailing current

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Figure 2-1. Shelter Island Yacht Basin TMDL Sampling Station Locations

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2.4.2 Sampling Date

Surface water at the seven sampling stations (six SIYB stations and one San Diego Bay reference station) was sampled on August 23, 2017. In accordance with the Monitoring Plan, water sampling bracketed slack high tide during the summer, as depicted in Figure 2-2. By sampling in the summer, dissolved copper concentrations were expected to be at their annual peak in the water column because rates of copper release from antifoulant paints are higher at warmer sea surface temperatures and during periods with a greater frequency of hull cleaning. This sampling approach was designed to provide the most conservative estimate of dissolved copper concentrations for SIYB.

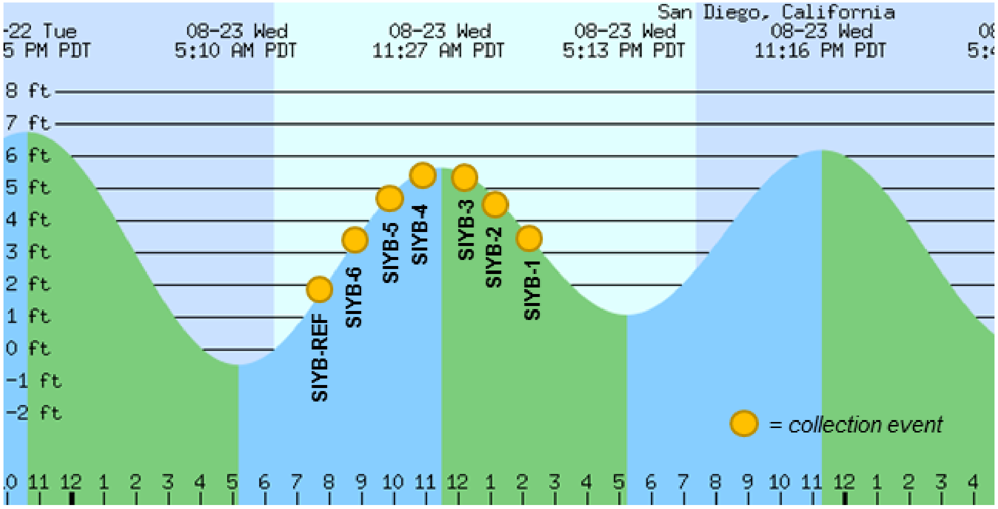

Figure 2-2. 2017 Sample Collection Times versus Tide

2.4.3 Sample Collection

Discrete water samples were collected at each station using a Niskin bottle deployed from a sample collection vessel. “Clean hands” sampling techniques were used, consistent with the project-specific and approved SIYB Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2017b). All stations were located using the Differential Global Positioning System.

Samples were collected within the top 1 meter of the basin surface; these samples are referred to as “surface water.” Field measurements were taken at each station for hydrogen ion concentration (pH), salinity, and temperature using a YSI Incorporated (YSI) Pro Plus data sonde. Following the collection and preservation of water samples, a top-to-bottom water quality profile using a Sea-Bird Electronics (SBE) CTD profile instrument was completed to evaluate pH, temperature, light transmittance, dissolved oxygen (DO), and salinity at the station. *In situ* analytical methods and detection limits are listed in Table 2-5.

Table 2-5.
In Situ Analytical Methods and Detection Limits

Water Quality Measurement	Method	Reporting Limit
Salinity	SBE CTD and YSI Pro Plus	± 0.1 ppt
Temperature	SBE CTD and YSI Pro Plus	± 0.1 °C
pH	SBE CTD and YSI Pro Plus	± 0.1 pH unit
Dissolved Oxygen	SBE CTD	± 0.1 mg/L
Light Transmittance	SBE CTD	± 0.1 %

Notes:
% = percent; °C = degrees Celsius; mg/L = milligrams per liter; pH = hydrogen ion concentration; ppt = part(s) per thousand; YSI = YSI Incorporated; SBE = Sea-Bird Electronics; CTD = conductivity, temperature, and depth

After collection, water samples were transferred to labeled containers for analysis of total and dissolved copper and zinc, total organic carbon (TOC), dissolved organic carbon (DOC), TSS, and toxicity.

Detailed field notes were recorded during sample collection at each station and all samples were logged on a chain-of-custody (COC) form, and then placed in a cooler on ice. Samples were stored at 4 degrees Celsius (°C) in the dark until delivered to the appropriate laboratory for analysis, within 24 hours of collection. Water chemistry analyses were conducted by Weck Laboratories (Weck) of City of Industry, California; toxicity tests were conducted by Nautilus Environmental Laboratory (Nautilus) of San Diego, California. Both laboratories are accredited through the California Environmental Laboratory Accreditation Program (ELAP). Photographs taken during field sampling are presented in Figure 2-3.

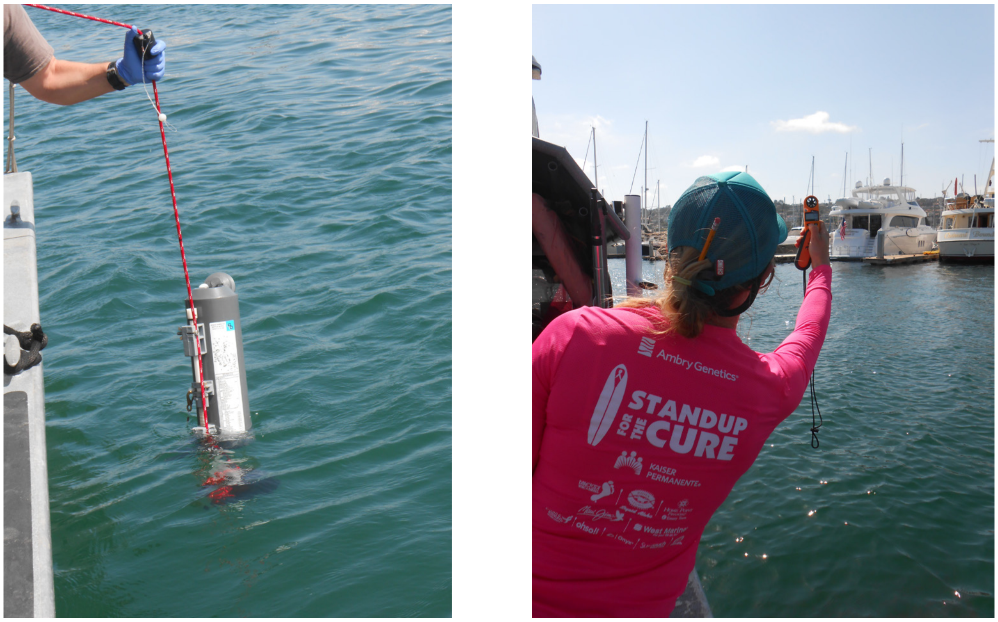

Photo A. Water sample collections were conducted using a Niskin bottle following clean sampling techniques.

Photo B. Recording of weather conditions, activities such as boat cleaning, and any other observations that may have an impact on water quality is an important component of the field monitoring program.

Photo C. Water sample collection for trace level copper analysis uses a Niskin bottle following clean sampling techniques.

Photo D. Filtration of water samples is conducted in the field immediately after collection for analysis of dissolved organic carbon.

Figure 2-3. Field Sampling Photographs

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2.4.4 Equipment Decontamination and Cleaning

The Niskin bottle was cleaned prior to sampling with clean, soapy water and thoroughly rinsed with deionized water. Upon deployment, the Niskin bottle received a thorough site water rinse prior to sample collection. After collection, water samples were transferred using the clean-hands method from the Niskin bottle to laboratory-certified, contaminant-free, high-density polyethylene bottles. The Niskin bottle was also rinsed thoroughly with deionized water between sites, and then rinsed with the site water of each station before sample collection.

2.4.5 Chemical Analyses

After collection was completed, samples were transported to the laboratory under customary COC protocols. Samples were analyzed for total and dissolved copper, total and dissolved zinc, TOC, and DOC, following certified USEPA or Standard Method (SM) test methods. Test method selection was based on the best available combination of sensitivity (low-level detection limits), accuracy (minimum susceptibility to bias or matrix interference), and precision (reproducibility) in accordance with the QAPP.

General water quality measurements (of salinity, temperature, TOC/DOC, TSS, and pH) were also taken at each station. Natural water quality parameters such as DOC are well known to affect the bioavailability and toxicity of copper in marine environments (Delgadillo-Hinojosa et al., 2008; Rosen et al., 2005; and Zirino, 2002). Zinc was also included for testing because it is commonly used as an alternative biocide in antifoulant paints. Both total zinc and dissolved zinc were measured to determine whether concentrations are increasing as vessel hull paints are converted from copper-based to non-copper-based paints.

Analysis of water quality data included calculations of average surface water dissolved copper concentrations to compare with the dissolved copper CTR WQO (3.1 µg/L). In Section 3.0, the 2017 dissolved copper results are compared with the 2005–2008 baseline data as reported in the Monitoring Plan (Weston, 2011) to evaluate the change in dissolved copper levels in the surface waters over time.

The laboratory analytical methods and detection limits are specified in Table 2-6.

Table 2-6.
Laboratory Analytical Methods and Detection Limits

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Total Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Dissolved Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Total Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
Dissolved Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
TOC	SM 5310 B	0.016 mg/L	0.10 mg/L
DOC	SM 5310 B	0.016 mg/L	0.10 mg/L
TSS	USEPA 2450 D	1.0 mg/L	5.0 mg/L

Notes:
µg/L = microgram(s) per liter; DOC = dissolved organic carbon; mg/L = milligram(s) per liter; SM = Standard Method; TOC = total organic carbon; TSS = total suspended solids; USEPA = United States Environmental Protection Agency

2.4.6 Toxicity Testing

Toxicity testing consisted of a 96-hour acute bioassay test using Pacific topsmelt (*Atherinops affinis*) to be consistent with the SIYB TMDL guidance (Regional Board, 2005). Additionally, a 48-hour chronic bioassay test using mussel larvae (*Mytilus galloprovincialis*) was performed because previous studies have used the 48-hour mussel larvae chronic test as their primary indicator of toxicity. Both tests were used to assess compliance with the narrative toxicity objective because both species have ecological relevance to the marina environment and previously have been found to be sensitive to copper.

2.4.6.1 Topsmelt 96-Hour Acute Bioassay

Topsmelt acute toxicity tests were initiated on August 24, 2017 (the day following sample collection) following the procedures described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (USEPA, 2002).

Juvenile topsmelt were exposed for 96 hours to three sample concentrations (0.5 dilution series) and a control. Each concentration was tested with six replicates and five topsmelt per replicate. Water quality measurements were conducted daily of DO, temperature, pH, and salinity. Test conditions are summarized in Table 2-7. After 96 hours, percent survival was calculated. The test was considered acceptable if mean survival was greater than or equal to 90 percent in the controls.

A 96-hour reference toxicant test using copper chloride was conducted concurrently with the project sampling to evaluate the relative sensitivity of test organisms to a single known chemical, as well as the laboratory's proficiency with the test procedure. The topsmelt reference toxicant test was conducted with copper concentrations of 0, 50, 100, 200, 400, and 800 µg/L. The reference toxicant test was conducted concurrent to the SIYB testing and used test organisms from the same batch. Following test termination, the median lethal concentration (LC_{50}) was calculated and compared with historical laboratory reference toxicant test data for this species. Test organisms are considered appropriately sensitive when the test LC_{50} is within two standard deviations of the historical laboratory standard.

Table 2-7.
Conditions for the 96-Hour Pacific Topsmelt Bioassay

96-Hour Acute Fish Survival Bioassay	
Samples Tested	SIYB-1, SIYB-2, SIYB-3, SIYB-4, SIYB-5, SIYB-6, SIYB-REF
Date Sampled	August 22, 2017
Test Dates	August 24–28, 2017
Test Species	Pacific topsmelt *(Atherinops affinis)*
Test Protocol	USEPA Acute Manual, 2002 (EPA/821/R-02/012)
Test Acceptability Criterion	≥90 percent mean survival in the laboratory control
Test Type and Duration	Acute survival/96-hour static-renewal (48-hour water renewal)
Organism Supplier	Aquatic Biosystems, Fort Collins, Colorado
Control Water Source	Scripps Pier seawater, 20-μm filtered
Acclimation Time	3 days
Age at Test Initiation	14 days old
Test Concentrations	0 (laboratory control), 25, 50, and 100 percent sample
Replicates per Sample	6
Organisms Exposed per Replicate	5
Exposure Volume	250 mL

Notes:
μm = micrometer(s); mL = milliliter(s); USEPA = United States Environmental Protection Agency

2.4.6.2 Bivalve 48-Hour Bioassay

The 48-hour bivalve larvae tests were initiated on August 24, 2017, for all samples collected in SIYB and followed the procedures described in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (USEPA, 1995).

Bivalves were exposed to five sample concentrations and a control. Each concentration was tested with five replicates and approximately 150 larvae were targeted for inoculation into each replicate. Daily water quality measurements included DO, temperature, pH, and salinity. Test conditions are summarized in Table 2-8.

After test termination, the percentage of surviving embryos with normal development was calculated to determine whether normality had been significantly reduced. The test was considered acceptable if (1) at least 50 percent of larvae survived, and (2) an average of 90 percent of surviving larvae developed normally in the controls. A combined endpoint of normal surviving embryos is reported.

Table 2-8.
Conditions for the 48-Hour Mussel Development Bioassay

48-Hour Chronic Bivalve Survival and Shell Development Bioassay	
Samples Tested	SIYB-1, SIYB-2, SIYB-3, SIYB-4, SIYB-5, SIYB-6, SIYB-REF
Date Sampled	August 23, 2017
Test Dates	August 24–26, 2017
Test Species	Mediterranean mussel *(Mytilus galloprovincialis)*
Test Protocol	USEPA/600/R-95/136 (USEPA, 1995); ASTM 1998; PTI 1995
Test Acceptability Criteria	Mean percent survival in the lab control must be 50 percent, and 90 percent of surviving organisms must have normal shell development. The percent minimum significant difference (PMSD) in the test must be less than 25.
Test Type/Duration	Bivalve larvae survival and development (endpoint reported as normal development of surviving embryos) – Static/48 hours
Organism Supplier	Kamilche Seafarms (Shelton, Washington)
Control Water Source	Scripps Pier seawater, 20-µm filtered
Age Class of Mussels Exposed	<4 hour-old embryos
Test Concentrations	0 (laboratory control), 6.25, 12.5, 25, 50, and 100 percent sample
Replicates/Sample	5
Initial Density of Organisms Exposed per Replicate	~150
Exposure Volume	10 mL

Notes:
µm = micrometer(s); mL = milliliter(s); USEPA = United States Environmental Protection Agency

A 48-hour reference toxicant test using copper chloride was conducted concurrently with the project sampling to evaluate the relative sensitivity of test organisms as well as the laboratory's proficiency with the test procedure. The bivalve reference toxicant test was conducted with copper concentrations of 0, 2.5, 5.0, 10, 20, and 40 µg/L. The same batch of test organisms was used for both the reference toxicant test and the project samples. At test termination, the median effective concentration (EC_{50}) was calculated and compared with historical laboratory reference toxicant test data for this species. Test organisms are considered to be responsive and appropriately sensitive if the test EC_{50} was within two standard deviations of the respective historical laboratory mean.

2.4.7 Toxicity Statistical Analyses

Determinations of toxicity using the 96-hour topsmelt and 48-hour mussel bioassays were statistically assessed using the Comprehensive Environmental Toxicity Information System™, Tidepool Scientific Software. Survival of topsmelt fish and normal development of surviving mussel embryos in each test dilution from SIYB were compared with organism performance observed in control exposures to filtered clean seawater collected from the end of the pier at Scripps Institution of Oceanography, La Jolla, California. Results were used to determine LC_{50} and EC_{50} values. If fish survival and normal embryo development in the controls did not differ significantly from those of the treatments, then conditions within were considered nontoxic at the station. The test of significant toxicity (TST) method was used to identify any samples that exhibited a statistically significant difference from the control (USEPA, 2010).

2.5 Quality Assurance and Quality Control

Sampling process QA/QC included preparation prior to, during, and after sample collection to minimize the possibility of compromising sample integrity. The sample collection team was trained in and followed field sampling standard operating procedures (SOPs), as described in the SIYB QAPP (Amec Foster Wheeler, 2017b). As part of the updated field collection protocol, QA/QC reviewers from the Port and Amec Foster Wheeler were onboard the sampling vessel at all times to review each step of the sample and data collection process. Additionally, Port-approved field checklists were used throughout the sampling event to ensure that all procedures were consistent at each location, all samples were collected in exactly the same manner at every station, and all required field data were properly recorded (see Appendix D). Observations of activities (e.g., vessel hull cleaning) surrounding the sampling area were recorded on field data sheets at each station and during movement between stations.

Field staff members were careful to avoid contamination of samples at all times, wore powder-free nitrile gloves during sample collection, and used the clean-hands technique. All samples were collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles. Field measurement equipment was checked for operation in accordance with the manufacturer’s specifications, and was inspected for damage prior to use and when returned from use. The QA/QC checks for the 2017 monitoring year are summarized as follows:

- ✓ QAPP updates
- ✓ Verification of laboratory certifications
- ✓ Field mobilization and equipment checklists
- ✓ Field sampling QA/QC checklists
- ✓ Field equipment calibrations records
- ✓ Observations of water clarity
- ✓ Staff training on QAPP-required field procedures
- ✓ Field conditions and water quality data sheets
- ✓ Onboard QA/QC oversight
- ✓ Observations for hull cleaning or other water-quality-impacting activities near sampling station locations

As required by Surface Water Ambient Monitoring Program (SWAMP) protocols, the monitoring program also included the addition of a field replicate. The field replicate sample consisted of a second complete set of samples collected at one of the sampling station locations (SIYB-1 in the 2017 monitoring program). The purpose of the field replicate is to assess variability in sampling procedures as well as ambient conditions.

Chemistry and toxicity samples were uniquely identified on sample labels using indelible ink. All sample containers were identified by the project title, appropriate identification number, date and time of sample collection, and preservation method. Sample labels were inspected by a QA reviewer before and after bottles were filled at each station to ensure that every sample and analysis type was labeled correctly before moving to the next station. All samples were kept on ice from the time of sample collection until delivery to the analytical laboratory for analysis within method-specified holding times (Table 2-9). Amec Foster Wheeler delivered samples on the same day as sample collection to Weck and Nautilus. Both Weck and Nautilus are California ELAP accredited for the specific tests that were performed at the time they were conducted.

Table 2-9.
Sample Holding Times

Analyte	Holding Time
TOC	28 days
DOC	28 days[a]
Total Copper	180 days
Dissolved Copper	48 hours[b]
Total Zinc	180 days
Dissolved Zinc	48 hours[b]
TSS	7 days
48-hour Acute Bioassay	36 hours
96-hour Chronic Bioassay	36 hours

Notes:
[a.] The holding time is applicable to preserved sample. The sample will be filtered in the field into a bottle with sulfuric acid (H_2SO_4) preservative for DOC analysis.
[b.] The holding time for metals after preservation is 180 days. The dissolved fraction will be filtered in the field through a 0.45-micrometer (µm) glass fiber filter using a bottle top vacuum filtration system. Samples will be preserved at the laboratory immediately upon receipt from the courier, within 24 hours of sample collection.
DOC = dissolved organic carbon; TOC = total organic carbon; TSS = total suspended solids

The QA objectives for chemical analysis conducted by the participating analytical laboratories are provided in their individual laboratory QA manuals. The objectives for accuracy and precision involved all aspects of the testing process, including:

- Methods and SOPs
- Calibration methods and frequency
- Data analysis, validation, and reporting
- Internal QC
- Preventive maintenance
- Procedures to ensure data accuracy and completeness

Results of all laboratory QA/QC analyses are reported in Appendix D. Any QC samples that failed to meet the specified QA/QC criteria in the methodology or QAPP were identified, and the corresponding data were appropriately qualified. Furthermore, in cases where laboratory data were not within control limits, follow-up testing was performed by the laboratory to verify results wherever applicable. All QA/QC records for the various testing programs are kept on file for review, as applicable.

2.6 Chain-of-Custody Procedures

COC procedures were used for all samples throughout the collection, transport, and analytical process. The principal documents used to identify samples and to document possession were COC records, field logbooks, and field tracking forms. COC procedures were initiated during sample collection. A COC record was provided with each sample or group of samples. Each Amec Foster Wheeler employee who had custody of the samples signed the form and ensured that the samples were always attended unless properly secured.

Documentation of sample handling and custody included the following:

- Client and project name
- Sample identifier
- Sample collection date and time
- Any special notations on sample characteristics or analysis
- Initials of the person collecting the sample
- Date the sample was sent to the analytical laboratory

Completed COC forms were placed in a plastic envelope and kept inside the cooler containing the samples. As previously noted, Amec Foster Wheeler staff members physically couriered the bay water samples from the dock on SIYB to Weck and Nautilus on the same day that the samples were collected (August 23, 2017). This level of effort provided an additional security to the COC process and ensured that all holding times were met.

Upon sample delivery to the analytical laboratory, the COC form was signed by the person receiving the samples. COC records were included in the final reports prepared by the analytical laboratories. Following completion of the analytical analyses, remaining sample material was stored until the holding time expired; samples were then disposed of properly.

2.7 Data Review and Management

Field and laboratory data were reviewed for completeness and accuracy prior to analysis and reporting, and were stored in a database, as described in the following sections.

2.7.1 Data Review

After each survey, field data sheets were checked for completeness and accuracy by the field crew and the QA reviewer. In addition, all sample COC forms were checked against sample labels at the end of the day prior to sample transport to the laboratories. In the laboratory, technicians documented sample receipt and sample preparation activities in laboratory logbooks or on bench sheets. Data validation included use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data. Data for laboratory analyses were entered directly onto data sheets. Data sheets were filled out in ink and signed by the technician, who checked the sheet to ensure completeness and accuracy. The technician who generated the data had primary responsibility for the accuracy and completeness of the data. Each technician reviewed the data to ensure the following:

- The sample description information was correct and complete.
- The analysis information was correct and complete.
- The results were correct and complete.
- The documentation was complete.

All data were reviewed and verified by participating team laboratories to determine whether data quality objectives had been met, and whether appropriate corrective actions had been taken when necessary.

2.7.2 Data Management

All laboratories supplied analytical results in Adobe Portable Data Format (PDF) files. After completion of the data review by participating team laboratories, laboratory results were forwarded to Amec Foster Wheeler for review and reporting. All laboratory records that were submitted, including any raw data, are included in Appendix D with each laboratory report.

3.0 RESULTS

This section provides details on new and ongoing dissolved copper BMP implementation activities undertaken by the Port and the SIML TMDL Group; results of the vessel tracking census; estimates of copper load reduction; and results of the ambient water quality and toxicity monitoring performed in SIYB in August 2017.

3.1 SIYB TMDL Implementation

Evaluation, interpretation, and tabulation of data and information on SIYB TMDL activities undertaken by the Port and SIML TMDL Group are provided in the following subsections. Through enhanced activities by marina and yacht club managers to survey boaters, approximately 82 percent of boat owners responded (based on the final combined 2017 survey) and reported their hull paint data. 2017 marks the highest reporting percentage since the program has started, and is a direct reflection of the improved efforts dedicated to collecting complete hull paint data. Figure 3-1 illustrates the continued response rate improvements over previous surveys.

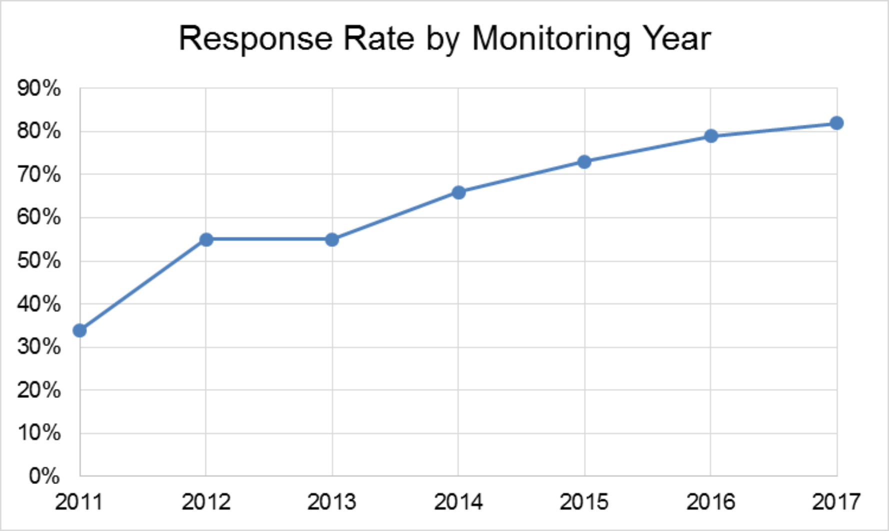

Figure 3-1. Vessel Census Response Rate by Monitoring Year

3.1.1 BMP Implementation

The Port and marina and yacht club owners and operators have implemented or are in the process of planning and implementing several categories of BMPs and other actions to reduce dissolved copper discharges to SIYB, including:

- ✓ Hull Paint Transition
- ✓ Hull-Cleaning BMPs
- ✓ Education and Outreach
- ✓ Grant Funding and Incentives
- ✓ Alternative Hull Paint Studies
- ✓ Monitoring
- ✓ Reporting
- ✓ Policy/Regulation
- ✓ Testing and Research
- ✓ Structural and Mechanical BMPs
- ✓ Agency-Wide Activities

3.1.1.1 Port of San Diego BMPs to Reduce Copper Loading

As part of its Copper Reduction Program, the Port has initiated, and is in the process of planning and implementing, a number of BMPs and other actions to reduce discharges of dissolved copper into harbors and marinas within SIYB, throughout San Diego Bay, and statewide. The Port's Copper Reduction Program is a pragmatic approach that complies with the interim and final goals of the SIYB TMDL. The Copper Reduction Program focuses on the largest source contributions, identifies a strategic approach for implementing projects over the short- and long-term, and effectively achieves regulatory compliance while balancing economic and public interests.

The projects implemented by the Port since the Regional Board adopted the SIYB TMDL have reduced dissolved copper discharges to SIYB. The Port's Copper Reduction Program began in 2007 and identified over 30 key initiatives, many of which enabled the Port to comply with the SIYB TMDL's first interim target.

The second interim compliance phase concluded in 2017, and the load reduction target was achieved. This success can be credited to both the robust, successful endeavors that have been initiated and completed as part of the Port's Copper Reduction Program as well as to tenant efforts (see Section 3.1.1.2). The Port was again successful in conducting and/or completing several initiatives during the second interim compliance period. During the 2013-2017 interim compliance phase, the Port made progress across all focused areas of the Copper Reduction Program. The design of the Copper Reduction Program has facilitated successful copper loading reductions in SIYB by laying foundational elements during the first interim target phase, which were then continued and built upon during the second interim target phase. It is also envisioned that these efforts will lead to continued success as the program transitions into the final compliance phase. Highlights from the Copper Reduction Program for the 2013-2017 interim compliance phase include (see also Table 3-1):

- Continued work with the DPR resulting in establishing copper leach rate regulations at the state level;
- Full conversion of the entire Port vessel fleet to non-copper hull paint;
- In-water hull cleaning policy established and enforced;
- The completion of the 319(h) Hull Paint Conversion Grant;
- Developed an outreach program model which included hosting booths at boating community events where in total 23 booths were hosted with the potential of reaching approximately 260,700 attendees total; and
- Annual water quality monitoring and special studies completed to address data gaps pertaining to water quality in SIYB.

Table 3-1.
Key Initiatives by Program Component (Second Interim TMDL Phase)

Copper Reduction Program Component	Initiative	2013	2014	2015	2016	2017	Direct (D) or Indirect (I) Load Reduction?	Completed (C) or On-Going (O)	5 Year Summary
Policy Development/Legislation	AB 425	Pot Sponsored Bill	Leach Rate Established (DPR)	-	-	DPR Leach Rate Regulation Adopted	D	O	• 1 State Bill Sponsored • 5 Comment letters submitted regarding copper related issues • 19 IWHC Enforcement Actions
	EPA	-	BLM Letter	-	BLM Letter	Registration Review Letter	I	C	
	IWHC	1st Full Year of Regulation	Regulations remain in place: Permits issued and reissued, continued enforcement				D	O	
Testing and Research	Paint Research	Port Grant funded research	On-going additional research and information dissemination				D	C (Grant), O (research)	• Early stage paint research funded by Port grant • Continued research by Port staff and dissemination of what is learned to boatyards, marinas, boaters • BEI established and RFP issued for technology solutions to copper issues
	Other Technologies	-	-	-	Blue Economy Incubator (BEI) established, RFP released	2 BEI copper-related projects selected	D	O	
	Culvert Feasibility	Tidal Flushing Modeling	-	-	Engineering culvert Feasibility Study	Continued internal feasibility discussions	D	O	
Hull Paint Transitions:	Port Fleet	Full fleet converted and maintained with non-copper hull paint					D	O	• Entire Port vessel fleet converted to non-copper hull paint resulting in 11.01 kg/yr load reduction • 41 total vessels converted to non-copper hull paint under the 319(h) grant resulting in 36.9 kg/yr load reduction
	Private Recreational Boats[1]	27 vessels converted under 319(h)	5 vessels converted under 319(h)	7 vessels converted under 319(h)	Conversions maintained		D	C	
Education and Outreach	Events	Signature hull paint expo event launched; Boating event outreach	Signature expo; Boating event outreach	Boating event outreach	Signature expo; Boating event outreach	-	I	O	• 23 booths at boated related events (reaching 260,700 people) • 4 Expos hosted • 3 brochures/print materials created • Over 500 print materials distributed to boatyards • 2,226 views on Web-Based calculator • 962 views on Boater Testimonial video • 7 Press Releases • 4 newspaper articles
	Web Material	Paint Conversion Cost Calculator completed	On-going updates of special website, Peer-based testimonial video available to view				I	O	
	Print Material	Press Releases	Paint information packets	Boater Paint Brochure, Press Releases	Press Releases, Newspaper Articles		I	O	

Table 3-1.
Key Initiatives by Program Component (Second Interim TMDL Phase) (Continued)

Copper Reduction Program Component	Initiative	2013	2014	2015	2016	2017	Direct (D) or Indirect (I) Load Reduction?	Completed (C) or On-Going (O)	5 Year Summary
Monitoring and Assessment	Annual Water Quality Monitoring	Annual water quality monitoring for dissolved copper at TMDL stations					I	O	• Annual compliance monitoring show meeting interim TMDL target load reductions • 2 updates to CSM •1 Modeling Study • 2 Special Studies • 1 completed RHMP cycle and planning 2018
	Conceptual Model	Updated		-	-	-	I	C	
	Water Column Special Study	-	-	Development	Final report	-	I	C	
	24 hr. Tidal Special Study	-	-	-	-	Development	I	O	
	RHMP Core Monitoring	Core monitoring conducted	Data analysis and draft reporting		Final report	2018 core monitoring planning	I	C (2013) O (2018)	
	Modeling Study	Development	Final report	-	-	-	I	C	

[1] Port was directly involved in the conversions of private recreational vessels through the 319 (h) Grant program.

The Copper Reduction Program efforts for 2017 are described below. A complete list of the Port's BMPs, including status brief effectiveness assessments, are provided in Appendix B. Unless footnoted otherwise, the following BMPs have been implemented in support of the SIYB TMDL:

Policies and Legislative Efforts to Reduce Copper Loading

Policies and legislative efforts to reduce copper loading are instrumental to the Port's Copper Reduction Program to not only help meet regulatory compliance requirements, but also to work towards reducing copper throughout San Diego Bay. The Port's policy and legislative efforts are in place to assist in pursuing regulatory change, one of the five goals of the Copper Reduction Program.

State and Federal Agency Efforts
The Port continues to implement policy-based efforts that support legislation (Assembly Bill 425 [AB 425]), other federal paint evaluations, and scientific studies. Regular communications with state and federal agencies, policy makers, and legislators promote consistency in requirements being developed across the state. They also provide a valuable networking mechanism to discuss strategies for implementation of activities and lessons learned and to build upon successful activity models. During 2017, the following efforts occurred:

United Stated Environmental Protection Agency (U.S. EPA)
In November 2017, the Port submitted a comment letter to the U.S. EPA's Docket ID No. EPA-HQ-QPP-2010-*0212 Registration Review Proposed Interim Decisions Being Issued for Copper Compounds, Case Numbers 0636, 0649, 4025, 4026*. In the comment letter, the Port specifically commented on interim decisions pertaining to Section 4. Ecological-Antimicrobial Uses- Anti-foulant Paints and Coatings. The Port strongly supported the use of sound science and advancements in technology and encouraged the EPA to carefully review product leach rates to ensure accepted leach rates will not adversely impact water quality. The Port also encouraged the EPA to consider the impacts related to copper-loading by recommending they require paint registrants to submit specific hull cleaning and maintenance expectations for products as part of the Data Call-In Notice. The comment letter is provided in Appendix F.

DPR
On November 18, 2016, the DPR published for public review, an Initial Statement of Reasons establishing the intent to adopt 3 CCR Section 6190, relating to leach rates for copper antifouling paints. In summary, the proposed action requires registrants of all new copper-based AFP products to submit leach rate data as a requirement for registration and sets forth the maximum allowable copper leach rate (i.e., ≤9.5 µg/cm2/day) to become effective July 1, 2018. The public review period was not widely publicized, and ended on January 4, 2017. **On January 31, 2017, the Port provided comments on the DPR's Initial Statement of Reasons, supporting the leach rate effective date of July 1, 2018 and encouraging the use of the additional mitigation measures that were identified when DPR established the leach rate in 2014 (provided in Appendix F). This rule was adopted in August 2017 and will become effective July 1, 2018.**

In July 2017, the DPR released an updated list of paints that meet the AB 425 leach rate criteria. **Both the original and updated DPR Lists have been instrumental in moving**

several Port projects forward, namely (1) development of paint guidance for improved vessel tracking, (2) development of a brochure to educate boaters on the importance of using DPR Category I (low leach) paints, (3) acceptance of updated tracking for SIYB annual reporting purposes, and (4) development of a modeling study using SIYB-specific vessel (i.e., paint) information and DPR leach rates.

On November 13, 2017, Port staff and DPR staff participated in a conference call to further foster the collaborative working relationship between the Port and the DPR, as well as discuss on-going copper related issues, including the missing leach rate data for certain manufactured paints**. This on-going collaborative partnership allows for Port staff to remain informed on the latest information available regarding copper anti-fouling paints.**

Inter-Agency Coordinating Committee
Two IACC meetings occurred during the 2017 reporting year, one on April 26, 2017 and the second on September 28, 2017. Topics of discussion for the April meeting included: an update from the DPR regarding copper antifouling paint mitigation efforts and activities; an update from the State Lands Commission on proposed commercial vessel biofouling regulations; and an overview of the statewide network of marine protected areas. Topics of discussion for the September meeting included: an overview and update on marine debris issues and activities underway in California; an update about sustained progress of the Clean Marinas Program as well as discussing program expansion; LA County's efforts of implementing the Marina del Rey Toxic Pollutants TMDL; and information about the ongoing registration review of Copper Compounds from the U.S. EPA.

Regulations for In-Water Hull Cleaning
Since October 2011, in-water hull-cleaning regulations have been in place requiring hull-cleaning businesses to obtain Port-issued permits to conduct hull cleaning within tidelands, develop BMP plans and implement BMPs during all cleaning activities, and ensure that all hull cleaners are trained on the BMPs. The regulations also require marinas to check each hull cleaner for proof of a valid permit and to prohibit non-permitted divers from working in their facility. At the end of 2012, the Port began issuing identification cards to all permitted hull cleaners to facilitate check-in at the marinas, a process that continued into 2017.

Diver cleaning a boat hull

Validation of the permits continued in 2017 via collaborative efforts made by the Port, marinas, and yacht clubs to continue implementing the check-in process. Port staff regularly inspected marinas and hull-cleaning practices, with 43 inspections in 2017. During the reporting period, inspections resulted in the following:

- One diver was cited for lack of permit;
- One marina was cited for allowing divers to operate under an expired permit in their leasehold;
- One marina was given a verbal warning for allowing an unpermitted diver to train with a permitted diver in their marina;

- One hull cleaning company was given a verbal warning for entering a marina with an unpermitted diver and performing in-water training with the permitted diver; and
- Four companies were cited for creating a paint plume (1 company) and operating without a valid permit (or proof of a valid permit; 3 companies).

In addition, 36 hull-cleaning permits had reached their end of the two-year permit term in 2017. Thirty of those businesses renewed their permits during this reporting period and 6 of the expired permitted businesses either no longer existed or the permit was not renewed.

For the 2017 reporting period, key permitting statistics are as follows:

- 81 permits have been issued since the onset of the regulation;
- 50 hull cleaning permits are active (as of December 31, 2017);
- 2 new hull cleaning permits were issued in 2017; and
- 30 hull cleaning permits had been renewed in 2017 (as of December 31, 2017).

To date, the regulations helped to reduce copper loads from in-water hull cleaning.

Boat hull before and after

Establishing Marina Self-Certification Forms
Prior to the 2017 vessel tracking data reporting deadline, the Port sent letters and a Marina Self-Certification Form template to each of the eleven marinas in SIYB requesting each marina submit a signed Marina Self-Certification Form with their annual vessel tracking data. Requiring the submittal of a signed self-certification form with the vessel tracking data submission puts ownership and responsibility on the signees to verify the accuracy and completeness of their vessel tracking data. Of the 11 marinas, ten submitted signed Marin Self-Certification Forms[5].

Testing and Research

The Testing and Research component of the Copper Reduction Program is aimed at finding effective hull paint alternatives. Starting in 2016 and continuing through the current reporting year, one adaptation of the testing and research program element has been that the focus has expanded beyond hull paint research and paint testing. Additional testing and research strategies that could further assist with copper reduction in SIYB include:

- Innovative ways to remove copper from SIYB;
- Exploring the feasibility and potential for increasing basin flow; and
- Further exploring paint alternatives.

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[5] All vessels from La Playa were moved during this reporting period for dock upgrades. La Playa did not submit a Self-Certification Statement form that confirmed there was no data to report.

In 2017, new strategies were incorporated into the Copper Reduction Program and are discussed below.

Copper Removal Approaches
The Port's Blue Economy business incubator was established in 2016 with the purpose to discover new technologies that may assist in Port operations and establish a Blue Economy portfolio of companies that could deliver multiple social, environmental, and economic benefits to the region. Specifically, this program may assist in copper reduction efforts in San Diego Bay.

In April 2016, an RFP was issued for innovative hull cleaning and remediation technology businesses to work with the Port. Under the Blue Economy program, successful trials could enable the subsequent installation of the demonstrated technology. In 2016, the Blue Economy Incubator began receiving proposals. During the first round, two proposals were relevant to copper reduction technologies and negotiations for potential partnerships between the Port and top proposers through the Blue Economy Incubator were started. In 2017, an ad hoc committee held 6 meetings to provide staff direction and feedback regarding proposals that should be moved into consideration by the Board. **The following two companies were selected and moved through Board-authorized negotiations to conduct copper-related pilot projects through the Blue Economy Incubator:**

- Red Lion Chem Tech proposed a one-year pilot project to demonstrate their core technology to remove soluble copper in seawater through active and passive filtration system. Pilot work is estimated to begin during the 2018 reporting year.
- Rentunder proposed a two-year pilot project to demonstrate their Drive-in Boatwash technology, a new approach for in-water hull cleaning, which may help reduce copper particulates released into San Diego Bay. Pilot work is estimated to begin during the 2018 reporting year.

Basin Flow Approaches
Ongoing research continues on the feasibility of construction of a culvert to increase the flow of water through SIYB by connecting it to America's Cup Harbor. Increasing the flow should decrease the residence time of water in SIYB and may help to further enhance water quality when paired with other management strategies. In 2013, the effectiveness of a culvert was modeled and a potential 17-21% (location specific) reduction in copper concentration averages was predicted for SIYB. The Port Engineering Department completed a culvert feasibility study led by Rick Engineering in July 2016 for SIYB and the surrounding area.

During 2017, the Port continued to hold internal meetings to discuss culvert feasibility, the additional analyses needed to determine feasibility, associated costs, and the potential impacts to tenant operations.

Hull Paint Transitions

The overall goal of the Hull Paint Transition component of the Copper Reduction Program is to transition vessels in SIYB to non-copper hull paint alternatives. The transition from high to low or non-copper alternatives is one of the most direct approaches to reduce copper loading. By transitioning to the available alternatives, load reduction is achieved by both the concentrations being put into the water both by active leaching during in water hull cleaning, and from passive leaching.

Conversion of Port Fleet
During the previous compliance phase, the Port completed transition of its fleet of boats to use of non-copper paints; all Port vessels now use non-copper paint. Boats were painted with various alternatives, largely depending on their use patterns. ***All 16 of the Port's boats continue to use non-copper paints, resulting in a 11.01-kg/yr[6] copper load reduction.***

Private Boaters
In 2011, the Port successfully secured a Clean Water Act Section 319(h) non-point source program grant from the SWRCB for $600,000 to help with hull paint transition. The grant-funded SIYB Hull Paint Conversion Project provided cost offsets for SIYB boaters who use non-biocide paints. This project was completed in May 2015. **Forty one boats were transitioned as a result of this effort, and it is the Port's understanding that these conversions currently remain in place. This resulted in a direct load reduction of 36.9 kg/yr.**

Boater Education and Outreach

The Port has developed an extensive education and outreach program geared toward educating boaters on the use of alternative hull paints and increasing their awareness of the environmental impacts of copper paints. The marketing strategy that was completed in 2011 led to the use of newer marketing tools; these tools continue to be highly effective mechanisms to promote copper reduction.

During 2017, the outreach program continued to employ a variety of techniques to ensure that frequent and consistent messages continue to be delivered through multiple media avenues, reaching a variety of audiences. Outreach efforts continued via email and phone-call responses to public inquiries, regular meetings with the SIMLG, and continuing to host web-access to brochures and information.

Workshops, Seminars and Conferences
Ongoing public education and outreach also can occur in the form of speaking engagements at conferences. In addition to providing information on the Port's alternative hull paint program and current water quality, staff in attendance gain valuable insight from others with similar experiences.

In 2017, Port staff attended 1 conference with focuses on sediment and water quality, as well as regulatory updates. Staff attended the Southern California Society of Environmental Chemistry and Toxicology (SoCal SETAC) in Dana Point (April 27-28, 2017). Port staff attended both days of the meeting and were informed on the latest science and policy regarding sediment and water quality in southern California.

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[6] The load reduction calculation for these values took into account actual vessel dimensions, rather than using the average size in the SIYB TMDL assumptions.

Outreach Materials—Printed Literature

Development of printed literature such as paint brochures, event flyers, project FAQs, and handouts is an effective way to disseminate information to the public. Event attendees can take the information home and read it at their leisure, rather than having to wait to get information during the event. In addition, the printed materials also provide a web link and other contact information so that readers can do additional research. ***During this reporting period, the Port had the previously produced printed literature available for download on the program website.***

Web and Media Tools

The use of a dedicated website for copper reduction program information is another effective mechanism to reach the public. Websites are increasingly popular as people rely on the Internet as a legitimate information source.

Dedicated Web Address created by the Port

The Port has developed a dedicated web address, www.sandiegobaycopperreduction.org, which links viewers to all elements of its copper reduction program. The link, which was started in 2010, provides information on conversion efforts such as the 319(h) grant project, hull-cleaning regulations, and general paint research information. The site also contains downloadable materials such as FAQs, applications to obtain a hull-cleaning permit, and recent press releases relevant to copper reduction. Monitoring studies are also available on the website***. During the 2017 reporting period, Port staff provided updated lists of permitted hull cleaners as new information became available. Staff also ensured that the website was readily available and that information remained current and easy to find.***

Vessel Tracking Database

A vessel tracking database was also developed through the 319(h) project. The web-based system was designed to calculate the amount of copper removed as a result of the conversion of boats to non-copper hull paints. The database was designed to calculate this amount not only for project reporting purposes, but also for long-term use for the SIYB TMDL. Due to a lack of interest from the SIYB community, no additional enhancements have been made to the database. As such, if SIYB entities indicate a desire to use the tool, it may have applicability to serve as a model for a standardized hull paint tracking mechanism.

Peer-Based Testimonials

Another media tool is peer-based marketing, with local boaters discussing their experiences using the alternative products. During 2012, video testimonials were developed and displayed at the 2012 expo. In 2013, the video was posted on the Port's website. Additional written testimonials were also included so that readers could learn about other local boaters' experiences***. As of December 31, 2017, the video had been viewed 956 times.***

Press Releases

Press releases and email are effective media tools to announce special happenings of interest in the copper reduction program. Regular use of press releases also helps to keep the topic fresh in the public's mind. Using established distribution lists, email blasts ensure that the press release information can reach the intended target audiences quickly. Additionally, repeat messaging has been shown to be an effective way to change behavior. The press releases have primarily focused on the increasing use of alternative paints and have highlighted some of the new tools for facilitating hull paint conversion (grant funds, cost calculator, etc.). ***In June***

2017, one press release was issued announcing the Port's Blue Economy incubator launch. The press release discussed four pilot projects, two of which relate to copper mitigation throughout San Diego Bay.

Newspaper Articles

The Log newspaper has a 52,000 person readership in southern California and **has served as an important vehicle for informing the public about the Port's efforts regarding copper reduction in San Diego Bay.**

- July 20, 2017: The article, "Port of San Diego enters final phase of copper reduction mandate", summarized and recapped the results of the 2016 SIYB Annual Report, and discussed the final compliance phase of the TMDL.

Audiences Reached in 2017

The efforts made under the Education and Outreach component of the Copper Reduction Program were designed to reach different stakeholders and audiences depending on the outreach mechanism. While each component was designed for a primary audience, secondary audiences may also benefit from the information. Table 3-2 lists the individual outreach efforts of 2017, as well as the audiences reached.

Table 3-2.
2017 Outreach Efforts and the Audiences Reached

Outreach Component	Audience Reached							
	Regulators	Academics	Government Agencies	Boaters	Marinas	Boatyards	Paint Manufacturers	General Public
Conference Attendance	P	P	P	-	-	-	-	-
Printed Outreach Material	S	S	S	P	P	S	S	P
Dedicated Web Address to CRP	S	S	S	P	P	S	S	P
Peer-Based Testimonials	S	S	S	P	P	S	S	P
Press Releases	P	S	P	P	P	P	P	P
Newspaper Articles	P	S	P	P	P	P	P	P

Notes:
P = Primary Audience, indicating that the most likely audience reached with the associated outreach effort
S = Secondary Audience- indicates audiences that could be potentially reached with the associated outreach effort

Internal Education

Increasing Port-wide awareness about the Copper Reduction Program, alternative paint use, and status of water quality regulations is vital to a successful program. A solid understanding of the program attracts support by the Port's decision makers, such as the Board of Port Commissioners and executive team, and so enables projects to move forward. An informed executive team can also ensure that adequate funding is available to implement the program.

As such, the Port continually seeks opportunities to provide information on key items of the copper reduction program. The following information was provided to the Port Board and executives during 2017:

- April 6, 2017: Port Board memorandum providing notification of the submittal of the 2016 Shelter Island Yacht Basin Dissolved Copper TMDL Annual Monitoring and Progress Report;
- April 11, 2017: Port staff appeared before the Board presenting information on Red Lion Chem and Rentunder Remediation Applications, two Blue Economy pilot projects aimed at reducing copper in San Diego Bay;
- June 8, 2017: Port Board memorandum providing an update on Blue Economy Incubator pilot projects;
- June 20, 2017: Port staff appeared before the Board presenting program status and updates for the Shelter Island Yacht Basin TMDL;
- June 20, 2017: A resolution was adopted authorizing the Executive Director to Enter into Blue Economy Agreements, specifically Copper Remediation Applications; and
- October 19, 2017: Port Board memorandum providing results of the 2017 SIYB TMDL Annual Water Quality Monitoring and Programmatic Next Steps.

Partnerships and Collaboration

Since the inception of the SIYB TMDL, the Port has been working to identify opportunities with tenants, academia, and other agencies to develop and provide outreach, testing opportunities, funding opportunities, and policies. As of December 2017, the Port has participated in three collaboration opportunities with groups within San Diego and throughout the California boating and regulatory communities. These activities and groups include:

- Coordination with hull cleaners on In-Water Hull-Cleaning regulations;
- Coordination with the SIMLG on SIYB TMDL annual reporting;
- Regular participation in state-led Interagency Coordinating Committee (IACC) meetings for antifouling and marina-related topics; and
- Coordination with other agencies such as Newport Beach and Marina Del Rey to promote regional information sharing regarding Copper TMDL issues.

Additional Efforts (Companion Programs)

There are several other Port programs bay-wide that directly or indirectly support the Copper Reduction Program’s efforts. The Blue Economy Incubator (discussed above) will continue to be instrumental in identifying potential pilot studies that may assist in the continued efforts to reduce copper concentrations throughout San Diego Bay.

The Port’s Stormwater Program incorporates BMPs to decrease copper loading bay-wide and specifically into SIYB. These efforts, described below, are primarily related to compliance requirements set forth in the Municipal Separate Storm Sewer System (MS4) Permit.

Construction Site Inspections
Construction inspections ensure that sites undergoing development or redevelopment control pollution and prevent discharges. For construction sites and facilities that do not comply, the Port takes enforcement action. ***In 2017, 237 inspections were performed along with 90 follow-up inspections where an overall BMP implementation rate of 93.5% was observed.***

Commercial Business Inspection Program
Per the requirements of the MS4 Permit, the Port inspects commercial facilities in SIYB and bay-wide. One particular component, the Port's marina inspection program, provides opportunities to educate boat owners about pollution prevention, focusing on visual observations to identify sources of pollution and the pollution prevention practices implemented at the marinas and yacht clubs. The goal of the inspections is to help implement behavior changes that will help reduce pollution (including copper) in bay waters. ***In SIYB, the inspections confirmed that BMPs were being implemented appropriately at most facilities. Written warnings were used to resolve deficiencies at eight facilities during 2017, five of which were not training employees in storm water pollution prevention. Additionally, at three of these facilities, administrative citations (one) and written citations (two) were given regarding the lack of using BMPs for Priority Development Projects.***

Stormwater Quality Management Plan (SWQMP) and Development of Regulations
The Port incorporates SWQMP requirements on applicable development and redevelopment projects bay-wide. Depending on the type and size of the projects, SWQMP requirements could include site design, source controls, and treatment controls such as low-impact development (LID). All efforts help reduce copper loading into San Diego Bay. Since 2009, there has been thirty-four existing bay-wide projects overall with metals as priority pollutants, treating a total of 114.25 acres. In SIYB, there have been 5 existing projects overall with metals as priority pollutants, treating a total of 9.19 acres. ***There were no new projects in SIYB during 2017 with metals as a priority pollutant. As a result, the total treated area did not change.***

Monitoring and Reporting

The main goal of the Monitoring and Reporting component of the Copper Reduction Program is to assess long-term improvements in water quality. Additionally, ascertaining a better understanding of basin water quality dynamics has been achieved via the implementation of special studies to address water quality data gaps identified in SIYB.

Shelter Island Yacht Basin Time Series Study Work Plan Development
The Time Series Study was designed to gain a better understanding on the effects tidal variations may have on concentrations of dissolved copper in surface waters in SIYB. At three sampling locations throughout the SIYB, water samples were collected every 2 hours over the course of one full mixed semidiurnal tidal cycle. The Work Plan and Quality Assurance Project Plan were developed in November and December 2017. Sampling occurred in January 2018, and results are provided in Appendix E of this report.

Regional Harbor Monitoring Program (RHMP)

This bay-wide monitoring program assesses the ambient conditions found in San Diego Bay and other southern California harbors based on comparisons with historical data and comparisons of contaminant concentrations with known surface water and sediment thresholds. The program samples water, sediment, benthic infauna, and a variety of fish species in San Diego Bay. Upon completion of the study, a comprehensive report is generated. The Port is the lead agency on this project.

The next core monitoring effort in scheduled for July 2018. Four planning meetings with other RHMP agencies for the 2018 efforts have occurred between September and December 2017.

3.1.1.2 SIML TMDL Group BMPs to Reduce Copper Loading

The SIML TMDL Group reported that the following BMPs and actions were ongoing or implemented in 2017 as a part of the group's TMDL BMP activity. These BMP actions are described in more detail in Appendix B.

- ***Meetings*** – Participation and attendance at SIYB TMDL Group meetings since 2005 including 11 group meetings in 2017
- ***Participation*** – Participate in meetings and coordination with Port staff and Port consultants on new and ongoing scientific studies
- ***BMP Committee*** – The BMP committee formed in 2016 and conducted 5 meetings in 2017
- ***Outreach*** - The BMP Committee initiated an outreach program including correspondence to the marinas and yacht clubs to support the relevance of low leach paints and new regulations upcoming in 2018. The results of these efforts are indicated in the 2017 vessel tracking results with a substantial upswing in the use of low leach paints
- ***Education*** – Boater education through newsletters, fliers, workshops and readily available literature
- ***Training*** - Ongoing staff trainings for existing and new marina employees
- In 2017 a Dockwalker Training program was conducted in cooperation with the CA State Parks Division of Department
- ***Procedures*** – Ongoing procedures for verifying and monitoring Port Diver Permit compliance at facilities, including:
  - Training marina staff on Port Diver Permits
  - Ensuring that all divers have valid Port hull-cleaning permits prior to entering leaseholds
  - Reporting hull cleaners who arrive by boat and do not check in with the dock master's office to the Port
  - Reporting hull cleaners who create visible paint plumes during hull cleaning to the Port
  - Posting diver BMP signs at marinas and yacht clubs entrances

MARINA RECREATION ASSOCIATION

SAN DIEGO PORT TENANTS ASSOCIATION

CLEAN MARINA

ATTENTION

DIVERS & BOAT OWNERS

Please help reduce pollution from bottom paints containing copper, zinc, biocides or any other toxic substance by following these basic best management practices when cleaning bottom paint.

This marina and the other California marinas have established the following
Rules for In-Water Hull Cleaning
For Bottom Paints Containing Copper, Zinc, Biocides, or any other toxic substance:

- All in-water hull cleaning must be done by hand only - no power equipment allowed.
- The Marina shall prohibit in-the-water hull scraping or any process that occurs under water which results in the removal of paint from boat hulls. This does not apply to bare metal parts.

Remember:

- NO Scrapers (metal/plastic/wood)
- NO Abrasives (sandpaper/cleanser/soft scrub)
- NO Scotchbrite®/3M® pads except the White pad
- NO Powered Rotary Brushes
- USE soft cloth or fleece mitt only

According to paint manufacturers, properly functioning antifouling paint will repel all hard growth and requires only occasional light wiping with a soft cloth to remove slime. Use only soft rags or a sponge or fleece mitt when light wiping is required.

Thank you for your cooperation.

Posted sign informing hull cleaners

of Boating and Waterways, open to the public

- ***Vessel Tracking*** – Boat owner surveys conducted for data collection and reporting in 2017 indicate a 3% increase in completeness and response over last year

BMP copper-reducing strategies such as the Hydra Hoist® (left) and dry space storage (right)

- **Alternative Methods**
  - Facilitation of dry storage on land
  - Encourage the use of slip liners
  - Encouraged use of in-water lift systems
  - Installation of a high-capacity hoist at San Diego Yacht Club in 2015 that will assist with storing more vessels on land
- ***Incentives*** – Marinas are encouraged to offer paint based incentive programs, which include slip wait list priority for boats with non-copper paints or low leach paints

An example of a boat slip liner–a common type of copper-reducing BMP strategy

3.1.2 Vessel Counts by Hull Paint Type

Vessel conversion calculations were based on data provided by the SIML TMDL Group for SIYB marinas and yacht clubs in addition to Port-maintained data for Port vessels, transient slips, and mooring buoys. The 2017 census of the hull paint types reported by the SIML TMDL Group is as follows:

- 780 vessels have copper or unknown (assumed to be copper) hull paint.
- 724 vessels have paints considered as lower copper. These vessels consist of the following:
  - 648 vessels have paint that is listed as a DPR Category I (low leach) paints.
  - 76 vessels have low-copper paint (confirmed [53 vessels] and unconfirmed [23 vessels]).
- 468 vessels have aged-copper hull paint.
- 123 vessels have either non-copper paints or no paint at all (confirmed [111 vessels] and unconfirmed [12 vessels]).

The 2017 census of the hull paint types reported from the Port-maintained slips (Port vessels, transient slips, and mooring buoys) is as follows:

- 67 transient dock vessels have copper or unknown (assumed to be copper) hull paint.
- 16 Port-owned vessels have either non-copper paints or no paint at all (16 confirmed).

3.1.3 Slip Count and Occupancy

Based upon the information provided by the SIML TMDL Group and the Port, 2,313 slips[7] in SIYB were available to be occupied by vessels in 2017, including a Port-operated anchorage with a capacity of up to 40 guest vessels, 27 transient docks, and 16 slips at the Harbor Police dock. Total slip count included one additional slip relative to the 2016 monitoring year count, with a decrease of 50 slips as compared with the 2,363 maximum available slips and moorings reported in the SIYB TMDL (Tables 3-1 and 3-2).

Of the 2,313 slips and moorings in SIYB during 2017, 135 slips were reported to be vacant year round (or at least at the time the survey was conducted), leaving 2,178 slips that were occupied for at least a portion of time in 2017. Slip occupancy rates for each hull paint type are also shown in Table 3-1 (yacht clubs and marinas) and Table 3-2 (Port-operated facilities). On average, slips and moorings in SIYB were occupied 89 percent of the time.

3.1.4 Vessel Dimensions

The average size vessel in SIYB in 2017, based on reported hull lengths and beam widths, was 38.7 feet (11.8 meters, total length) by 12.2 feet (3.7 meters, beam width) (Appendix C). The average wetted hull surface area of 2017 SIYB vessels was calculated to be 37.3 square meters (m^2)[8].

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[7] At several locations in SIYB, single slips can be occupied by more than one vessel. In these cases, the slip count may include each vessel within the slip. For example, if two vessels occupy a single slip, the slip count for this location may have been reported as two slips, not one. Efforts to improve consistency on this issue remain ongoing.

[8] The wetted hull surface area used in loading calculations for the SIYB TMDL Technical Report was 35.3 m^2.

3.1.5 Estimated Copper Load

Copper loads from passive leaching and in-water hull cleaning are being reported separately for the 2017 monitoring year. Dissolved copper loads in 2017 attributed to passive leaching are shown in Tables 3-1 (yacht clubs and marinas) and 3-2 (Port-operated facilities). Dissolved copper loads in 2017 attributed to in-water hull cleaning are shown in Tables 3-3 (yacht clubs and marinas) and 3-4 (Port-operated facilities).

Passive load estimates were calculated by multiplying the number of vessels in each category by either 0.86 kg/yr (for copper, assumed copper, and unconfirmed low-copper paints, or unconfirmed non-copper paints), or 0.43 kg/yr (for DPR Category I, low-copper, and aged-copper paints). In-water hull cleaning loads estimates were calculated by multiplying the number of vessels in each category by either 0.04 kg/yr (for copper, assumed copper, and unconfirmed low-copper paints, or unconfirmed non-copper paints), or 0.02 kg/yr (for DPR Category I, low-copper, and aged-copper paints).

The load estimate for each category was then corrected for average vessel occupancy (i.e., Average Time Occupied in Tables 3-3 through 3-6). The combined 2017 load estimates from passive and in-water hull cleaning sources are presented in Table 3-7 and as follows:

- Vessels with copper (or assumed copper) paints contributed a load of 634.1 kg/yr (this total includes 609.7 kg/yr from vessels in yacht clubs and marinas and 24.4 kg/yr from vessels in Port-operated facilities).
- DPR Category I paints contributed a dissolved copper load of 275.4 kg/yr.
- Low-copper hull paints contributed a dissolved copper load up to 22.1 kg/yr.
- Aged-copper paints contributed an annual dissolved copper load of 188.2 kg/yr.
- Vessels that were reported to have unconfirmed low-copper (17.3 kg/yr) or unconfirmed non-copper (10.3 kg/yr) paints contributed an annual dissolved copper load of 27.6 kg/yr.
- No dissolved copper load was contributed to SIYB by the 111 vessels with either confirmed non-copper paint, vessels in HydraHoists®, or vessels that were unpainted.
- A total of 135 slips within the SIYB yacht clubs and marinas were reported to be vacant year-round, and so were not loading dissolved copper into the basin.

In summary, vessels painted with copper paints, DPR Category I paints, low-copper hull paints, and aged-copper paints contributed a combined passive and in-water hull cleaning load of 1,147.3 kg/yr (i.e., approximately 1,122.9 kg/yr for yacht clubs and marinas plus approximately 24.4 kg/yr for Port-operated facilities) of dissolved copper to SIYB in 2017.

Table 3-3.
2017 Copper Load by Vessel Hull Type and Reported Occupancy at Yacht Clubs and Marinas as a Result of Passive Leaching Using TMDL Assumptions

Vessel Hull Paint Category	Number per Category	Average Time Occupied[c]	Copper Load per Vessel (kg/yr)[d]	Total Copper Load (kg/yr)
Copper or Unknown (Assumed Copper)	780	86.9%	0.86	582.59
DPR Category I (Low Leach)	648	94.4%	0.43	263.13
Low-Copper (Confirmed)	53	92.5%	0.43	21.09
Low-Copper (Unconfirmed)[a]	23	83.7%	0.86	16.56
Aged-Copper Paint[b]	468	89.4%	0.43	179.83
Non-Copper (Confirmed or Not Painted)	111	93.7%	0	0
Non-Copper (Unconfirmed)[a]	12	95.1%	0.86	9.81
Vacant Slips (Yacht Clubs and Marinas)	135	--	--	0
Total (Yacht Clubs and Marinas)	***2,095[e]***	**--**	**--**	***1,073.01***

Notes:
[a] Low- or non-copper paints that were not confirmed are counted as high-copper paint, per the Monitoring Plan.
[b] Calculations for aged-copper paints are similar to low-copper paints (0.43 kg/yr load).
[c] The average total occupancy was derived by the count within each vessel hull paint category multiplied by the average percent occupancy for that category; values are presented to three significant figures.
[d] Based upon per vessel load identified for passive leaching in Appendix 2 of the SIYB TMDL Technical Report.
[e] Note: Vacant slips are not included in this total.
% = percent; kg/yr = kilogram(s) per year

Table 3-4.
2017 Copper Load by Vessel Hull Type and Reported Occupancy at Port-Operated Facilities as a Result of Passive Leaching Using TMDL Assumptions

Vessel Hull Paint Category	Number per Category	Average Time Occupied[b]	Copper Load per Vessel (kg/yr/vessel)[d]	Total Copper Load (kg/yr)
Port Fleet (Confirmed Non-Copper)	16	100%	0	0
Port Transient Dock[a] (Copper or Unknown and Assumed to be Copper)	26	54.9%	0.86	12.27
Port Transient Dock[c]	1	100%	0.86	0.86
Port Weekend Anchorage[a] (Copper or Unknown and Assumed to be Copper)	40	29.5%	0.86	10.16
Vacant Slips (Port HPD Dock)	0	0%	--	0
Total (Port-Operated Facilities)	***83***	**--**	**--**	***23.29***

Notes:
[a] Calculated as an average, based on total number of days a slip was occupied by a guest vessel.
[b] The average total occupancy was derived by the count within each vessel hull paint category multiplied by the average percent occupancy for that category; values are presented to three significant figures.
[c] A known research vessel occupies one slip at the transient dock year-round. The paint type could not be verified, therefore the vessel was assumed to have copper-based hull paint.
[d] Based upon per vessel load identified for passive leaching in Appendix 2 of the SIYB TMDL Technical Report.
% = percent; kg/yr = kilogram(s) per year; HPD = Harbor Police Dock

Table 3-5.
2017 Copper Load by Vessel Hull Type and Reported Occupancy at Yacht Clubs and Marinas as a Result of In-Water Hull Cleaning Using TMDL Assumptions

Vessel Hull Paint Category	Number per Category	Average Time Occupied[c]	Copper Load per Vessel (kg/yr)[d]	Total Copper Load (kg/yr)
Copper or Unknown (Assumed Copper)	780	86.9%	0.04	27.10
DPR Category I (Low Leach)	648	94.4%	0.02	12.24
Low-Copper (Confirmed)	53	92.5%	0.02	0.98
Low-Copper (Unconfirmed)[a]	23	83.7%	0.04	0.77
Aged-Copper Paint[b]	468	89.4%	0.02	8.36
Non-Copper (Confirmed or Not Painted)	111	93.7%	0	0
Non-Copper (Unconfirmed)[a]	12	95.1%	0.04	0.46
Vacant Slips (Yacht Clubs and Marinas)	135	--	--	0
Total (Yacht Clubs and Marinas)	***2,095[e]***	***--***	***--***	***49.91***

Notes:
[a] Low- or non-copper paints that were not confirmed are counted as high-copper paint, per the Monitoring Plan.
[b] Calculations for aged-copper paints are similar to low-copper paints (0.02 kg/yr load for cleaning).
[c] The average total occupancy was derived by the count within each vessel hull paint category multiplied by the average percent occupancy for that category; values are presented to three significant figures.
[d] Based upon per vessel load identified for in-water hull cleaning in Appendix 2 of the SIYB TMDL Technical Report.
[e] Note: Vacant slips are not included in this total.
% = percent; kg/yr = kilogram(s) per year

Table 3-6.
2017 Copper Load by Vessel Hull Type and Reported Occupancy at Port-Operated Facilities as a Result of In-Water Hull Cleaning Using TMDL Assumptions

Vessel Hull Paint Category	Number per Category	Average Time Occupied[b]	Copper Load per Vessel (kg/yr/vessel)[c]	Total Copper Load (kg/yr)
Port Fleet (Confirmed Non-Copper)	16	100%	0	0
Port Transient Dock[a] (Copper or Unknown and Assumed to be Copper)	26	52%	0.04	0.57
Port Transient Dock[d]	1	100%	0.04	0.04
Port Weekend Anchorage[a] (Copper or Unknown and Assumed to be Copper)	40	31%	0.04	0.47
Vacant Slips (Port HPD Dock)	0	0%	--	0
Total (Port-Operated Facilities)	***83***	***--***	***--***	***1.08***

Notes:
[a] Calculated as an average, based on total number of days a slip was occupied by a guest vessel.
[b] The average total occupancy was derived by the count within each vessel hull paint category multiplied by the average percent occupancy for that category; values are presented to three significant figures.
[c] Based upon per vessel load identified for in-water hull cleaning in Appendix 2 of the SIYB TMDL Technical Report.
[d] A known research vessel occupies one slip at the transient dock year-round. The paint type could not be verified, therefore that vessel was assumed to have copper-based hull paint.
% = percent; kg/yr = kilogram(s) per year; HPD = Harbor Police Dock

3.1.6 Estimated Copper Load Reduction

The dissolved copper load reduction for 2017 is shown in Table 3-7. Load reduction is determined by subtracting the estimated dissolved copper load from the 2,100 kg/yr baseline load attributed to vessels identified in the SIYB TMDL Technical Report (passive leaching = 2,000 kg/yr and in-water hull cleaning = 100 kg/yr).

Based upon these calculations, the 2017 estimated copper load reduction is 952.7 kg/yr (i.e., 2,100 kg/yr minus 1,147.3 kg/yr = 952.7 kg/yr), which is a 45.4 percent reduction compared with the baseline load identified in the TMDL.

Table 3-7.
2017 Estimated Copper Load Reduction

Copper Loading Category	Total Copper Load (kg/yr)
SIYB Vessels in Yacht Clubs and Marinas with Copper or Unknown Paint (Assumed Copper)	609.69
SIYB Vessels in Yacht Clubs and Marinas with DPR Category I (Low Leach Paint)	275.37
SIYB Vessels in Yacht Clubs and Marinas with Confirmed Low-Copper Paint	22.07
SIYB Vessels in Yacht Clubs and Marinas with Unconfirmed Low-Copper Paint	17.33
SIYB Vessels in Yacht Clubs and Marinas with Aged-copper Paint	188.19
SIYB Vessels in Yacht Clubs and Marinas with Confirmed Non-Copper Paint or No Paint	0
SIYB Vessels in Yacht Clubs and Marinas with Unconfirmed Non-Copper Paint	10.27
Port HPD Fleet	0
Port-Operated Docks in SIYB	24.37
SIYB Yacht Club and Marina Year-Round Vacancies	0
Grand Total Load	1,147.3
***Load Reduction from TMDL**[a]*	**952.7** (**45.4**%)

Notes:
[a] The total copper load from the TMDL equals 2,100 kg/yr from vessel paints (passive leaching and in-water hull cleaning, combined). The estimated load due to background, urban runoff, and atmospheric deposition is not included in this total.
% = percent; kg/yr = kilograms per year; HPD = Harbor Police Dock; SIYB = Shelter Island Yacht Basin; TMDL = Total Maximum Daily Load

3.2 SIYB TMDL Water Quality Monitoring

This section summarizes the results of the 2017 annual analytical chemistry and toxicity monitoring program conducted in SIYB. Detailed laboratory reports are in Appendix D.

3.2.1 Surface Water Chemistry

Annual water quality monitoring was performed on August 23, 2017. Surface water samples were tested for concentrations of total and dissolved copper and zinc, and for DOC and TOC. Results of the monitoring survey are presented in Table 3-8, including the *in situ* water quality measurements; a QA/QC summary of all analytical laboratory data is in Section 3.2.1.2. The chemistry results reports submitted by each analytical laboratory are in Appendix D.

Table 3-8.
Chemistry Results for SIYB Surface Waters, August 2017 Event

Station	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
SIYB-1	**12**	13	31	31	1.5	1.7	13
SIYB-2	**13**	13	28	29	1.5	1.5	11
SIYB-3	**9.1**	9.8	20	21	1.7	1.4	11
SIYB-4	**7.9**	8.3	18	19	1.5	1.7	12
SIYB-5	**3.4**	3.9	9.3	10	2.5	1.7	13
SIYB-6	1.8	2.3	5.6	6.6	2.1	1.4	14
SIYB-REF	0.95	1.2	3.1	4.4	1.5	1.5	10

Notes:
Values in **bold** are above the USEPA National Recommended Water Quality criterion continuous concentration (CCC) for dissolved copper of 3.1 µg/L in marine waters
No values were above the zinc CCC of 81 µg/L
High tide on 08/23/2017 was +5.47 feet at 11:15 am; tidesandcurrents.noaa.gov
µg/L = microgram(s) per liter; DOC = dissolved organic carbon; mg/L = milligrams per liter; TOC = total organic carbon; TSS = total suspended solids

Dissolved Copper – Dissolved copper levels within SIYB ranged from 1.8 to 13 µg/L. The lowest concentration within the basin occurred at the outermost station (SIYB-6); the highest level was recorded at an inner station (SIYB-2). The concentration of dissolved copper at the reference station (SIYB-REF) was 0.95 µg/L. Dissolved copper concentrations at five of the six SIYB stations exceeded the dissolved copper USEPA National Recommended Water Quality CTR WQO of 3.1 µg/L.

Total Copper – Total copper concentrations measured in SIYB followed a similar spatial pattern, ranging from 2.3 µg/L at the outermost station in the basin (SIYB-6) to 13 µg/L at the innermost stations (SIYB-1 and SIYB-2). The total copper concentration at the reference station (SIYB-REF) was 1.2 µg/L.

Dissolved Zinc – Dissolved zinc levels in SIYB followed a spatial pattern similar to that of dissolved copper. Concentrations ranged from 5.6 to 31 µg/L within SIYB (lowest at SIYB-6 and highest at SIYB-1). The concentration at SIYB-REF was 3.1 µg/L. Dissolved zinc levels in SIYB have remained well below the USEPA criterion continuous concentration (CCC) of 81 µg/L during all SIYB TMDL monitoring events.

Total Zinc – Total zinc concentrations followed the same spatial pattern, with values ranging from 6.6 µg/L at SIYB-6 to 31 µg/L at SIYB-1. The concentration of total zinc at the SIYB-REF station was 4.4 µg/L.

DOC – DOC concentrations in the water column, which have been shown to affect the bioavailability of free copper, maintained relatively consistent levels throughout SIYB, ranging from 1.5 to 2.5 milligram(s) per liter (mg/L).

TOC – Measured concentrations of TOC were relatively consistent for all samples, ranging from 1.4 mg/L at SIYB-3 to 1.7 mg/L at three stations (SIYB-1, SIYB-4 and SIYB-5).

TSS – Measured concentrations of TSS were relatively consistent for all samples, ranging from 11 mg/L at SIYB-2 and SIYB-3 to 14 mg/L at SIYB-6. The concentration of TSS at the SIYB-REF station was 10 mg/L.

3.2.1.1 Comparison of SIYB Dissolved Copper Levels over Time

An average basin-wide dissolved copper concentration was calculated (excluding the reference station) for comparison with the prior SIYB TMDL monitoring results (Figure 3-2). The basin-wide average concentration of dissolved copper measured in 2017 was 7.9 µg/L ± 1.8 µg/L (mean ± standard error), which was approximately 5 percent lower than the 2005-2008 baseline level.

As shown in Figure 3-2, the dissolved copper levels in the surface waters of the basin have been relatively consistent over the previous four TMDL monitoring events (2014-2017).

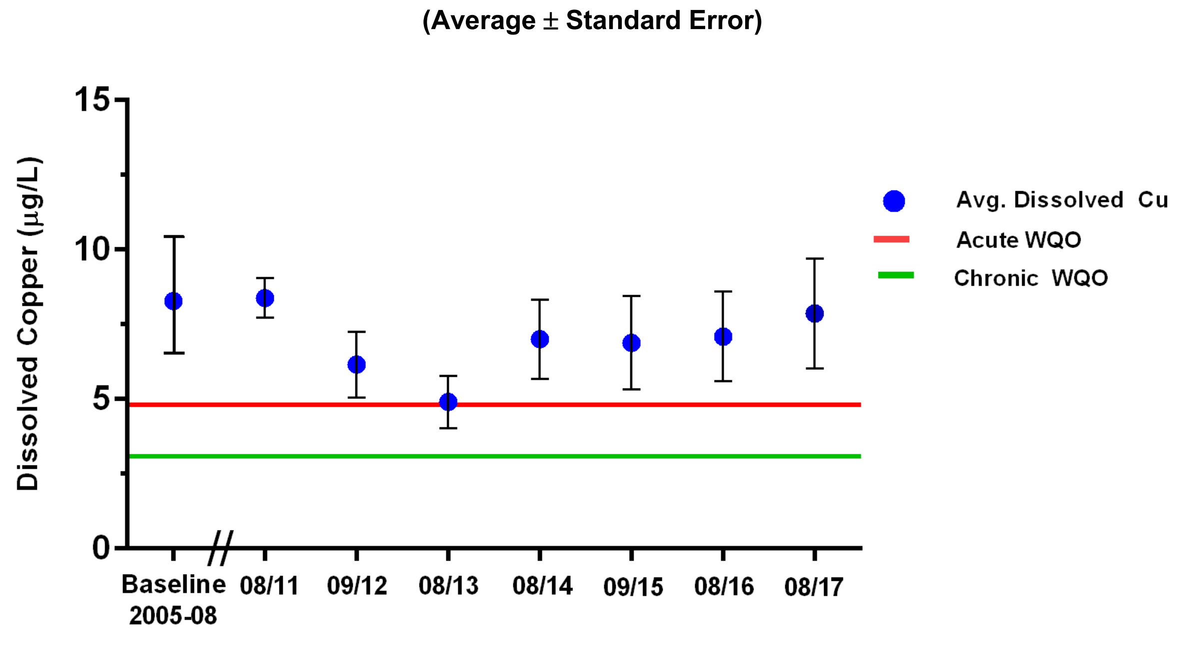

Figure 3-2. Dissolved Copper Concentrations in SIYB Relative to Baseline Conditions

3.2.1.2 Analytical Chemistry QA/QC

All samples were submitted to the analytical laboratories on the same day that they were collected (August 23, 2017). The samples were received in good condition at Weck, at 4.5°C and on ice. The samples for dissolved metals analyses were filtered by the laboratory immediately upon receipt. All samples met holding time requirements for analysis.

Analytical chemistry results underwent a thorough QA/QC evaluation; they were determined to meet the data quality objectives outlined in the QAPP and were deemed acceptable for reporting purposes, with qualifications as noted in the QA section of the individual laboratory reports (these issues are summarized below). The analytical laboratory reports in Appendix D have specific QA/QC sections that highlight any qualified data.

The following information summarizes the relevant data QA/QC-related findings associated with the 2017 SIYB TMDL study:

- **Issue** – Similar to results in 2016, higher-than-expected levels of total copper and total zinc were observed in the equipment rinsate blank. Ideally, the level of metals in this QA sample should be very low or non-detect. The field blank contained concentrations of less than the equipment blank, indicative of potential trace contamination of equipment. The concentrations of the metals in the equipment rinsate are similar to the concentrations measured at the reference station for zinc.
- **Issue** – Higher-than-expected levels of DOC/TOC were observed in the equipment rinsate blank, and to a lesser degree in the field blank. These low-level detections are of a range similar to that of previous events and may be representative of trace contamination. Corresponding laboratory QA/QC samples meet all project specific limits in the QAPP.
- **Issue** – DOC values in some cases were higher than the TOC values reported for the same sample. Corresponding laboratory QA/QC samples met all QAPP limits, and concentrations measured in the associated laboratory blanks were very low to non-detect. The magnitudes of these minor differences are in general agreement with results from previous events and these differences appear to be inherent to the method. The exact source of these low-level detections is unknown, but they may be a trace-level artifact introduced as part of the filtration step.

  Explanation and Resolution – Similar to the 2016 event, trace detections of metals, DOC, TOC, and detectable TSS were measured in the equipment rinsate. The source of these detections is unknown. Based on similar low-level detections of contaminants of concern in the equipment rinsate, several best field practices are employed as part of the field collection. Specifically, the Niskin bottle used for sample collection was the same piece of equipment that has been used for previous SIYB TMDL monitoring events. Furthermore, prior to the TMDL sampling event, the Niskin bottle was scrubbed with an Alconox® solution, thoroughly rinsed with deionized water, and sealed in a plastic bag. Prior to the equipment rinsate collection, the Niskin bottle was rinsed again with laboratory-certified deionized water.

  The minor differences and low-level detections were not considered significant enough to warrant retesting or recollection of samples and testing. All results are considered usable for their intended data purposes and are reported as provided by the laboratory.

3.2.2 Toxicity

In addition to water chemistry analyses, the samples were tested for toxicity using an acute 96-hour survival exposure with a marine larval fish (Pacific topsmelt), and a chronic 48-hour survival and development test using bivalve embryos (Mediterranean mussel). The complete toxicity laboratory report for the 2017 study is in Appendix D.

3.2.2.1 Pacific Topsmelt 96-Hour Acute Bioassay

Pacific topsmelt survival ranged from 93.3 percent to 96.7 percent in all laboratory controls. This survival rate meets the minimum acceptable mean control criterion of 90 percent (Table 3-9). No toxicity was observed in any of the undiluted samples tested. The LC_{50} for all samples was greater than 100 percent, indicating that surface water samples collected in SIYB and at the reference station were nontoxic to topsmelt.

Table 3-9.
Results of the 96-Hour Pacific Topsmelt Bioassay

Concentration (% Sample)	Sample ID/Mean Survival (%)						
	SIYB-1	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6	SIYB-REF
Laboratory Control	96.7	96.7	96.7	93.3	93.3	96.7	96.7
25	96.7	96.7	100	96.7	100	96.7	96.7
50	100	96.7	96.7	100	93.3	96.7	96.7
100	93.3	93.3	100	93.3	93.3	96.7	96.7
TST (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass	Pass
NOEC (%)	100	100	100	100	100	100	100
LOEC (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LC_{50} (%)	>100	>100	>100	>100	>100	>100	>100

Notes:
% = percent; ID = identification; LC_{50} = concentration estimated to be lethal to 50 percent of the organisms; LOEC = lowest observed effect concentration; N/A = not applicable (because all test treatments had an NOEC of 100%); NOEC = no observed effect concentration; TST (Pass/Fail) = test of significant toxicity; TST Pass = sample is nontoxic according to the TST calculation; TST Fail = sample is toxic according to the TST calculation

3.2.2.2 Bivalve Larvae 48-Hour Chronic Bioassay

Results of the mussel development tests conducted on SIYB surface water samples are summarized in Table 3-10. Results are presented as a combined endpoint of survival and development per the USEPA 1995 protocol.

Bivalve tests were conducted on both filtered and unfiltered samples (for the 100 percent treatments only). Filtration on the undiluted samples was conducted to safeguard against potential undesirable effects from resident organisms in the raw water samples. The need to filter the samples prior to conducting the bivalve larvae test is further discussed in Section 3.2.2.3.

A bivalve larvae test is considered acceptable (i.e., valid) if at least 50 percent of the control larvae survived and an average of 90 percent of surviving control larvae developed normally. Control survival for the 2017 tests ranged from 93.2 percent to 97.7 percent; average control survival was 96.0 percent (which exceeds the test acceptability criteria of 50 percent survival; see toxicity report in Appendix D). Bivalve larvae normality in the controls ranged from 94.9 percent (SIYB-1) to 98.1 percent (SIYB-6); average control normality was 96.4 percent (which exceeds the test acceptability criteria of 90 percent normal development). Based upon these high levels of control survival and normal development, the 2017 SIYB bivalve larvae tests met the required acceptability criteria and the tests were deemed valid.

Table 3-10.
Results of the 48-Hour Bivalve Larvae Bioassay

Concentration (% Sample)	Mean Combined Survival and Normal Development						
	SIYB-1	**SIYB-2**	**SIYB-3**	**SIYB-4**	**SIYB-5**	**SIYB-6**	**SIYB-REF**
Laboratory Control	95.0	96.0	93.2	96.9	97.5	97.7	96.0
6.25	95.2	95.2	96.9	93.7	93.7	95.4	94.5
12.5	95.4	95.3	95.5	96.3	94.9	96.2	94.8
25	96.8	96.6	95.9	90.6	93.9	94.2	95.5
50	96.9	95.9	97.0	98.1	95.5	94.8	94.7
100	**41.9**	**71.4**	89.1	94.7	97.2	96.7	96.7
100 (0.45-µm filtered)[a]	**62.6**	86.1	92.4	92.3	95.2	95.6	95.4
TST (Pass/Fail) unfiltered sample	Fail	Fail	Pass	Pass	Pass	Pass	Pass
TST (Pass/Fail) filtered sample	Fail	Pass	Pass	Pass	Pass	Pass	Pass
EC_{50} (% unfiltered sample)	>100	>100	>100	>100	>100	>100	>100
EC_{50} (% filtered sample)	94.7	>100	>100	>100	>100	>100	>100

Notes:
The reference toxicant EC_{50} value (7.47 µg/L copper) for this test was within two standard deviations of the Nautilus historical mean (8.58 ± 4.62 µg/L copper), indicating typical organism sensitivity to copper.
TST: Pass = sample is nontoxic according to TST calculation; Fail = sample is toxic according to the TST calculation.
Values in **bold** indicate a statistically significant decrease compared to control.
[a] Each undiluted sample was also tested filtered through 0.45-µm filter to remove potentially harmful native algae that might interfere with test organism performance. Mean combined survival and normal development in the filtered control was 94.1 percent.
% = percent; µm = micrometer; EC_{50} = concentration estimated to cause an adverse effect on 50 percent of the organisms

A statistically significant decrease in the combined survival and development endpoint using the TST test was observed in two of the six samples tested (SIYB-1 and SIYB-2) from within the basin. Exposure of bivalve larvae to the undiluted and unfiltered SIYB-1 and SIYB-2 samples (i.e., 100 percent concentration) resulted in 41.9 percent and 71.4 percent combined survival and normal development compared with the laboratory control level (95 and 96 percent, respectively). For the undiluted and filtered samples tested, only one sample (SIYB-1) showed statistically a significant decrease in the combined survival and normal development endpoint (62.6 percent). The EC_{50} for the filtered SIYB-1 sample was calculated to be 94.7 percent; the EC_{50} for the unfiltered SIYB-1 and both SIYB-2 samples was >100 percent. The full toxicity testing report in provided in Appendix D.

3.2.2.3 Toxicity QA/QC

3.2.2.3.1 Field Observations

On the day prior to sample collection (August 22, 2017), a reconnaissance survey was conducted in SIYB to evaluate the study area for the presence of algal blooms and for general water clarity. In addition to these visual assessments, the reconnaissance survey also included collection of several water samples that were sent to the laboratory to be analyzed for the presence of harmful algal species. The reconnaissance survey showed that the water clarity in SIYB was acceptable and that the collected water samples did not contain an abundance of harmful algae species. Based upon these findings, it was determined that the collection project should proceed as planned. No other QA/QC issues were noted for this test, and all water quality parameters were within the appropriate ranges for the duration of the test.

3.2.2.3.2 Sample Receipt

Samples were received in good condition on the same day that they were collected (August 23, 2017). The SIYB samples were delivered on ice and received in the laboratory within the USEPA recommended temperature range of 0–6°C. All tests were initiated within the 36-hour holding time requirement.

3.2.2.3.3 Toxicity Test Validity

The controls for each test met the minimum test acceptability criteria set by USEPA, as well as internal laboratory QA program requirements. Both the Pacific topsmelt 96-hour acute survival and the bivalve 48-hour chronic development tests met all protocol-required minimum acceptability criteria. Nautilus's QA/QC summary of the toxicity test results is in Appendix D.

3.2.2.3.4 Reference Toxicant Tests

Concurrent topsmelt and bivalve reference toxicant results are summarized in Table 3-11 and Table 3-12, respectively. The controls for both reference toxicant tests met the minimum test acceptability criteria, and the calculated EC_{50} value for the bivalve test fell within two standard deviations of the laboratory historical mean. This result indicates that the test organisms used during this round of testing had typical sensitivity to copper. The LC_{50} for the Pacific topsmelt test was also within two standard deviations of the historical mean, indicating that the fish used during this round of testing had typical sensitivity to copper.

Table 3-11.
Summary of Reference Toxicant Test Results for Pacific Topsmelt

Copper Chloride Reference Toxicant Test			
Concentration (µg/L Copper)	**Mean Percent Survival**	**LC_{50} (µg/L Copper)**	**Historical Mean ± 2 Standard Deviations (µg/L Copper)**
Laboratory Control	100	141	104 ± 60.4
50	90		
100	90		
200	10		
400	0		
800	0		

Notes:
µg/L = microgram(s) per liter; LC_{50} = concentration estimated to be lethal to 50% of the organisms

Table 3-12.
Summary of Reference Toxicant Test Results for Bivalve Larvae

Copper Chloride Reference Toxicant Test			
Concentration (µg/L Copper)	**Mean Combined Survival and Normal Development**	**EC_{50} (µg/L Copper)**	**Historical Mean ± 2 Standard Deviations (µg/L Copper)**
Laboratory Control	95.9	7.47	8.58 ± 4.62
2.5	95.8		
5.0	93.8		
10	0.6		
20	0		
40	0		

Notes:
µg/L = microgram(s) per liter; EC_{50} = concentration estimated to cause an adverse effect on 50% of the organisms

Curved Hinged Larvae

During the 2014 monitoring, it was noted that some of the abnormal larvae (approximately 70 percent) were enumerated as "abnormal" because they had a slightly curved-hinged shell (i.e., bean-shaped) rather than a straight-hinged D-shaped shell[9]. To evaluate the recurrence of this observation for future TMDL bivalve larvae tests, the laboratory scored the larvae as (1) larvae with a fully developed shell with a straight-hinged D-shape, (2) partially developed larvae with a concave or curved hinge, and (3) larvae that fail to develop a shell or display severe morphological defects.

As described in Appendix D, approximately 0 to 3.5 percent[10] of the bivalve larvae in the undiluted, unfiltered samples for SIYB-1 through SIYB-5 for the 2017 study were partially developed, but did not possess a straight hinge. Two of these samples (SIYB-1 and SIYB-2) resulted in statistically significant toxicity to bivalve larvae. This response was not observed in any of the control replicates, nor was it observed in samples from SIYB-6 or SIYB-REF. A much

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[9] Photographs of bivalve larvae with slightly curved-hinged shells were included in the 2014 SIYB TMDL report (AMEC, 2015).

[10] This value is lower than those observed in 2015, which ranged from 5 to 10 percent in SIYB-1 through SIYB-4.

smaller percentage of the larvae were partially developed with a curve-hinged shell in 2017 compared with 2014. The factor(s) that contributed to the elevated number of curve-hinged shells observed in the SIYB-1 sample in 2014 (>70 percent) did not recur in 2017 (see Nautilus' study report contained in Appendix D for more information).

4.0 ONGOING INITIATIVES AND STUDIES RELEVANT TO THE SIYB TMDL

This section provides a summary of additional local, state and federal initiatives or studies that occurred in 2017 that are relevant to the SIYB TMDL. These initiatives are instrumental in supporting the objectives of the Port's Copper Reduction Program to both meet regulatory compliance requirements and work toward reducing copper loading in SIYB and San Diego Bay.

4.1 DPR Efforts

Updated List of Copper-based Antifoulant Paints by Leach Rate Category – On July 20, 2017, the DPR published a memorandum that provided an updated list of copper-based AFP products that contain the active ingredients copper oxide, copper hydroxide, and cuprous thiocyanate (DPR, 2015), grouped into two categories:

1. Category I: Products with a leach rate below or equal to (≤) 9.5 micrograms per square centimeter per day (μg/cm^2/day)
2. Category II: Products with a leach rate greater than (>) 9.5 μg/cm^2/day

Both the original and updated DPR Lists have been instrumental in moving several Port projects forward, namely (1) development of paint guidance for improved vessel tracking, and (2) acceptance of updated tracking for SIYB annual reporting purposes.

Update to Section 6190 of Title 3 California Code of Regulations – In August 2017, the DPR adopted section 6190 of Title 3, California Code of Regulations. This action establishes a maximum allowable copper leach rate for copper-based AFP products registered in California for use on recreational vessels beginning July 1, 2018. This regulatory program is a critical component of the SIYB TMDL, as all copper-based AFPs that do not meet the maximum leach rate of 9.5 μg/cm^2/day (i.e., non-Category I paints) will no longer available for application on recreational vessels in California marinas. As a result, additional reduction in the copper loading into SIYB should occur. Prior to adoption, on January 31, 2017, the Port provided comments on the DPR's Initial Statement of Reasons. In its summary letter, the Port (1) supported the effective date of July 1, 2018, and (2) encouraged the continued development and implementation of additional copper reduction mitigation measures. The Port's letter is provided in Appendix F.

4.2 USEPA Interim Decisions on Copper Compounds

In September 2017, the USEPA announced availability of the proposed interim registration review on several pesticides, including copper compounds. Triennial Reviews allow the USEPA to consider the latest science when determining whether current regulations for copper require additional changes from the current rules in place. Staying informed and submitting comment letters allows the Port to be involved in the transparent processes set forth by the USEPA and gives a platform for discussing the science and policy aspects that would assist in meeting TMDL compliance. The Port submitted comments on this interim registration review during the 60-day public comment period. In summary, the Port provided the following comments on the proposed interim registration review:

- The Port strongly encouraged the USEPA to consider the most recent scientific findings and water quality impacts, especially in areas with known impairments, to ensure that legally available AFPs do not continue to contribute to those regions' impairments; and
- The Port strongly encouraged the submittal of specific hull cleaning practices and maintenance expectations for each product.

The Port's response letter is provided in Appendix F.

4.3 Port Initiatives

In 2017, the Port continued to pursue a wide range of initiatives as outlined in the SIYB TMDL Implementation Plan (Section 3.1.1.1). Each of these initiatives are incorporated under one of five core elements of the Copper Reduction Program and work in concert to achieve copper loading reductions in SIYB and San Diego Bay.

4.4 SIYB Time Series Study

During each annual TMDL compliance monitoring event, individual surface samples obtained for copper analyses are collected at one discrete time during the course of a daily tidal cycle. For year-on-year consistency purposes, the field collection crew collects individual samples at the seven TMDL stations at approximately the same point in the daily tidal cycle. While the sampling design is consistent at time of collection during the tidal cycle each year, the extent to which surface concentrations of dissolved copper may vary over the course of an entire semidiurnal tidal cycle in SIYB remains unknown. The SIYB Time Series study aimed to capture potential variations in dissolved copper concentrations at the surface over the course of one full semidiurnal tidal cycle.

The "Time Series Study" addresses the following study question: *How do tidal variations affect the concentrations of dissolved copper in the surface waters of SIYB?* Appendix E contains the technical memorandum, which discusses study methods and results. Overall, tidal variations do seem to affect the dissolved copper concentrations in surface waters of SIYB, however much of what is observed appears dependent on location within the basin. This variability is (1) the least prominent at the head of the basin (as shown at station TS-1), where variability between samples was relatively small; (2) more prominent at the locations closer to the mouth of the basin (as shown by stations TS-2 and TS-3), (3) more prominent between tidal phases closer to the mouth of the basin (i.e., stations TS-2 and TS-3), and (4) not significantly different at each station between the high and low tidal phases captured during the Time Series Study.

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5.0 DISCUSSION

This section highlights some of the findings associated with the load reductions and water quality monitoring as they relate to initiatives implemented within this reporting period.

5.1 Dissolved Copper Load

The vessel-tracking program for 2017 estimated an annual dissolved copper load to SIYB of 1,147.3 kg/yr. This value was calculated by adding together the estimated contributions from (1) copper and assumed copper paints, (2) DPR Category I and confirmed low-copper paints, and (3) aged-copper paints. Figure 5-1 shows the dissolved copper loads from 2011 to 2017 compared with the TMDL baseline load (2,100 kg/yr). This figure also shows the estimated yearly load in relation to the TMDL interim and final load reduction targets.

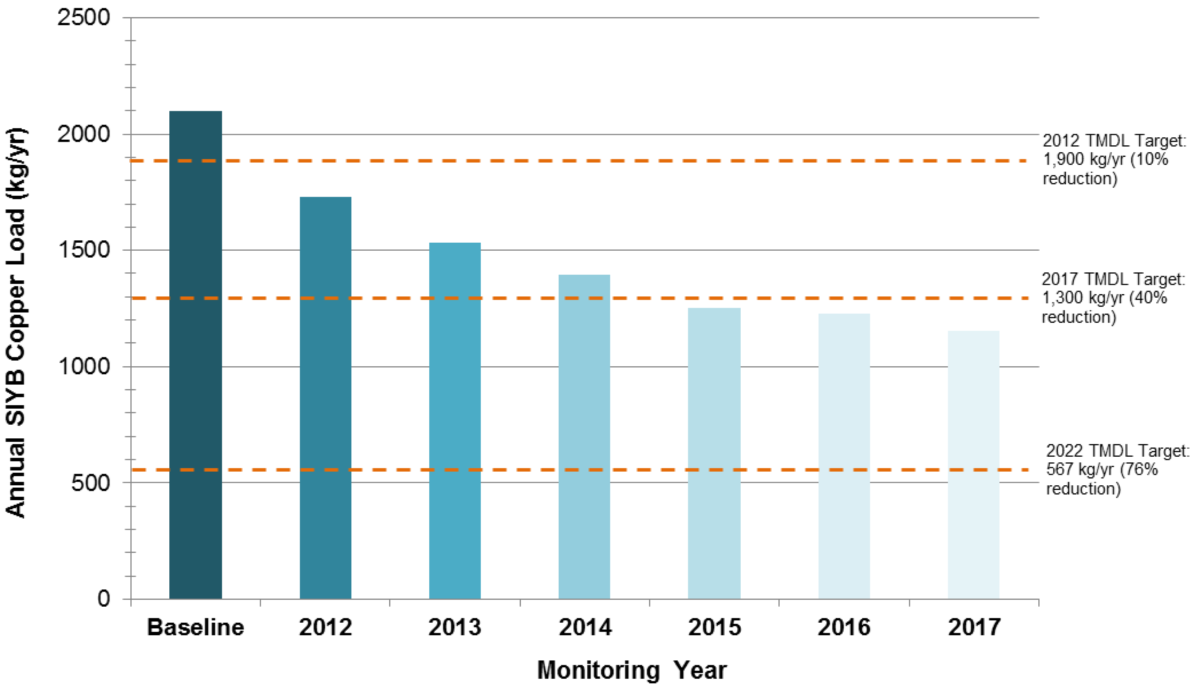

Figure 5-1. Annual SIYB Copper Load per Monitoring Year

5.2 Dissolved Copper Load Reduction

The results of the Port and SIML TMDL Group vessel tracking programs were used to estimate a dissolved copper load reduction of 45.4 percent (952.7 kg/yr) for 2017 compared with the TMDL baseline load (2,100 kg/yr). Not only is this an increase in load reduction from the previous year, but the program has successfully hit the 2017 TMDL required target of 40% load reduction by 2017. The estimated load reduction (952.7 kg/yr) was calculated by adding together all of the individual load contribution sources, and then subtracting this sum from the TMDL baseline (i.e., 2,100 kg/yr minus 1,147.3 kg/yr equals 952.7 kg/yr). The relative load reduction from each reduction category is shown in Figure 5-2.

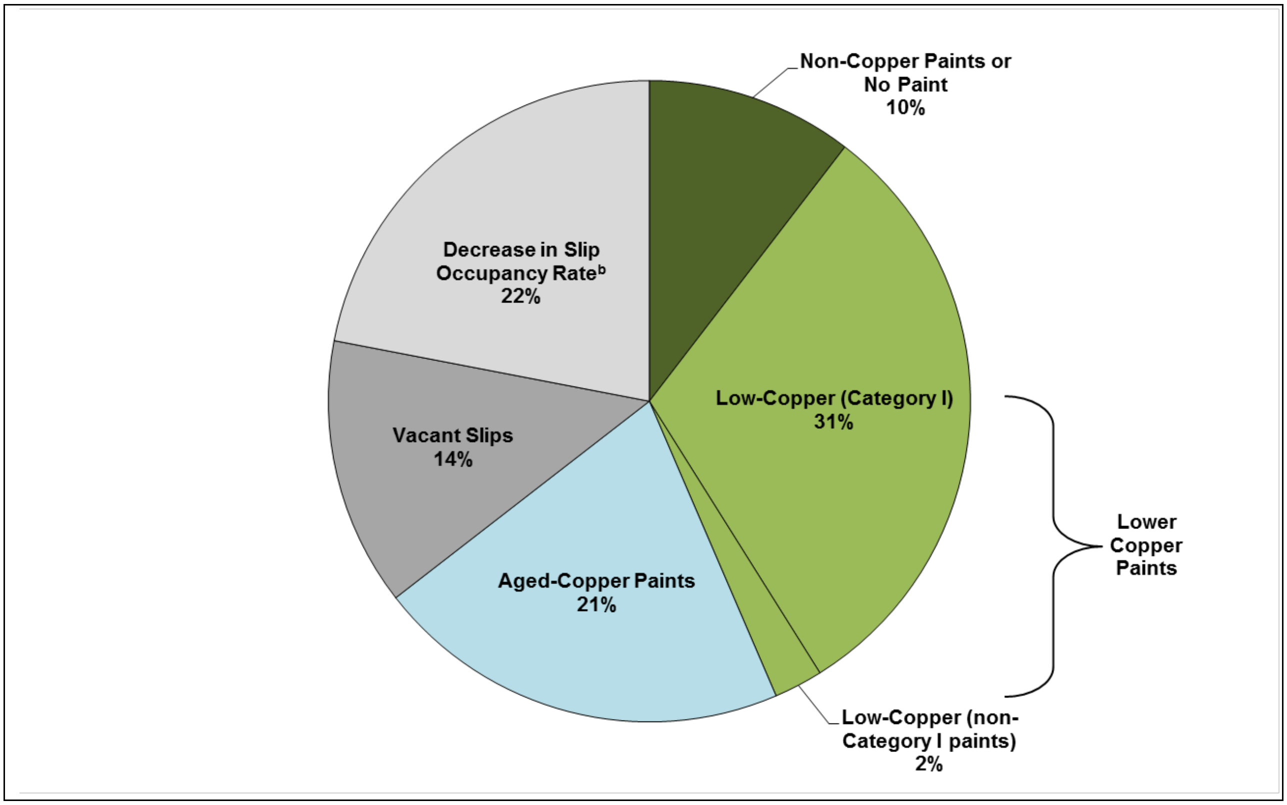

Figure 5-2. 2017 Estimated Load Reduction (952.7 kg/yr) Relative Percentage per Category[a]

Notes:

[a] The 2017 load reduction was determined by subtracting the estimated dissolved copper load (1,147.3 kg/yr) from the TMDL baseline load (2,100 kg/yr).This value does not include the load reduction due to the difference between the number of total slips used in the TMDL load calculation (2,363) and the number of slips reported in 2017 (2,313). Therefore, the percent breakdown per category is relative to the 952.7 kg/yr estimated load reduction.

[b] Decrease in average slip occupancy represents the load reduction due to an average occupancy rate of 89% for all vessels in SIYB.

The SIYB TMDL identified vessel conversions from copper to non-copper paints as the primary method for reducing dissolved copper loads to SIYB. In reality (as shown in Figure 5-2), there are numerous ways by which load reduction can occur, such as conversions to DPR Category I or low-copper paints, more time between repainting (i.e., aged-copper paint), or slip vacancies. Adjustments to hull-cleaning practices may also reduce loading to a greater extent than identified in the TMDL. A hull—cleaning event triggers both an active and subsequent passive dissolved copper leaching phase that lasts 30 days post-cleaning (Earley et al., 2013). Adjusting hull-cleaning practices may directly reduce the loading contribution in both the active and passive leaching phases, which would result in further load reductions into SIYB.

With the continued implementation of the annual vessel tracking program, the approach implemented by the SIML TMDL Group provides for self-reporting of realistic loading estimates, which will continue to improve as the data quality and response rate improves. Over the life of the vessel tracking program, numerous modifications were made to the copper load contributions from various loading sources. These modifications were made when new information was obtained that allowed a more accurate copper load assignment, compared with the more conservative TMDL loading assumptions. For example, the reclassification of vessels with aged paint reduced the per-vessel copper load of 0.9 kg/yr to 0.45 kg/yr, which resulted in a significant decrease in annual copper loads. Using actual yearly occupancy rate information in the load calculations rather than the TMDL assumption of 100 percent occupancy also resulted in a significant load reduction. As a result, the annual copper load reductions provide a realistic assessment of current loading conditions.

Figure 5-3 shows the distribution of load categories throughout each monitoring year. Continuing to conduct a thorough and rigorous annual vessel tracking program is essential to capture the continued movement by SIYB vessels owners to DPR Category I and non-copper paints as well as any substantial changes in the other load reduction categories (e.g., occupancy and vacancy, aged-copper paints). The 2017 vessel tracking program showed that the number of Category I paints increased by 344 vessels (over a 200 percent increase) compared to the 2016 monitoring period. Continued efforts like this by the boaters of SIYB will further assist with loading reductions. This notable observation is illustrated in Figure 5-3.

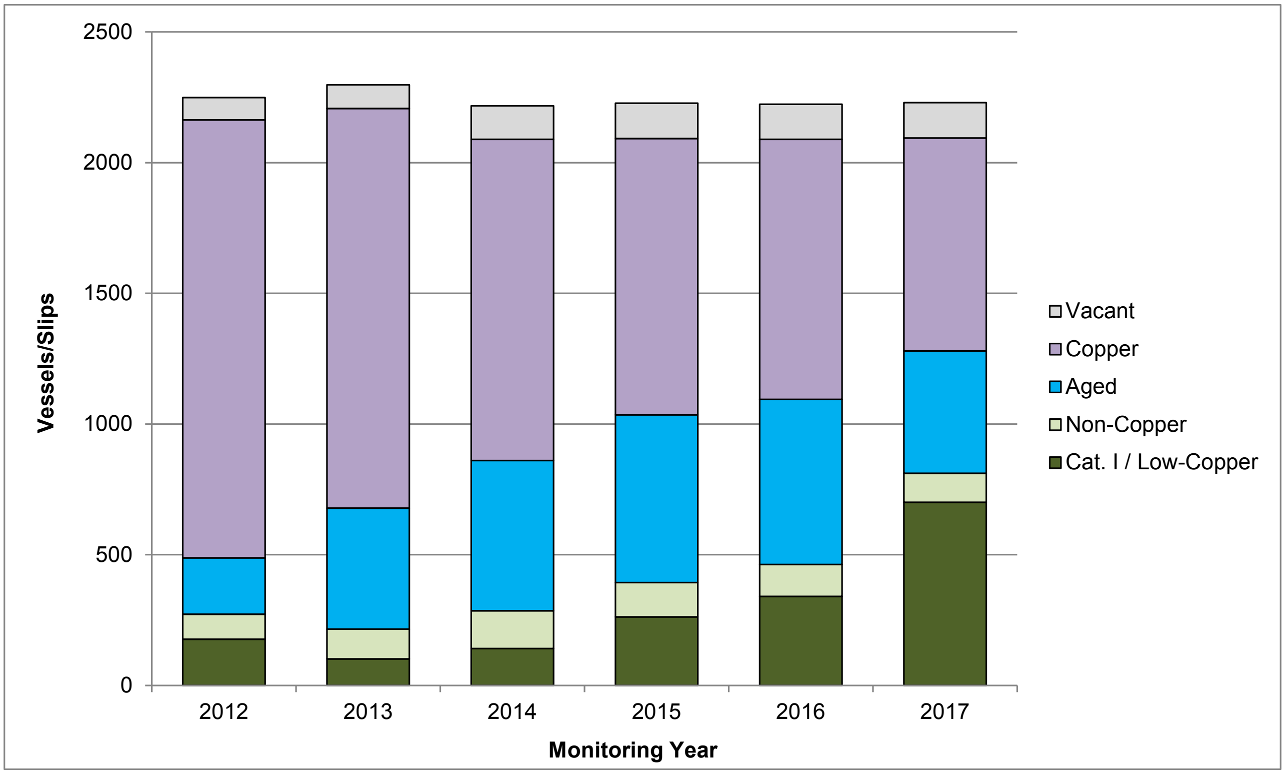

Figure 5-3. Load Categories per TMDL Year, 2011–2017

5.2.1 Estimated Future Load Reductions

The 2018 DPR Rule should result in additional reductions of the total copper load to SIYB. For future load reduction estimating purposes, when all vessels identified in 2017 with high-copper paint (or assumed high-copper paint) transition to a DPR Category I paint, the basin would see a minimum copper load reduction of approximately 338 kg/yr (assuming the same occupancy rate as reported for 2017). The conversion from high copper AFPs to Category I paints combined with all other loading sources would result in the load reduction of 1,285 kg/yr, which is a 61 percent load reduction compared with the TMDL baseline load (based on 2017 occupancy). Transitioning to non-copper paints would be even more beneficial because non-copper paints contribute 0 percent dissolved copper load to the basin, whereas DPR Category I paints contribute a 50 percent load (when compared to the 100 percent loading of high copper paints).

While the upcoming transition to DPR Category I paints should result in additional reductions in copper loading, this alone will not achieve the required TMDL loading reduction compliance requirement of 76% by 2022. Early predictions show that in SIYB, the DPR Rule may have the ability to reduce loading by 61% (assuming all current copper and/or unconfirmed paints transition to a Category I paint). Additionally, caution should be taken when trying to (1) predict the timeframe over which the load reduction would occur, and (2) estimate the actual reduction in copper loading that would result prior to, during, and after the transition process. The factors that may influence load reductions associated with implementation of the DPR Rule include (but are not limited to): (1) the transition time to phase out non-Category I paints, (2) the amount of time it takes for owners to repaint their vessels with Category I paints, and (3) the potential for a spike in the number of vessel owners opting to repaint with non-Category I paints (i.e., high copper paints) prior to the paint transition taking full effect. It is important to note that the 2017 vessel tracking results suggest an on-going transition to Category I paints is occurring. Even with the new DPR Rule, continued voluntary transitions to non-copper paints, or other policy based changes aimed at further copper reduction will likely also be needed to meet the final TMDL reduction goal.

5.3 Water Quality Monitoring

5.3.1 Dissolved Copper Levels

The 2017 monitoring program showed the basin-wide average dissolved copper level to be 7.9 µg/L. Copper levels at five of the six SIYB sampling stations exceeded the CTR WQO of 3.1 µg/L on the day of collection. Dissolved copper concentrations at these same five stations exceeded the CTR during the past three annual monitoring events. The 2017 monitoring event also showed that concentrations of dissolved copper at four of six stations exceeded the CTR acute criterion maximum concentration (CMC) water quality objective (4.8 µg/L). This result is consistent with the results of 2016, when the CMC was exceeded at the same four stations.

Figure 5-4 depicts the dissolved copper levels measured at each station from 2011 through 2017. As shown on this figure, there is a gradient in dissolved copper levels in SIYB where higher concentrations are consistently found near the head of the basin, with levels decreasing moving toward the mouth (i.e., toward San Diego Bay).

Although the basin-wide dissolved copper average observed in the 2017 monitoring program (7.9 µg/L) is approximately 14 percent higher compared to the previous three monitoring events (averages ranged from 6.9 µg/L to 7.1 µg/L), the 2017 average concentration is within the standard error of previous average concentrations. Additionally, the 2017 results are in agreement with the results of the Enhanced Water Quality Special Study conducted in 2016, which showed the basin-wide dissolved copper average to be 7.6 µg/L (Amec Foster Wheeler, 2017c). These recent data show that the year-after-year dissolved copper levels seem to be holding steady (neither increasing nor decreasing).

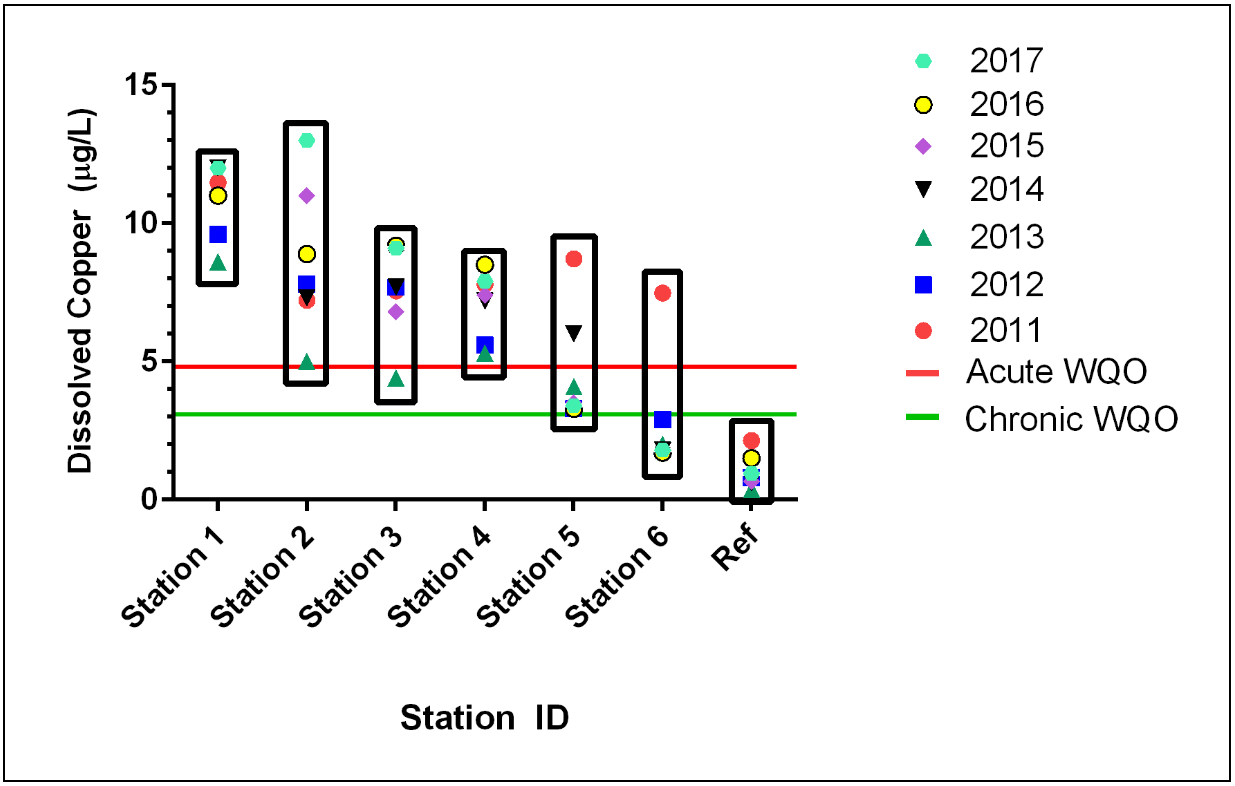

Figure 5-4. Dissolved Copper Comparison by Sampling Station

5.3.2 Toxicity Tests

Consistent with previous tests conducted for the TMDL monitoring program (dating back to the initiation of the monitoring in 2011), no acute toxicity to fish larvae was observed at any of the SIYB stations or the reference station. These results confirm that acute toxicity to fish larvae has not been an issue for SIYB.

Similar to the recent findings of the dissolved copper chemistry analyses of SIYB surface waters, toxicity in basin waters has also been relatively constant. Chronic toxicity has been observed during each year of the TMDL monitoring program dating back to 2012; however, toxicity has been limited to only two stations: SIYB-1 and SIYB-2. Station SIYB-2 showed a toxic response in 2017 (as it did in 2012 and 2015); however, it did not show a toxic response in 2013, 2014, or 2016. SIYB-1 also showed a toxic response in 2017, as it has in each of the previous TDML monitoring years since 2012. Stations SIYB-1 and SIYB-2 are the closest to the head of the basin and have the highest concentrations of vessels within the immediate vicinity (compared with other stations). Consistent with previous SIYB monitoring events, the 2017 monitoring found no chronic toxicity at the sampling stations in the middle or near the mouth of the basin, only at the head of the basin.

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6.0 CONCLUSIONS

The SIYB TMDL monitoring program results indicate that the second interim target, a 40 percent load reduction by 2017, was achieved. The 2017 vessel tracking data show 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. Furthermore, the improvements made to the vessel tracking program provided a realistic assessment of current loading conditions, the accuracy of which will only improve as the data quality and response rate continues to improve. As such, the program, with continued efforts to improve implementation, appears on track to maintain this load reduction.

While copper loading into SIYB has continued to decrease, dissolved copper concentrations in the surface water have leveled off from an original decrease, and thus have remained relatively constant, especially during the four most recent monitoring events (2014–2017). The Port has planned and implemented several studies to evaluate the apparent disconnect between dissolved copper levels observed in surface waters during the annual water quality program and the load calculated using annual vessel tracking data. To date, the Port has collected additional data regarding:

- Tidal variations and their potential effect on surface water dissolved copper concentrations (January 2018)
- Evaluating how increasing circulation in the head of SIYB via the construction of a culvert may help lessen surface water dissolved copper concentrations (on-going)
- How dissolved copper concentrations may vary throughout the basin depending on depth (August 2016)

Such additional data will inform the Port on management strategies that may need to be considered in the next three years for future policy decisions that will be needed to reach the TMDL compliance goal of a 76% loading reduction, since the DPR Rule will only, at most, achieve a 61% reduction of copper loading in SIYB.

For future load reductions to translate into measurable decreases in water column dissolved copper levels, there will need to be continued transitions from high-copper to both non-copper or DPR Category I paints along with the development and implementation of other copper reduction strategies. A substantial copper load reduction should occur when the DPR Rule goes into effect in July 2018. However, while the DPR expects significant reductions in dissolved copper concentrations to be realized following full implementation of the DPR rule, marina basins with more than 1,833 vessels (which includes SIYB) may not fully meet the 3.1 µg/L dissolved copper WQO, even with 100 percent transition to Category I paints (DPR, 2014). Therefore, continued voluntary transitions to non-copper paints, as well as additional management actions may need to be considered to further reduce dissolved copper levels in SIYB.

In the 2016 SIYB TMDL Monitoring Report, the Port proposed to identify additional copper reduction implementation concepts, strategies, and policy initiatives that could be considered in 2017. The following recommendations from the 2016 report were pursued:

- **Additional Copper Reduction Implementation Concepts and Strategies -** *Established Marina Voluntary Self-Certification Process:* In December 2017, the Port sent letters to each individual marina discussing the importance of vessel tracking for the TMDL, the ending of the compliance phase, summarizing their vessel tracking data that was submitted for 2016, and comparing their 2016 data to other SIYB marinas as a whole. Marina managers were asked to review the data, and return a Self-Certification Statement with their 2017 vessel tracking data submittal that confirmed their data was collected honestly and to the best of their ability. All marinas submitted data for 2017 and all but one marina submitted signed Certification forms.
- **Additional Copper Reduction Implementation Concepts and Strategies**- **Focus on Accurate Reporting and Prepare for the new 2018 DPR Low Leach Rule to go into effect**: The main strategy for 2017 was to encourage accurate and complete reporting from all marinas, in order to compile a data set that would most accurately determine if the 2017 interim compliance phase was met. Additionally, the Port recognized how an accurate data set from 2017 will set up the ability to effectively determine if the 2018 DPR Low Leach Rule will assist in further loading reductions in the coming 5 years.

Actions for the final TMDL Phase

Moving forward into the final TMDL phase, the Port will work with stakeholders and the Regional Board to advance efforts to reduce copper. Efforts to meet the final load reduction target will focus on additional actions that can directly decrease copper loading both from passive leaching and in-water hull cleaning[11]. The primary goal of any selected strategy or policy initiative is to improve water quality in the basin and San Diego Bay by realizing measurable and lasting reductions in dissolved copper.

Given the success of achieving interim compliance goals, the Port will continue to implement the BMP structure that is set forth in the Implementation Plan. Efforts for the next three years will be adaptive management-based and focused on exploring strategies that will close the gap between the estimated 61 percent copper load reduction (assuming the DPR Rule and 2017 occupancy data) and the TMDL compliance requirement of a 76 percent load reduction by 2022. Management strategies will be focused on initiatives and/or policies that will result in the additional loading reductions needed to reach a 76 percent load reduction.

The Port will continue to reach out annually to the Regional Board regarding the program's progress towards the TMDL compliance requirement, and seek input, where applicable, on direction for the final compliance phase.

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[11] This may include further consideration of the potential copper mitigation strategies identified in the DPR's January 30, 2014 memorandum entitled "*Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints Per AB 425*."

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APPENDIX A

SIYB DISSOLVED COPPER TMDL MONITORING PLAN
REVISION 3

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FINAL
SHELTER ISLAND YACHT BASIN
TOTAL MAXIMUM DAILY LOAD
MONITORING PLAN
REVISION 3

Prepared for:
California Regional Water Quality Control Board
San Diego Region

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123

In Coordination with:

Port of San Diego

May 2011
Revision 3: August 2017

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ACRONYMS AND ABBREVIATIONS

APHA	American Public Health Association
ASTM	American Society for Testing and Materials
Basin Plan	*Water Quality Control Plan for the San Diego Basin – Region 9*
BMPs	best management practices
COC	chain-of-custody
CTD	Conductivity, Temperature, and Depth
CTR	California Toxics Rule
DO	dissolved oxygen
DOC	dissolved organic carbon
DPR	Department of Pesticide Regulation
ELAP	California Environmental Laboratory Accreditation Program
Implementation Plan	SIYB TMDL Implementation Plan
Investigative Order	Investigative Order No. R9-2011-0036
L_h	hull cleaning annual loading
L_p	passive leaching annual loading
LC_{50}	median lethal concentration
LOEC	lowest observed effect concentration
MAR	marine habitat
Monitoring Plan	SIYB TMDL Monitoring Plan
N_v	number of vessels
NOEC	no observed effect concentration
OAL	Office of Administrative Law
pH	hydrogen ion concentration
Port	Port of San Diego
QA	quality assurance
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan
QC	quality control
RHMP	Regional Harbor Monitoring Program
Regional Board	San Diego Regional Water Quality Control Board
SBE	SeaBird Electronics
SIML	Shelter Island Master Leaseholders
SIYB	Shelter Island Yacht Basin
SM	Standard Methods
SOPs	Standard Operating Procedures
SWAMP	Surface Water Ambient Monitoring Program
State Board	State Water Resources Control Board
TMDL	total maximum daily load
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency
TST	test of significant toxicity
WESTON	Weston Solutions, Inc.
WILD	wildlife habitat
WQO	water quality objective

UNITS OF MEASURE

%	Percent
°C	degrees Celsius
µg/L	micrograms per liter
µg/cm²/day	micrograms per square centimeter per day
cm	centimeter(s)
ft	feet or foot
kg/yr	kilograms per year
µm	micrometer(s)
m	meter(s)
mm	millimeter(s)
mg/L	milligrams per liter
mL	milliliter(s)
Nm	nanometer
ppt	parts per thousand
psu	practical salinity unit
yr	year(s)

1.0 INTRODUCTION

The *Shelter Island Yacht Basin (SIYB) Total Maximum Daily Load (TMDL) Monitoring Plan* (Monitoring Plan) describes the approach for assessing loading reductions through tracking conversion of vessels from copper to non-copper hull paints to determine compliance with TMDL load reduction targets. The Monitoring Plan also details the specific elements of the annual water quality monitoring program that are performed in SIYB to quantify ambient dissolved copper concentrations and toxicity. Water quality monitoring is used to evaluate annual basin-wide improvements in dissolved copper concentrations and toxicity levels, and to determine progress towards complying with the numeric and narrative objectives of the final TMDL.

This revised Monitoring Plan (Revision 3) is being submitted to the San Diego Regional Water Quality Control Board (Regional Board) to incorporate monitoring program modifications that arose during the 2016 monitoring period. The original Monitoring Plan was submitted to the Regional Board in May 2011 in response to a requirement specified in Resolution No. R9-2005-0019 (in which the Regional Board incorporated the dissolved copper TMDL into the *Water Quality Control Plan for the San Diego Basin—Region 9*) (Regional Board, 2005).

Revision 1 was submitted in 2013, and included program modifications that were made as recommendations to the Regional Board in the 2012 SIYB TMDL Monitoring and Progress Report (AMEC 2013). The modifications presented in Revision 1 were:

- Addition of the “aged-copper paint” category to the vessel classification template
- Modifications to the methods used to collect annual vessel census information
- Discontinuation of conducting *in situ* free copper analyses
- Analytical and data analysis method revisions

Revision 2 was submitted in March 2016, and included an additional paint tracking category to the annual SIYB vessel census. DPR Category I (low leach) was added as a paint tracking category for 2015. This category was added in response to the DPR’s February 23, 2015 list of hull paints by leach rate category. The Port recommended that Category I paint be added as tracking category during a 2015 project status meeting with the Regional Board held on October 5. This modification was approved by the Regional Board.[1] In addition, beginning in the 2015 Monitoring Year, the copper load contributions from passive leaching and in-water hull cleaning were presented separately. This is consistent with the loads provided in Appendix 2 of the SIYB TMDL (Regional Board, 2005). The vessel tracking template was also adjusted to include more relevant information for vessel tracking purposes.

Revision 3, herein, includes the modification of several field procedures for the annual TMDL water quality monitoring program. These include:

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[1] Per E-mail correspondence between the Regional Board and Port dated October 21 and November 9, 2015.

1. Field filtration of all samples collected for dissolved copper and zinc analyses, in agreement with the U.S. Environmental Protection Agency (USEPA) 1640 protocol.
2. Performing a top-to-bottom vertical water quality profile (using a conductivity, temperature, and depth [CTD] profiler) at each station to evaluate pH, temperature, light transmittance, and salinity with depth in the water column.
3. The addition of conducting total suspended solids (TSS) analyses.

These modifications in Revision 3 of the Monitoring Plan are informational, and therefore do not require a response from the Regional Board.

This revised Monitoring Plan meets the requirements of Investigative Order No. R9-2011-0036 (Investigative Order), which directs the Port of San Diego (Port) to develop and submit a Monitoring Plan to track the progress of implementing the TMDL, and to revise the plan as needed. In addition, the project-specific Quality Assurance Project Plan (QAPP) is revised yearly (prior to the annual monitoring event). The QAPP defines project-specific objectives and organization, monitoring activities, data quality objectives, and quality assurance and quality control (QA/QC) procedures in compliance with the State Water Resources Control Board's *Surface Water Ambient Monitoring Program* (SWAMP) protocols.

1.1 Compliance Schedule

Under Resolution R9-2005-0019, the SIYB dissolved copper TMDL (herein referred to as "SIYB TMDL") requires that loading of dissolved copper into the water column be reduced by 76 percent to 567 kilograms per year (kg/yr) over a 17-year period (Regional Board, 2005). Based on the official TMDL approval date[2], this time period is set to end in 2022. No reductions in dissolved copper loading were required during the initial two-year orientation period (2005–2007). The subsequent 15-year period requires incremental reductions of dissolved copper loadings: a 10-percent reduction within seven years; a 40-percent reduction within 12 years; and a 76-percent reduction within 17 years (Table 1-1).

Table 1-1.
Loading Targets for TMDL Attainment

Stage	Time Period	Target Reduction from TMDL Estimated Loading	Reduction To Be Attained by End of Year	Estimated Target Loading (kg/yr of Dissolved Copper)
1	2005–2007	0%	N/A	N/A
2	2008–2012	10%[a]	2012 (7 years)	1,900
3	2013–2017	40%	2017 (12 years)	1,300
4	2018–2022	76%	2022 (17 years)	567

Notes:
a. Loading calculations in the *2012 TMDL Monitoring and Progress Report* showed that a 17-percent load reduction had been achieved. Compliance with the 2012 load reduction goal of 10 percent was confirmed by the Regional Board in a letter to the Port dated July 26, 2013.
kg/yr = kilograms per year; N/A = not applicable

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[2] For a TMDL to be incorporated into the Basin Plan, it must be approved by the Regional Board, State Water Resources Control Board (State Board), Office of Administrative Law (OAL), and USEPA Region 9. The official TMDL approval date is the date of OAL approval.

The first compliance year for the TMDL was 2012. Loading reduction estimates presented in the *2012 Monitoring and Progress Report* (AMEC, 2013) indicated that dissolved copper loading to SIYB by the end of compliance year 2012 had been reduced by 17 percent, exceeding the 10-percent target. In a letter dated July 26, 2013, the Regional Board stated the following, "Based on the data submitted and information provided in the Report [2012 TMDL Monitoring and Progress Report], the 10-percent reduction in dissolved copper loading required to demonstrate compliance with the SIYB TMDL by the December 1, 2012, compliance date was achieved."

The second compliance period began in January 2013 and continues through 2017. This monitoring year will conclude the second compliance period.

1.2 TMDL Implementation Plan

The *2011 SIYB TMDL Implementation Plan* (Implementation Plan) is the Named Parties' implementation strategy to reduce the loading of copper into the water column of SIYB, as directed by the SIYB TMDL and the Investigative Order. The Implementation Plan describes the approach to reducing copper loading into SIYB to preserve and restore water quality and beneficial uses of associated marine habitat (MAR) and wildlife habitat (WILD). The Implementation Plan takes a solutions-oriented approach of establishing and implementing best management practices (BMPs) that directly and indirectly help reduce copper loading into the basin to meet the SIYB TMDL interim and final dissolved copper loading compliance thresholds.

The Port has reviewed the BMP initiatives that were detailed in the SIYB TMDL Implementation Plan (Weston, 2011). Based upon this review, the strategic approach to planning and implementing copper reduction BMPs has not changed. The ongoing copper reduction program being implemented by the Port and the SIML TMDL Group is following the same adaptive management strategy and concept for selecting BMPs as was outlined in the Implementation Plan. The Port and SIML TMDL Group provide updates on the BMP program in each annual monitoring and progress report submitted to the Regional Board. Consequently, no revisions to the Implementation Plan are necessary at this time.

1.3 Sources of Dissolved Copper

Based on the Regional Board's source analysis in the TMDL, the total mass load of dissolved copper to SIYB was estimated to be 2,163 kg/yr, of which 98 percent of inputs were attributable to (a) passive leaching of copper from copper-based hull paints on vessels, and (b) hull cleaning activities (Table 1-2).

Table 1-2.
Sources of Dissolved Copper to SIYB per the TMDL

Source	Estimated Mass Load (kg/yr)	Contribution (Dissolved Copper)
Passive Leaching	2,000	93%
Hull Cleaning	100	5%
Urban Runoff	30	1%
Background	30	1%
Direct Atmospheric Deposition	3	<1%
Sediment	0	0
Total	2,163	100%

Notes:
kg/yr = kilogram(s) per year

1.4 Water Quality Objective Criteria

The numeric water quality objective (WQO) for dissolved copper in SIYB is equal to the USEPA National Recommended Water Quality for Aquatic Life and California Toxics Rule (CTR) water quality values for dissolved copper in marine environments (USEPA, 2000). Continuous or chronic exposures may not exceed 3.1 micrograms per liter (µg/L) over a 4-day average; acute exposures should not exceed 4.8 µg/L over a 1-hour average. In addition, numeric WQOs must not be exceeded more than once every three years. Based on these numeric targets and existing monitoring data available at the time when the TMDL was implemented, the final waste load allocation was estimated to be 567 kg/yr. This includes a 10-percent margin of safety calculated to be 57 kg/yr.

In addition to numeric WQOs, the Basin Plan established narrative WQOs for toxicity and pesticides (Regional Board, 1994) as follows:

Toxicity Objective – All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms; analyses of species diversity, population density, and growth anomalies; bioassays of appropriate duration; or other appropriate methods as specified by the Regional Board.

Pesticide Objective – No individual pesticide or combination of pesticides shall be present in the water column, sediments, or biota at concentration(s) that adversely affect beneficial uses. Pesticides shall not be present at levels that will bioaccumulate in aquatic organisms to levels that are harmful to human health, wildlife or aquatic organisms.

Beneficial uses within SIYB threatened by elevated dissolved copper concentrations are MAR and WILD. The Regional Board indicated that if numeric WQOs are met for dissolved copper, then narrative WQOs will also be met.

1.5 Monitoring Purpose

Results of the vessel tracking program will be used to assess both interim and final compliance with the TMDL loading reduction requirements for dissolved copper into SIYB. Water quality monitoring will be used to annually assess dissolved copper concentrations and toxicity levels, and also to determine progress towards final numeric and narrative objectives. These objectives are as defined in Resolution No. R9-2005-0019, in which the Regional Board incorporated the dissolved copper TMDL into the *Water Quality Control Plan for the San Diego Basin—Region 9* (Basin Plan; Regional Board, 2005). By annually tracking vessels and monitoring water quality monitoring, the program will eventually be able to evaluate the relationship between reducing loads and improving water quality. Additionally, this approach will provide the data needed to assess the overall effectiveness of the TMDL implementation in attaining both loading reductions and numeric WQOs that protect the basin's MAR and WILD beneficial uses.

2.0 BEST MANAGEMENT PRACTICE IMPLEMENTATION FOR SIYB

The Port has incorporated an adaptive management approach to reducing copper loads in SIYB and throughout San Diego Bay. This process is outlined in the SIYB TMDL Implementation Plan. The five elements of the Port's program are: (a) alternative hull paint testing and research, (b) hull paint transition, (c) policy development and legislation (e.g., required permits for in-water hull-cleaning businesses), (d) education of and outreach to boaters, and (e) monitoring and data assessment. The SIML TMDL Group was formed to represent the marinas and yacht clubs in SIYB. The group's purpose is to compile information from marinas and yacht clubs collected from the boat owners in each of their facilities for TMDL Investigative Order reporting requirements. In addition, the SIML TMDL Group has developed a BMP program specific to the marinas and yacht clubs in SIYB with similar components.

Over the course of developing the TMDL, multiple additional BMPs have been integrated to build on previous knowledge and to facilitate effective implementation of the SIYB TMDL program. Additional measures include meetings between the Port and other stakeholders in SIYB about the TMDL; increased scrutiny of water quality data and analytical methods; reassessment of field sampling techniques, including additional oversight of field procedures; and review of methods to track the type of bottom paints on vessels in SIYB. These measures were intended to collect relevant, quality data; enhance communication among all involved parties; and develop an iterative and collaborative process that provides both transparency to the process and a known and scientifically defensible dataset to support the TMDL compliance objectives.

The Port has developed a comprehensive copper reduction program and maintains a cumulative list of copper reduction BMPs implemented in support of the TMDL since 2007. In addition, the SIML TMDL Group is involved in selecting and implementing BMPs that contribute to the dissolved copper load reductions in SIYB. In compliance with Investigative Order reporting requirements, the SIML TMDL Group submits information annually to the Port detailing the BMPs and actions implemented throughout the year to reduce dissolved copper loads to SIYB. The various Port and SIML TMDL Group BMP activities undertaken throughout the year will be tracked and reported in detail in the annual monitoring and progress report. In addition, any updates of the copper reduction BMP strategies outlined in the TMDL Implementation Plan will be included in an appendix to the annual monitoring and progress report.

3.0 TRACKING VESSEL CONVERSIONS

Based on the Regional Board's TMDL source analysis, the vast majority (98 percent) of copper loading to SIYB was attributed to antifouling paints on vessels moored within the basin.

3.1 Vessel Tracking

Annual reduction of copper loading will be assessed by (a) tracking conversions of hull paints from copper to non-copper or lower copper (either DPR Category I paints or paints containing less than 40-percent copper) products, (b) identifying vessels with aged-copper paints, and (c) estimating the resultant contribution from in-water hull cleaning of copper paints for vessels moored within SIYB.

3.1.1 Tracking Approach

On an annual basis, marina and yacht club owners/operators are responsible for soliciting pertinent information from SIYB boat owners of the percent of time slips in their facilities are unoccupied or are occupied by vessels with copper, non-copper, lower copper paints, aged copper, and unknown hull paints. The information will be gathered by distributing a survey form prepared by the SIML TMDL Group to the SIYB yacht club and marina operators. It will be the responsibility of the operators to ensure the survey form is disseminated to individual vessel owners. The SIML TMDL Group will collect and compile the completed survey forms into a database. If no initial response is received, the SIML TMDL Group will follow up with telephone calls and emails to gather the requested information. An example of the current survey form is in Attachment A.

After compiling the information, the SIML TMDL Group will submit the vessel tracking information to the Port annually, no later than January 15 for the previous calendar year. The vessel tracking data requested is listed in Table 3-1. The tracking reports will be submitted to the Regional Board as an appendix to the annual monitoring and progress report.

Table 3-1.
Required Vessel Tracking Data

Vessel Tracking Data Fields	
1.	Name of marina or yacht club
2.	Date of report
3.	Slip/Mooring reference number
4.	Slip/mooring occupation data (percent of year occupied)
5.	Vessel-specific information
	a. Vessel type (sail, power, multi-hull, etc.)
	b. Vessel length
	c. Vessel beam width
6.	Paint Type (copper, low copper, non-copper, no paint, etc.)

As a data QA/QC and confirmation check, additional information on paint type will be required for vessels reported to have lower copper (either DPR Category I paints or paints containing less than 40 percent copper) or non-copper hull paints (Table 3-2).

Table 3-2.
Required Lower Copper and Non-Copper Hull Paint Vessel Data

Vessel Tracking Data Fields	
1.	Paint brand name
2.	Product number
3.	DPR Registration Number (if applicable)
4.	Name of boatyard that applied paint or purchase date
5.[a]	Painting date (month and year)

Notes:
a. This information is required for determining whether a vessel has aged-copper paint.

The Port will evaluate the vessel tracking data from the SIML TMDL Group to determine the percentage of time that slips are unoccupied or are occupied by vessels with copper, lower copper, aged-copper paint, non-copper, or unknown hull paints as required by the Investigative Order (Table 3-3). These data will be used to calculate the annual dissolved copper load to SIYB from vessels, the number of vessels converted from copper to lower copper or non-copper hull paints, and the reduction in dissolved copper loading achieved annually, as described in Section 3.2 (Annual Dissolved Copper Load Analysis). Estimates of the reductions in basin-wide loading and annual loading reductions will be presented in the annual monitoring and progress reports.

Table 3-3.
Vessel Tracking Data for Annual Monitoring as Required in Investigative Order

Vessel Tracking Data Fields	
1.	Total number of slips or buoys in facility available to be occupied by vessels
2.	Number of unoccupied slips or buoys and length of time unoccupied during each year
3.	Number of vessels confirmed with copper-based hull paints and approximate length of time occupying a slip or buoy in facility each year
4.[a]	Number of vessels confirmed with aged-copper hull paints and approximate length of time occupying a slip or buoy in facility each year
5.	Number of vessels confirmed with alternative hull paints, by hull paint type, and approximate length of time occupying a slip or buoy in facility each year
6.	Number of vessels with unconfirmed information about hull paints and approximate length of time occupying a slip or buoy in facility each year
7.	Estimate of the dissolved copper load reduction achieved for the year (kg/yr and percent)

Notes:
a. This vessel tracking category was not included in the Investigative Order, but was added as a recommendation in the 2012 Monitoring and Progress Report. The recommendation was approved July 26, 2013, letter signed by David Gibson, executive officer of the San Diego Regional Water Quality Control Board titled, "Comments on 2012 Shelter Island Yacht Basin Total Maximum Daily Load Monitoring and Progress Report."

3.1.2 Tracking Templates

The SIML TMDL Group will coordinate with the marina and yacht club owners and operators, who are responsible for soliciting pertinent vessel information from SIYB boat owners. This includes tracking the number and paint types of all vessels moored at the respective marinas and/or yacht clubs within SIYB (if known and reported). The Port will be responsible for collecting vessel tracking information for the Port-operated facilities in SIYB, including the Harbor Police dock, transient vessel docks, and temporary anchorage. Vessel data submitted in the annual report will consist of (a) the information provided by the marina and yacht club owners and operators, and (b) the information gathered by the Port for the facilities it operates.

The vessel tracking templates are in a spreadsheet format and contain fields for required vessel tracking information such as facility name, slip reference number, type and size of vessel, boatyard used for hull painting, type of hull paint (brand and product number and DPR registration number, if applicable), the date (month and year) the hull was last painted (this information will be used to determine whether the vessel qualifies as having aged-copper paint), and approximate percentage of time occupying a slip in SIYB during the monitoring year. An example of the vessel tracking template is provided in Attachment A.

3.2 Annual Dissolved Copper Load Analysis

Compliance with interim and final TMDL loading reduction goals will be assessed through basin-wide vessel tracking. Annual dissolved copper loading will be assessed through tracking the number of vessel hulls with copper paint, lower copper paint, aged-copper paint, or non-copper paint, the number of slips using BMPs to isolate hulls from water (i.e., slip liners, Hydro Hoists®) as well as the number of vacant slips in SIYB and input from in-water hull cleaning. Vessels that have aged-copper paint are considered to be in the low-copper category, but will be tracked separately.

The annual tracking program will use a conservative approach to estimating loading reductions. If the hull paint name and type are unknown, the paint will be assumed to be copper-based. Additionally, if the occupancy time of a slip or mooring is not reported, the slip or mooring will be assumed to be occupied 100 percent of the time (i.e., 365 days). If the paint categories for transient vessels visiting the Port-operated transient vessel dock and temporary anchorage are not collected, these vessels will be assumed to have copper hull paints.

This annual assessment will incorporate the following assumptions that were used by the Regional Board in determining loading allocations (Regional Board 2005, Appendix 2).

- All 2,363 SIYB slips or buoys were occupied by vessels (N_v).
- All 2,363 recreational vessels moored within SIYB have copper-based paints 100 percent of the time.
- Annual loading from passive leaching basin-wide (L_p) equals 2,000 kilograms per year (kg/yr).
- Annual loading from hull cleaning (L_h) equals 100 kg/yr[3].
- Average annual loading (L_v) per vessel with copper hull paint equals 0.9 kg/yr, where: $L_v = (L_p + L_h)/N_v$.

Based on the Regional Board assumptions in determining dissolved copper loading via passive leaching and hull cleaning combined, there will be an average loading reduction of 0.9 kg/yr for every vessel in SIYB that converts from copper-based to non-copper-based paint (a reduction of 0.86 kg/yr from passive leaching, and 0.04 kg/yr from the cleaning load). Beginning in 2015, the Regional Board recognized the use of DPR Category I hull paints (i.e., paints with leach rates ≤ 9.5 micrograms per square centimeter per day [$\mu g/cm^2/day$]) as a viable means of reducing copper to the basin. This category coincides with the use of low-copper hull paints (i.e., hull coatings with less than 40-percent copper but leach rates greater than 9.5 $\mu g/cm^2/day$). Category I hull paints and low-copper hull paints are grouped together to represent the lower copper group. This loading reduction analysis assumes that each vessel transitioned to low-copper hull paint will reduce (on average) annual dissolved copper loading by 0.45 kg/yr. Aged-copper paints (boat hulls that have not been repainted as of the cutoff date [Table 3-4]) will be considered to have low-copper hull paint (i.e., 0.45 kg/yr per vessel). Based upon these loading scenarios, calculations of annual dissolved copper loading will be based on the assumptions listed in Table 3-4.

Annual loading will be calculated for each slip by multiplying the reported dissolved annual loading for a given hull paint category by the percent of time a slip is reported to be occupied (e.g., the product of 0.9 kg/yr for copper hull paints and 90-percent occupancy results in an annual loading of 0.81 kg/yr). In the case of the Port-operated anchorage, data on the number of three-day permits issued weekly will be used to calculate annual occupancy and loading. For each issued permit, it will be assumed that the vessel occupied the anchorage for an average of two days. If no hull paint data is collected for a vessel that occupies the Port-operated anchorage, it will be assumed to have copper paint. Therefore, annual dissolved copper loading due to passive leaching is calculated by multiplying the annual dissolved copper load (0.9 kg/yr) by the average number of vessels occupying the anchorage on a weekly basis and the average percentage of time slips are occupied.

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[3] The TMDL assumed that 50 percent of the in-water hull cleaning in SIYB would be conducted using BMPs. The Port's hull cleaning ordinance requires 100 percent use of BMP; therefore, the load calculations assume that 100 percent of in-water hull cleaning is conducted using BMPs.

Table 3-4.
Dissolved Copper Loading Calculation Assumptions

Dissolved Copper Loading Assumptions	
1.	All vessels moored in SIYB at the enactment of the TMDL had copper hull paints.
2.	Average annual dissolved copper load from a vessel with copper paint equals 0.9 kg/yr.
	a. The passive leaching load from a vessel with copper paint equals 0.86 kg/yr.
	b. The cleaning load from a vessel with copper paint equals 0.04 kg/yr.
3.	Vessels with unknown hull paints have copper paint
4.	Slips/moorings for which occupancy data are not provided are considered to be 100-percent occupied.
5.	Annual dissolved copper load from a vessel with non-copper hull paint equals 0 kg/yr.
6.	DPR Category I paints are paints with leach rates ≤9.5 μg/cm²/day. These paints are considered as lower copper.
7.	Low-copper hull paints are paints with less than 40-percent copper. These paints are also considered as lower copper.
8.	Average annual dissolved copper load from a vessel with lower copper paint equals 0.45 kg/yr
	a. The passive leaching load from a vessel with lower copper paint equals 0.43 kg/yr.
	b. The cleaning load from a vessel with lower copper paint equals 0.02 kg/yr.
9	Vessels determined to have aged-copper paint (i.e., copper paint applied to a vessel hull prior to December 31, 2014[a]) will have an annual dissolved copper load equal to 0.45 kg/yr.
10.	Annual loads will be normalized by the percent of time vessels are docked in SIYB.

Notes:

a. December 31, 2014, is the cutoff date for vessels to be considered to have aged-copper paint for the 2017 annual monitoring and progress report load calculation. This cutoff date will advance by one -year for each subsequent annual load calculation.

kg/yr = kilogram(s) per year; TMDL = total maximum daily load; μg/cm²/day = micrograms per square-centimeter per day

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4.0 WATER QUALITY MONITORING

Water quality will be assessed annually to determine the average concentration of dissolved copper and toxicity levels in SIYB using a spatially representative sampling design. Water quality monitoring will supplement vessel tracking studies to assess long-term improvements in dissolved copper concentrations and toxicity levels that occur as a consequence of loading reductions throughout the interim stages. Water quality monitoring will also be used to determine attainment of final WQOs.

4.1 Water Quality Sampling and Analyses

Water quality will be sampled annually throughout SIYB to determine the average concentration of dissolved copper in the basin and to assess water quality trends over time. The monitoring will use methods consistent with prior studies conducted by the Regional Board in SIYB, which were used to establish the baseline copper levels and loading reduction requirements of the TMDL (Appendix 6 of the TMDL, Regional Board, 2005). To be consistent with studies conducted by the Regional Board, this monitoring program will include annual sampling at six stations and one reference station in the main channel of San Diego Bay adjacent to SIYB. These station locations are similar to those sampled by the Regional Board for development of the TMDL and meet the Investigative Order requirement of spatially representing dissolved copper concentrations in SIYB.

Based on an assessment of monitoring water quality data collected between 2005 and 2008 in SIYB from the Regional Harbor Monitoring Program (RHMP) Pilot Study (WESTON, 2008), the 2008 RHMP (WESTON, 2010), and the Neira et al. study (2009), surface water dissolved copper concentrations ranged from 3.4–13.5 micrograms per liter (µg/L), and the average concentration was 8.28 ± 1.36 µg/L (mean ± standard error). This average concentration was determined by using the surface water dissolved copper monitoring data collected from six stations in the immediate vicinity of the sampling stations that comprise the monitoring network.

4.1.1 SIYB Sample Locations

The annual monitoring program is conducted at six stations within SIYB and one station in the main channel of San Diego Bay (Table 4-1 and Figure 4-1). Monitoring was conducted at these stations for all SIYB TMDL monitoring events since 2011.

Table 4-1.
Sampling Station Coordinates

Station	Target	
	Latitude	Longitude
SIYB-1	32.71821	-117.22601
SIYB-2	32.71412	-117.22921
SIYB-3	32.71550	-117.22989
SIYB-4	32.71683	-117.23203
SIYB-5	32.71217	-117.23297
SIYB-6	32.70858	-117.23514
SIYB-REF	32.70406	-117.23232

4.1.2 Frequency of Sampling

Sampling will be conducted at the seven water quality stations once per year during the summer (i.e., in August or September). By sampling in the summer, dissolved copper concentrations are likely to be at their highest level in the water column because the release rates of copper from antifouling paints is higher at warmer sea surface temperatures and with a greater frequency of hull cleaning. As a consequence, this sampling design will provide the most conservative estimate for dissolved copper concentrations for SIYB. In addition, annual monitoring during the summer will facilitate integration with the RHMP, which includes sampling of a broader range of chemical and biological parameters once every five years during the summer.

Sampling annually to bracket the slack high tide at the same station locations during the summer will allow repeated measurements and temporal trend analyses to determine changes in dissolved copper concentrations with time[4]. Revisiting the same spatially representative stations allows basin-wide assessments of water quality, limiting spatial variability and facilitating better detection of trends. Additionally, correlation analyses can be used to assess relationships between estimated loading reductions from vessel conversions with surface water dissolved copper concentrations to track progress of the TMDL.

4.1.3 Sample Collection

Sample collection will start at the Reference station (SIYB-REF) located in San Diego Bay and continue northward to Station SIYB-1 located near the head of basin. Samples will be collected in the following order: SIYB-REF, SIYB-6, SIYB-5, SIYB-4, SIYB-3, SIYB-2, and SIYB-1. Collection of the samples will be timed so that the midpoint of the collection (SIYB-4) will occur as close to the slack high tide as possible. This sample collection approach will be followed for all annual water quality monitoring events to ensure consistency and repeatability.

Discrete water samples will be collected at each station using the “clean hands” techniques with a Niskin bottle deployed from a sampling vessel. In addition, the field manager will ensure that the sample collection boat is painted with a non-copper or non-zinc-containing hull paint. All stations will be located using the differential Global Positioning System. Samples will be collected within one meter of the surface. Upon collection, water samples will be transferred to labeled containers for analysis of total and dissolved copper, total and dissolved zinc, total organic carbon (TOC), dissolved organic carbon (DOC), total suspended solids (TSS), and toxicity testing. Water samples collected for dissolved metals analyses will be filtered in the field and preserved immediately upon arrival to the analytical laboratory. DOC samples will be filtered in the field into a bottle with sulfuric acid. Field measurements of the hydrogen ion concentration (pH), temperature, and salinity of the surface water at each station (i.e., within 1 meter (m) of the surface), will be made using a YSI meter according to manufacturer’s specifications.

Following the collection and preservation of water samples, Amec Foster Wheeler will use a Seabird Electronics SBE-19 Plus CTD instrument equipped with a YSI dissolved oxygen sensor

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[4] Sampling schedule is adjusted annually to ensure that station SIYB-4 is sampled during the slack high tide to ensure consistency between monitoring years.

(model SBE 43), a pH meter (model SBE 18 with Innovative pH Sensor), and a WET Labs C-Star laser transmissometer (25-centimeter [cm], 660-nanomether [nm]) to capture the profile of the entire water column at each station. The water quality characteristics collected by the CTD will be used for informational purposes only. For example, the CTD data can show how water quality parameters, such as water temperature and clarity, vary from top to bottom, at different locations in the basin, and from year to year.

amec foster wheeler

Shelter Island Yacht Basin
TMDL Monitoring Station Locations

FIGURE
4-1

Figure 4-1. Shelter Island Yacht Basin Monitoring Network

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All water samples will be logged on a chain-of-custody (COC) form (Attachment B) and placed in a cooler on ice. Samples will be stored at 4 degrees Celsius (°C) in the dark until delivered to the appropriate laboratory for analysis.

4.1.4 Equipment Decontamination and Cleaning

The Niskin bottle will be cleaned prior to sampling using clean soapy water and thoroughly rinse with deionized water. Upon deployment, the Niskin bottle will be rinsed with site water prior to sample collection. After collection, water samples will be transferred from the Niskin bottle to laboratory-certified, contaminant-free bottles that are of the appropriate type and containing the appropriate preservative for the required analyses.

4.1.5 Chemical Analysis

Water samples will be analyzed for total and dissolved copper, total and dissolved zinc, TOC, DOC, TSS, salinity, temperature, pH, dissolved oxygen, and transmissivity (Table 4-2). Zinc is commonly used as an alternative biocide in antifouling paints; therefore, total and dissolved zinc levels will be measured to assess changes in the ambient zinc levels in SIYB as vessels are converted from copper-based to non-copper-based paints.

Surface water characteristics (salinity, temperature, pH, and visual observations of water clarity) will be collected to compare ambient conditions from year to year. All analytical methods will follow USEPA or Standard Methods (SM) of the American Public Health Association (APHA), 1998). Required analytical methods, detection, and reporting limits are presented in Table 4-2.

Table 4-2.
Laboratory Analytical Methods and Detection Limits

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Total Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Dissolved Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Total Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
Dissolved Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
TOC	SM 5310 B	0.016 mg/L	0.10 mg/L
DOC	SM 5310 B	0.016 mg/L	0.10 mg/L
TSS	USEPA 2450 D	1.0 mg/L	5.0 mg/L
Salinity	SBE CTD and YSI Pro Plus	NA	± 0.1 ppt
Temperature	SBE CTD and YSI Pro Plus	NA	± 0.1 °C
pH	SBE CTD and YSI Pro Plus	NA	± 0.1 pH unit
Dissolved Oxygen	SBE CTD	NA	± 0.1 mg/L
Light Transmittance	SBE CTD	NA	± 0.1 %

Notes:

µg/L = microgram(s) per liter; °C = degrees Celsius; DOC = dissolved organic carbon; mg/L = milligram(s) per liter; pH = hydrogen ion concentration; ppt = part(s) per thousand; SM = Standard Methods; TOC = total organic carbon; TSS = total suspended solids; USEPA = U.S. Environmental Protection Agency; YSI = YSI Incorporated; SBE = SeaBird Electronics; CTD = conductivity, temperature, and depth.

4.1.6 Toxicity Testing

Water column toxicity will be assessed at the six SIYB sampling stations and the reference station. Toxicity testing will consist of a 96-hour acute bioassay test using Pacific topsmelt (*Atherinops affinis*), consistent with the TMDL guidance (Regional Board, 2005). Additionally, a 48-hour chronic bioassay test using a mussel (*Mytilus galloprovincialis*) will also be conducted because previous studies have used the 48-hour mussel chronic test as the primary indicator of toxicity. Both tests will be used to assess the narrative toxicity objective described in Section 1.4 (Water Quality Objective Criteria) because both species have ecological relevance to the marina environment and have previously been found to be sensitive to dissolved copper.

The 96-hour acute bioassay with topsmelt will be conducted in accordance with procedures described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (USEPA, 2002). Testing will be initiated within 36 hours of sample collection. Topsmelt will be exposed for 96 hours to three sample concentrations (25, 50, and 100 percent) and to a control. Each concentration will be tested with six replicates and five topsmelt per replicate. Water quality will be analyzed daily and include dissolved oxygen (DO), temperature, pH, and salinity. After 96 hours, percent survival will be calculated. The test will be considered acceptable if 90 percent or greater survive in the controls. Test conditions are summarized in Table 4-3.

A 96-hour reference toxicant test using copper chloride will be conducted concurrently with the SIYB project sample and using the same batch of test organisms to evaluate the relative sensitivity of test organisms as well as the laboratory's proficiency with the test procedure. The topsmelt reference toxicant test will be conducted with copper concentrations of 0, 50, 100, 200, 400 and 800 µg/L. At test termination, the median lethal concentration (LC_{50}) will be calculated and compared to historical laboratory reference toxicant test data for this species. Test organisms will be considered to be responsive and appropriately sensitive if the test LC_{50} is within two standard deviations of the historical mean from the previous 20 tests.

The 48-hour bivalve larvae test will be performed in accordance with procedures outlined in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (USEPA, 1995) and ASTM E724-98 (ASTM, 2006). Testing will be initiated within 36 hours of sample collection. The test will be run for 48 hours or up to 54 hours if necessary to ensure development of the bivalve larvae to the D-hinged stage in the control. Bivalves will be exposed to five sample concentrations (6.25, 12.5, 25, 50, and 100 percent), and a control. Each concentration will be run with six replicates and 150–300 larvae will be targeted for inoculation into each replicate. Water quality will include DO, temperature, pH, and salinity at test initiation and termination. The test will be considered acceptable if at least 50 percent of larvae survived and an average of 90 percent of surviving larvae developed normally in the controls. A combined endpoint of normal surviving embryos will be reported. Test conditions are summarized in Table 4-4.

Table 4-3.
Conditions for the 96-Hour Pacific Topsmelt Bioassay

Test Conditions 96-Hour Acute Bioassay		
Test Species		*Atherinops affinis*
Test Procedures		EPA-821-R-02-012 (USEPA, 2002)
Age and Size Class		7–15 days
Test Type and Duration		Acute static-renewal / 96-hours
Sample Storage Conditions		4°C, dark, minimal head space
Holding Time		36 hours
Control Water Source		Scripps Pier seawater, 20 µm filtered
Recommended Water Quality Parameters	Temperature	21 ± 1°C
	Salinity	34 ± 2 ppt
	Dissolved Oxygen	>4.0 mg/L
	pH	Monitor for pH drift
Photoperiod		16 hours light, 8 hours dark
Test Chamber		500-mL beaker or plastic cup
Concentrations		3 (25, 50, and 100 percent) and a control
Number of Replicates per Sample		6
Number of Organisms per Replicate		5
Exposure Volume		250 mL
Aeration		None, unless DO falls below 4.0 mg/L
Feeding		once daily
Water Renewal		48 hours
Statistical Analysis		Test of Significant Toxicity (TST) - Control and test sample comparisons

Notes:
µg/L = microgram(s) per liter; µm = micrometer; °C = degrees Celsius; mg/L = milligram(s) per liter; mL = milliliter(s); pH = hydrogen ion concentration; ppt = part(s) per thousand; USEPA = U.S. Environmental Protection Agency

A 48-hour reference toxicant test using copper chloride will be conducted concurrently with the SIYB project sample and using the same batch of test organisms; this test will evaluate the relative sensitivity of test organisms as well as the laboratory's proficiency with the test procedure. The bivalve reference toxicant test will be conducted with copper concentrations of 0, 2.5, 5.0, 10, 20 and 40 µg/L. At test termination, the median effected concentration (EC_{50}) will be calculated and compared to historical laboratory reference toxicant test data for this species. Test organisms will be considered to be responsive and appropriately sensitive if the test EC_{50} is within two standard deviations of the respective historical laboratory mean. At the termination of the study, survival and shell development will be compared between the control and test concentrations to determine whether significant mortality or reduction in normality exists.

A close look at the test receiving waters for any potentially interfering algal species is recommended prior to initiating tests with *Mytilus* embryos. If algae are prevalent and densities appear to be of concern, filtration of a subsample of water from each site through a 1–2-µm mesh filter to remove the algae is highly recommended. This filtered sample is then tested side-by-side to the unfiltered sample for comparison purposes.

Table 4-4.
Conditions for the 48-Hour Mussel Development Bioassay

<table>
<tr><th colspan="3">Test Conditions
48-Hour Chronic Bioassay</th></tr>
<tr><td colspan="2">Test Species</td><td><i>Mytilus galloprovincialis</i></td></tr>
<tr><td colspan="2">Test Procedures</td><td>EPA/600/R-95/136 (USEPA, 1995)</td></tr>
<tr><td colspan="2">Age and Size Class</td><td><4-hour-old embryos</td></tr>
<tr><td colspan="2">Test Type and Duration</td><td>Bivalve Larvae—Static / 48 hours</td></tr>
<tr><td colspan="2">Sample Storage Conditions</td><td>4°C, dark, minimal head space</td></tr>
<tr><td colspan="2">Holding Time</td><td>36 hours</td></tr>
<tr><td colspan="2">Control Water Source</td><td>Scripps Pier seawater, 20 µm filtered</td></tr>
<tr><td rowspan="4"><i>Recommended Water Quality Parameters</i></td><td>Temperature</td><td>15 ± 1°C</td></tr>
<tr><td>Salinity</td><td>30 ± 2 ppt</td></tr>
<tr><td>Dissolved Oxygen</td><td>> 4.0 mg/L</td></tr>
<tr><td>pH</td><td>6-9; monitor for pH drift</td></tr>
<tr><td colspan="2">Photoperiod</td><td>16 hours light, 8 hours dark</td></tr>
<tr><td colspan="2">Test Chamber</td><td>20-mL glass shell vials</td></tr>
<tr><td colspan="2">Concentrations</td><td>5 (6.25, 12.5, 25, 50, and 100 percent) and a control</td></tr>
<tr><td colspan="2">Replicates and Sample</td><td>5</td></tr>
<tr><td colspan="2">Number of Organisms/Replicate</td><td>Recommended: 15–30/mL</td></tr>
<tr><td colspan="2">Exposure Volume</td><td>10 mL</td></tr>
<tr><td colspan="2">Feeding</td><td>None</td></tr>
<tr><td colspan="2">Water Renewal</td><td>None</td></tr>
<tr><td colspan="2">Statistical Analysis</td><td>TST - Control and test sample comparisons</td></tr>
</table>

Notes:
µm = micrometer; °C = degrees Celsius; mg/L = milligram(s) per liter; mL = milliliter(s); pH = hydrogen ion concentration; ppt = part(s) per thousand; USEPA = U.S. Environmental Protection Agency

4.1.7 Water Quality Analysis

4.1.7.1 Water Chemistry

The basin-wide dissolved copper results (excluding the Reference site) will be used to calculate an average dissolved copper concentration. This average will be used to determine basin-wide compliance with the CTR dissolved copper chronic target (3.1 µg/L) or a potential site-specific objective. Because the same station locations will be revisited annually, repeated measurements will be used to evaluate reductions in dissolved copper levels with time.

4.1.7.2 Toxicity

Toxicity will be statistically assessed using the software program Comprehensive Environmental Toxicity Information System™ from Tidepool Scientific Software. With this software, survival of topsmelt fish and normal development of surviving mussel embryos in each test dilution from SIYB are compared to organism performance observed in control exposures to filtered clean seawater collected from the end of the pier at Scripps Institution of Oceanography in La Jolla, California. Results are used to determine LC_{50} and EC_{50} values. If fish survival and normal embryo development in the controls do not differ significantly from that of the treatments, then conditions are considered to be non-toxic at the station. The USEPA Test of Significant Toxicity[5] (USEPA 2010) approach will be used to determine statistically significant effects for this study.

4.2 Field and Analytical QA/QC Procedures

Strict QA/QC procedures will be employed throughout the entire study, from mobilization through delivery of samples to the laboratories. Extra care will be taken to minimize the possibility of compromising sample integrity. The sample collection team will be trained in, and follow, field sampling standard operating procedures (SOPs), as described in the SIYB QAPP (AMEC 2012). As part of the field collection procedures identified in the 2012 and 2013 QAPP updates, a QA/QC reviewer from the Port and the field contractor will be present onboard the sampling vessel at all times to review each step of the sample and data collection process. Additionally, Port-approved field and QA/QC checklists will be used throughout the sampling event to ensure that all procedures are consistent at each location; samples are collected in exactly the same manner at every station; and all required field data are recorded correctly and completely.

Field staff members will take care to avoid contamination of samples at all times by employing the clean hands technique and will wear powder-free nitrile gloves during sample collection. In addition, the field manager will ensure that the sample collection boat is painted with a non-copper or non-zinc containing hull paint. All samples will be collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles containing the correct preservative (if applicable). The sampling team will be provided the updated QAPP and field sampling standard operating procedures (SOPs) to ensure all sampling personnel are trained accordingly. Additionally, the field staff will be made aware of the significance of the project's detection limits and the requirement to avoid contamination of samples at all times. Field measurement equipment will checked and calibrated for operation in accordance with the manufacturer's specifications (calibration records will be recorded and maintained), and will inspected for damage prior to use and when returned from use. Observations of activities surrounding the sampling area will be recorded on field data sheets at each station and during movement between stations (i.e., boat hull cleaning).

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[5] A recommendation was made by the Port to the Regional Board in the 2012 monitoring report to begin using this new statistical method in place of previous statistical tests. The Regional Board agreed with this recommendation in its July 26, 2013, letter regarding SIYB TMDL progress. The TST method was used to identify any samples that exhibited a statistically significant difference from the control.

As required by SWAMP protocols, the monitoring program will include the addition of a field replicate. The field replicate sample will consist of a second complete set of samples collected at one of the monitoring locations and will be analyzed for chemical constituents only (no toxicity analyses will be conducted on the field replicate sample). The purpose of the field replicate is to assess variability in sampling procedures as well as ambient conditions. In addition to the field replicate, each batch of samples that is submitted to the laboratories for analyses will be accompanied by an equipment rinse blank and field blank, as specified under SWAMP.

Chemistry and toxicity samples will be uniquely identified with sample labels in indelible ink. All sample containers will be identified with the project title, appropriate identification number, date and time of sample collection, and preservation method. Sample labels are inspected by a Port and contractor QA reviewers before and after bottles are filled at each station to ensure that every sample and analysis type are labeled correctly before moving to the next station; this information will be recorded on the field checklist. All samples will be kept on ice from the time of sample collection until delivery to the analytical laboratory for analysis within method-specified holding times (Table 4-5). Samples will be delivered by courier to the analytical laboratories following the day of collection. All analyses will be conducted by laboratories that are accredited by the California Environmental Laboratory Accreditation Program (ELAP) for the specific tests that are required to be performed at the time they are conducted.

Table 4-5.
Sample Holding Times

Analyte	Holding Time
TOC	28 days
DOC	28 days[a]
Total Copper	180 days
Dissolved Copper	48 hours[b]
Total Zinc	180 days
Dissolved Zinc	48 hours[b]
Total Suspended Solids	7 days
48-hour acute bioassay	36 hours
96-hour chronic bioassay	36 hours

Notes:

a The holding time is applicable to preserved sample. The sample will be filtered in the field into a bottle with sulfuric acid (H_2SO_4) preservative for DOC analysis.

b The holding time for metals after preservation is 180 days. The dissolved fraction will be filtered in the field through a 0.45-micrometer (µm) glass fiber filter using a bottle top vacuum filtration system. Samples will be preserved at the laboratory immediately upon receipt from the courier, within 24 hours of sample collection.

DOC = dissolved organic carbon; TOC = total organic carbon

The annual TMDL monitoring program will include the following QA/QC elements:

- ✓ QAPP and SOP updates
- ✓ Verification of laboratory certifications
- ✓ Field mobilization and equipment checklists
- ✓ Field sampling QA/QC checklists
- ✓ Field equipment calibrations records
- ✓ Staff training on QAPP-required field procedures
- ✓ Field conditions and water quality data sheets
- ✓ On-board QA/QC oversight
- ✓ Observations for hull cleaning or other water-quality-impacting activities near sample collection locations

The analytical laboratory will (a) be certified to conduct the analyses for the constituents of concern for the SIYB TMDL study, (b) be certified for the specific analysis methods required for this program, and (c) hold a valid ELAP certificate at the time the monitoring program is initiated and the samples are analyzed. The QA objectives for chemical analysis to be followed by the participating analytical laboratories are detailed in their laboratory QA manuals and the QAPP. The objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Methods and SOPs
- Calibration methods and frequency
- Data analysis, validation, and reporting
- Internal QC
- Preventive maintenance
- Procedures to ensure data accuracy and completeness

Results of all laboratory QC analyses will be reported with the final data. Any QC samples that fail to meet the specified QC criteria in the methodology or QAPP will be identified and the corresponding data will be appropriately qualified in the final report. The final report will include a separate section that discusses any QA/QC issues encountered during the monitoring event, as well as the corrective actions taken to satisfactorily address any issues.

All QA/QC records of the various testing programs will be kept on file for review by regulatory agency personnel.

4.3 Chain-of-Custody Procedures

Proper chain of custody (COC) procedures will be used throughout the sample collection, transport, and analytical process. The principal documents used to identify samples and to document possession are COC records, field logbooks, checklists, and field tracking forms. The COC process is initiated during sample collection. A COC record will be provided with each sample or group of samples. Each employee who has custody of the samples will sign the form and ensure that the samples are not left unattended and are properly secured.

Documentation of sample handling and custody included the following:

- Client and project name

- Sample identifier
- Sample collection date and time
- Any special notations on sample characteristics or analysis
- Initials of the person collecting the sample
- Date the sample was sent to the analytical laboratory
- Shipping company and waybill information

Completed COC forms will be placed into a plastic envelope and kept inside the cooler containing the samples. If possible, field staff should physically courier the bay water samples from the dock at SIYB to the analytical laboratory on the same day as collection. This level of effort will provide an additional level of security to the chain of custody process as well as ensure that all holding times are met. Upon delivery to the analytical laboratory, the COC form will be signed by the person receiving the samples. Copies of the COC records will be included in the final reports prepared by the analytical laboratories.

4.3.1 Health and Safety

Because sampling will be conducted from a boat, dangerous situations can arise. Field personnel need to be aware of safety hazards and take appropriate precautions. A health and safety tailgate meeting will be held prior to any on-site activity. During this meeting, site-specific hazards will be discussed and addressed appropriately.

4.3.2 Use of Boats and Working over Water

Work will be conducted from a boat over and around SIYB; therefore, special considerations are required. All watercraft will be operated according to the applicable navigational rules and regulations. The boat will be operated by a certified captain with U.S. Coast Guard small vessel training. Personnel working on the boat will be trained according to internal SOPs. The hazards associated with the operation and use of boats include drowning, heat stress, and injuries from falling. An approved personal flotation device must be available for each person onboard. Wet conditions increase the chances of slipping; therefore, engineering controls such as guardrails will be used.

Sampling will be conducted in the summer, which increases the risk of heat stress. To reduce this risk, plenty of water will be made available to field staff and wearing short pants will be acceptable. A float plan will be prepared for each trip and submitted to the safety officer or project manager. At a minimum, it will include destination, expected time of return, personnel on board, and description of vessel. The float plan will be used if the field crew does not return or notify the shore contact at a specified time and a rescue is needed. A weather forecast will be reviewed prior to field sampling. High winds may pose potential hazardous conditions within the harbor.

5.0 DATA REVIEW AND MANAGEMENT

Field and laboratory data will be reviewed for completeness and accuracy prior to analysis and reporting, and are stored in a database, as described in the following sections.

5.1 Data Review

After each survey, field data sheets and checklists will be checked for completeness and accuracy by the field crew and the QA reviewers. In addition, all sample COCs will be checked against sample labels at the end of the day prior to samples being transported to the laboratories. In the laboratory, technicians will document sample receipt and sample preparation activities in laboratory logbooks or on bench sheets.

Data validation will include dated and signed entries by technicians on the data sheets and logbooks used for samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data. Data for laboratory analyses will be entered directly onto data sheets. Data sheets will be filled out in ink and signed by the technician, who is responsible for checking the sheet to ensure completeness and accuracy. The technician who generated the data will have the prime responsibility for the accuracy and completeness of the data.

Each technician will review the data to ensure the following:

- Sample description information is correct and complete
- Analysis information is correct and complete
- Results are correct and complete
- Documentation is complete

All data will be reviewed and verified by participating team laboratories to determine whether data quality objectives have been met and that appropriate corrective actions have been taken, when necessary, as detailed in the QAPP.

5.2 Data Management

The chemistry and toxicity laboratories will supply analytical results in both hard copy and electronic formats. Laboratories will have the responsibility of ensuring that both forms are accurate. After completion of the data review by participating team laboratories, hard copy results will be placed in a project file; results in electronic format will be imported into a database system. Additional details regarding data management are provided in the project-specific QAPP.

5.3 Laboratory Quality Assurance and Quality Control

Analytical laboratories will provide a QA/QC narrative that describes the results of the standard QA/QC protocols that accompany analysis of field samples. All hard copies of results will be maintained in the project files. In addition, back-up copies of results generated by each laboratory will be maintained at their respective facilities. At a minimum, the laboratory reports will contain results of the laboratory analysis, QA/QC results, all protocols and any deviations from the project Monitoring Plan, and a case narrative of COC details.

6.0 REPORTING

Reporting under the SIYB TMDL will include annual monitoring and progress reports to be submitted to the Regional Board by the Port no later than March 31 of each year. The purpose of the report is to document the methods and results of annual vessel tracking surveys and water quality monitoring. Reports will detail the number of vessels converted to non-copper or lower copper paints within SIYB to calculate loading reductions. Additionally, annual progress reports will describe water quality conditions, specifically focused on the concentrations of dissolved copper within the basin and observed toxicity levels.

At a minimum, the following information will be included in annual monitoring and progress reports.

SIYB TMDL Implementation: An evaluation, interpretation, and tabulation of data and information on SIYB Dissolved Copper TMDL activities undertaken by the Named Parties.

1. *Vessel Conversions.* Assess vessel conversions from copper-based antifouling paints to non-copper and lower copper hull paints, including:
    a. Total number of slips or buoys in SIYB available to be occupied by vessels
    b. Number of unoccupied slips or buoys and length of time unoccupied during each year
    c. Number of vessels confirmed with copper-based hull paint and approximate length of time occupying a slip or buoy in SIYB during each year
    d. Number of vessels confirmed with alternative hull paints, by alternative hull paint type, and approximate length of time occupying a slip or buoy in SIYB during each year
    e. Number of vessels with aged-copper paint and approximate length of time occupying a slip or buoy in SIYB during each year
    f. Number of vessels with unconfirmed information about hull paint and approximate length of time occupying a slip or buoy in SIYB during each year;
    g. An estimate of the dissolved copper load reduction achieved, in terms of kilograms and percent, for the year
    h. Any other data or information relevant to annual tracking of vessels in SIYB occupying slips or buoys and conversions from copper-based hull paints to alternative (non-copper or lower copper) hull paints.

SIYB BMP Implementation. Describe BMPs or other actions that have been implemented by the Named Parties to reduce dissolved copper discharges from boat hulls into SIYB. BMPs and other actions implemented and required to be implemented by in-water hull cleaners are also described in the BMP section of the annual monitoring and progress report. In addition, any updates of the copper reduction BMP strategies outlined in the TMDL Implementation Plan will be included in an appendix to the annual monitoring and progress report.

San Diego Baywide BMP Implementation. Describe BMPs or other actions that can be, will be, or have been implemented by the Port to reduce dissolved copper discharges from boat hulls into harbors or marinas, other than SIYB, within San Diego Bay.

SIYB TMDL Monitoring. An evaluation, interpretation, and tabulation of water quality sampling and analysis data, including:

2. *Sampling Locations and Numbers*. The locations, type, and number of samples must be identified and shown on a site map.
3. *Sample Analyses*. The sample collection and laboratory analytical methods, QA/QC results, time and date of sample collection, and other pertinent information must be described.
4. *QA/QC Summary.* Discusses the adherence to project-specific QAPP requirements, QA/QC issues that needed to be addressed, and any necessary corrective actions.
5. *Water Quality Trends.* Interpretations and conclusions, as to whether the “trajectory” of the measured water quality values points toward attainment of the dissolved copper water quality objectives, must be provided.

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ATTACHMENT A

VESSEL TRACKING DATABASE TEMPLATE

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Attachment A
SIYB Dissolved Copper TMDL
Vessel Tracking Template Form

Facility (Marina or Yacht Club)	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type (Copper, Low, or Non, No Paint)	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	DPR Category I Registration Number

ATTACHMENT B

CHAIN-OF-CUSTODY FORMS

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Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

CHAIN OF CUSTODY RECORD

STANDARD

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Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

Page 1 Of 5

CLIENT NAME:

PROJECT: Port of San Diego - Shelter Island Yacht Basin

ADDRESS:

PHONE:

FAX:

EMAIL:

PROJECT MANAGER Rolf Schottle

SAMPLER

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☑ 10 Business Days
- ☑ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	**Total Copper** Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	**Dissolved Copper** 2 Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	**Total Zinc** Method EPA 1640 MDL 0.036 µg/L, RL= 0.20 µg/L	**Dissolved Zinc** 2 Method EPA 1640 MDL 0.036 µg/L, RL= 0.20 µg/L	**Total Organic Carbon (TOC)** Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	**Dissolved Organic Carbon (DOC)** 1 Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L					COMMENTS

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice Y / N
Preserved Y / N
Evidence Seals Present Y / N
Container Intact Y / N
Preserved at Lab Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) DOC samples were field filtered through 0.45 um Teflon filters, 2) LAB ACTION UPON RECEIPT:FILTER/PRESERVE DISSOLVED Cu/Zn IMMEDIATELY- 24hr HT; 3) 10 working day TAT;
4) FB = Field Blank; 5) ER = Equipment Rinsate (Equipment Blank); 6) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
7) Please see attached CAR for metals analysis / acid washing filters. Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
8) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 9) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L
10) Select pages from AMEC QAPP included for reference; 11) HDPE Metals Bottles were provided to AMEC with NO acid (HNO3) in bottle. WECK to add acid in-house at appropriate time.

Nautilus Environmental

Chain of Custody (electronic)

4340 Vandever Ave. San Diego, CA 92120

Date__________Page___of___

Sample Collection By:	AMEC Environment & Infrastructure		
	Report to:		Invoice to:
Company			
Address			
City/State/Zip			
Contact			
Phone			
Email			

	SAMPLE ID	**DATE**	**TIME**	**MATRIX**	**CONTAINER TYPE**	**# OF CONTAINERS**	**COMMENTS**	**ANALYSES REQUIRED**								Receipt Temperature (°C)
								Topsmelt 96-hr Acute Survival	Mussel 48-hr Survival and Dev.							
1																
2																
3																
4																
5																
6																
7																
8																

PROJECT INFORMATION	**SAMPLE RECEIPT**	
Client:	**Total # Containers:**	
P.O. No.:	**Good Condition?**	
Shipped Via:	**Matches Test Schedule?**	

Comments:
Concurrent reference toxicant test for both species

Relinquished By:		**Received By (courier):**	
Signature:	**Date**	**Signature:**	**Date**
Print Name:	**Time**	**Print Name:**	**Time**
Company:		**Company:**	
Relinquished By (courier):		**Received By Lab:**	
Signature:	**Date**	**Signature:**	**Date**
Print Name:	**Time**	**Print Name:**	**Time**
Company:		**Company:**	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

APPENDIX B

BEST MANAGEMENT PRACTICE PLANS

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BEST MANAGEMENT PRACTICE PLANS

PORT OF SAN DIEGO

Shelter Island Yacht Basin Total Maximum Daily Load BMP Work Plan – San Diego Unified Port District
Summary of efforts completed /in progress during 2017 Reporting Period (Jan- Dec 2017)

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
Defined Projects for Stage 3 (2013-2017)							
Policy/ Regulation	***Copper Hull Paint Legislation AB 425 (Atkins): The Port sponsored state legislation that required the Dept. of Pesticide Regulation to adopt a leach rate that is protective of aquatic environments.***	***State-wide***	***This bill supports the Port's efforts to reduce copper pollution in San Diego Bay marinas by controlling copper loading throughout the state.***	***Completeness: Adoption of bill*** ***Load Reduction:*** ***(1) establish leach rate that is protective of aquatic environments.*** ***(2) Limit paints to only those meeting the leach rate.***		***Start Date: Feb 2013*** ***Completion Date:*** ***(1) Bill Complete – Oct 2013*** ***(2) Establish Leach Rate – Feb 2014*** ***(3)Leach Rate Use – Adopted Rule August 2017,*** ***Status: Legislation Complete***	• ***AB425 was signed in October 2013.*** • ***The final DPR report was completed on January 30, 2014, and established the following:*** o ***Max Leach Rate of 9.5 µg/cm2/day for paints w/ monthly soft carpet.*** o ***7 additional mitigation measures identified to be implemented.*** o • ***Leach Rate Use Adopted Rule- August 2017***
Policy/Regulation	Copper Hull Paint Legislation AB 425 (Atkins): The Port sponsored state legislation that created a requirement for the Dept. of Pesticide Regulation to adopt a leach rate that is protective of aquatic environments.	State-wide	This bill supports the Port's efforts to reduce copper pollution in San Diego Bay marinas by controlling copper loading throughout the state.	Completeness: Adopted Bill Implemented Implementation: (1) Adoption of Bill (2) Implementation of Adopted Bill		Start Date: August 2017 – Leach Rate Use Rule adopted Status: Adopted rule to be implemented starting July 1, 2018	• Leach Rate Use Adopted Rule- August 2017 • Adopted Rule to become effective on July 1, 2018
Policy/ Regulation	In-water Hull Cleaning Regulations – New Permits Issued	Bay-wide	In-Water Hull Cleaning regulations are intended to reduce or eliminate copper pollution caused by hull cleaning activities in San Diego Bay.	Completeness: Issue Permits to 100% of In-Water Hull Cleaning businesses operating in San Diego Bay. Load reduction: All hull cleaning businesses operating on Port Tidelands have obtained permits & use BMPs.	# of permitted in-water hull cleaning businesses/ total in-water hull cleaning businesses known to operate.	Start Date: FY10 Status: Ongoing Annually	• 81 permits issued since onset of regulation. 50 active permits as of December 2017. • 2 new hull cleaning permits issued in 2017.

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
Policy/ Regulation	In-water Hull Cleaning- Permit Renewals	Bay-wide	In-Water Hull Cleaning Permit renewals are required every two years. A regular renewal process is intended to ensure divers stay up to date on education and training.	Completeness: Permit renewals issued Load reduction: All hull cleaning businesses operating on Port Tidelands possess valid permits & use BMPs.	# of permitted in-water hull cleaning businesses having permits expiring in 2017/ total #in-water hull cleaning businesses	Start Date: Jan 2013 Completion Date: Annually Status: Ongoing annually	• 30 Hull cleaning businesses renewed permits in 2017. • 6 expired permits (no longer in business or will not be renewed).
Policy/ Regulation	In-water Hull Cleaning – Diver/Marina Inspections	Bay-wide	Inspections for IWHC activities and review of marina's check-in practices are intended to verify whether businesses are complying with permit requirements. In general, compliance with permit requirements is indicative of divers using BMPs and controlling their pollution to the MEP.	Completeness: compliance with regulations confirmed through visual inspections. Load reduction: All hull cleaning businesses operating on Port Tidelands have obtained permits & use BMPs.	# of inspections conducted/ # of citations/warnings issued	Start Date: FY10 Status: Ongoing Annually	• 43 Hull cleaning inspections in 2017. • 1 diver cited in 2017 for lack of permit. • 1 marina cited in 2017 for admitting divers operating under an expired permit to its leasehold • 1 marina given verbal warning in 2017 for admitting unpermitted diver to train with permitted diver in marina • 1 company given verbal warning in 2017 for entering marina with unpermitted diver to perform in-water training with permitted diver • 4 companies cited in 2017-1 for creating a paint plume , 3 for operating without a valid permit (or proof of a valid permit(
Policy/ Regulation	Correspondence with State & Federal Agencies	State-wide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities, lessons learned, and build upon successful activity models.	Completeness: submittal of letters; response to request(s)	# of letters sent / # of requests satisfied	Ongoing Annually	• The Port submitted a comment letter to the DPR regarding the leach rate rule Initial Statement of Reasons, supporting the July 1, 2018 date and encouraging using additional mitigation measures (January 31, 2017). • The Port submitted a comment letter to the U.S. EPA regarding the use of sound science and leach rate reviews for interim decisions for copper compounds, specifically ecological-antimicrobial uses- anti-foulant paints and coatings. The comment letter addressed Docket ID No. EPA-HQ-QPP-2010-0212 (November 2017). • DPR released an updated list of paints meeting the AB425 leach rate criteria (July 2017). • Port staff and DPR staff continued their on-going collaborative partnership by holding a conference call to discuss on-going copper

Shelter Island Yacht Basin Total Maximum Daily Load BMP Work Plan – San Diego Unified Port District
Summary of efforts completed /in progress during 2017 Reporting Period (Jan- Dec 2017)

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
							related issues and missing leach rate data for certain paints (November 2017)
Testing and Research	***Hull Paint Research Grants***	***State-wide***	***Projects advance the understanding of available alternative technologies; 3 new technologies being tested (nanotechnology, surface adhesion, natural antifouling compounds.***	***Completeness: Development of test products***	***Deliverable of final report and ability to test product in Port panel testing.***	***Start Date: FY11 Completion Date: FY13 Status: Completed***	• ***ePaint - Completed 2012*** • ***University of Washington – Completed March 2013*** • ***Xurex – Completed July 2013***
Testing and Research	***Hull Paint Testing Program: Development of a testing program to evaluate new and emerging coatings***	***SIYB***	***The objective of the project was to identify effective non-copper antifouling paints through panel testing.***	***Completeness/Change in Awareness***	***Identification of alternative hull paints that are comparable to copper hull paints.***	***Start Date: FY09 Status: Complete Annual Totals: • 2011: Five of 17 non-copper hull paints identified to be effective • 2010: Four of 21 non-copper hull paints identified to be effective.***	• ***Paint testing efforts have been completed; no new work anticipated for the paint testing program.***
Testing and Research	Pilot projects for concepts to mitigate copper in San Diego Bay	SIYB	Test/implement potentially useful copper reduction technologies . These efforts are being coordinated through the Port Blue Economy Incubator (BEI).	Successful trials and subsequent installations of demonstrated technologies.	Measured reduction in copper concentrations in the water column.	• 2016: BEI established and project proposals are reviewed annually	• In 2017, two companies were awarded agreements to conduct copper-related pilot projects through the Blue Economy Incubator • Red Lion Chem Tech will demonstrate their core technology to remove soluble copper in seawater via active and passive filtration • Rentunder Boat Wash will utilize a new enclosed-system approach to in-water hull cleaning, which may help reduce dissolved copper and copper particulates released into the water
Hull Paint Transition	***Transition of Port Fleet to Non-copper Hull Paints***	***SIYB/Bay-wide***	***To facilitate the reduction of copper loading to SIYB in compliance with interim and final loading reduction targets.***	***Load reduction: 100% of fleet transitioned to non-copper hull paints Completeness: conversion of entire Port fleet***	***# converted/ total***	***Start Date: FY09 Completion Date: FY11 Status: Complete. 16 of 16 converted***	• ***All 16 Port boats have been converted, resulting in an 11.01 kg/yr load reduction.*** • ***Project completed ahead of schedule.***
Hull Paint Transition	***Vessel Tracking Templates***	***SIYB/Bay-wide***	***Excel-based data sheets for marinas and yacht clubs to use to track hull paint in a consistent manner for reporting purposes .***	***Completeness/Change in Behavior***	***# of facilities using templates and tracking hull paint information***	***Start Date: FY11 Completion Date: FY13 Status: complete***	• ***The Port and all 11 facilities are currently using template to track hull paint.***

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BMP TYPE	**PROJECT NAME / DESCRIPTION**	**LOCATION**	**PURPOSE(S)**	**TARGETED OUTCOME(S)**	**ASSESSMENT MECHANISM**	**SCHEDULE / STATUS**	**FINDINGS / ACCOMPLISHMENTS**
Hull Paint Transition	***Comprehensive Paint List***	***SIYB/Bay-wide***	***Development of a comprehensive list of copper, non-copper, and non-biocide paints that includes paint names, product numbers, and(for copper products) AB425 leach rate categories for each paint product.***	***Completeness***	***Creation of a list***	***Start Date: FY15*** ***Completion Date: Dec 2015*** ***Status: Complete***	• ***A paint list was completed and was used to validate the vessel data in this annual report.***
Hull Paint Transition	***Web-based Vessel Tracking System***	***SIYB/Bay-wide***	***A web-based database to track vessel paint information for District and tenant facilities.***	***Completeness/Change in Behavior***	***Presence/absence of usable/accessible online vessel tracking database that calculates annual loading reductions.***	***Start Date: FY12*** ***Completion Date: FY13*** ***Status: Database complete, enhancements in progress***	• ***Database completed but not currently being used by stakeholder groups***
Grant Funding/ Incentives	***319h Hull Paint Conversion Project***	***SIYB***	***The project is designed to reduce the levels of copper in Shelter Island Yacht Basin by incentivizing boaters to switch from copper to non-biocide hull paint.***	***Load reduction targets (as of 2012 cost reallocation):*** ***107 vessels converted to non-toxic hull paints and estimated 96.3 kg/yr copper load reduction***	***# of vessels converted and loading reduction as compared to targets.***	***Start Date: FY11*** ***Completion Date: May 30, 2015*** ***Status: Completed*** ***Past Annual Totals:*** ***2011 to 2014 – 34 boats, 32.25 kg/yr total load reduction***	• ***7 boats converted in 2015*** • ***41 vessels converted overall*** • ***2015 Load reduction = 6.26 kg/yr*** • ***Overall load reduction = 38.51 kg/yr*** • ***Final report submitted to State Board on May 30, 2015, 2015*** • ***Report posted to website at https://www.portofsandiego.org/environment/copper-reduction-program/hull-paint-transition.html***
Education/ Outreach	Workshops/seminars to boating community & Stakeholders	SIYB/Bay-wide	Educate boat owners on environmental impacts of copper-based hull paints; Provide information on alternative hull paints; Inform boat owners of the Hull Paint Conversion Project; Inform stakeholders of programs or policies.	Change in Awareness/Change in Behavior	# of people attending; Results from public opinion/awareness surveys or pre/post-tests (as applicable)	Start Date: FY 09 Status: On-going Past Annual Totals: • 2016 – 6 events • 2015 – 5 events • 2014 – 6 events • 2013 – 1 event • 2012 – 3 events	• Conferences: o April 27-28, 2017: Southern California Society of Environmental Toxicology and Chemistry, Dana Point, CA. topics covered water and sediment quality in southern California with both scientific and regulatory focuses Approximately 200 people attended conference. • Port Board Memorandums o 3 Board Memorandums ▪ Submittal of the 2016 Shelter Island Yacht Basin Dissolved Copper TMDL Annual Monitoring and Progress Report (April 6, 2017). ▪ Results of the 2017 Shelter Island Yacht Basin Dissolved Copper Total Maximum Daily Load (TMDL) Annual Water Quality Monitoring and Programmatic Next Steps (October 19, 2017).

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
						• 2011 – 2 events • 2010 – 1 event	▪ Blue Economy Incubator Pilot Project Update (June 8, 2017). • Port Board Meeting Agendas o 3 Board Agendas ▪ Blue Economy Incubator Presentation on Red Lion Chem Tech and RentUnder Remediation Applications (April 11, 2017). ▪ Presentation on the 2016 Copper Load Reduction Efforts Related to the Shelter Island Yacht Basin Total Maximum Daily Load (TMDL) (June 20, 2017). ▪ Resolution Authorizing the Executive Director to Enter into Blue Economy Agreements – Copper Remediation Applications (June 20, 2017).
Education/ Outreach	Booths at Outreach Events:	SIYB/Bay-wide	The Port hosts booths at various boating relating events, such as the Sunroad Boat Show or Day at the Docks. The purpose is to educate boating community on environmental impacts of copper-based hull paints; Provide information on alternative hull paints; Inform boat owners of the Hull Paint Conversion Project.	Change in Awareness/Change in Behavior	# of attendees ; # of posted advertisements or pamphlets distributed Results from public opinion/awareness surveys (as applicable)	Start Date: FY 09 Status: On-going Past Annual Totals: • 2016 – 6 events • 2015 – 6 events • 2014 – 5 events • 2013 – 5 events • 2012 – 4 events • 2011 – 4 events • 2010 – 1 event • 2009 – 1 event	• The Port Environmental Staff did not host any booths this year due to staff resource limitations.

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
Education/ Outreach	Develop Partnerships/ Collaboration	SIYB/Bay-wide	Identify opportunities to collaborate with tenants, academia, and other agencies to develop and provide outreach, testing opportunities, funding opportunities, and policies.	Change in Awareness/Change in Behavior	# partnerships developed	Start Date: FY 09 Completion Date: On-going Status: In progress:	• Coordination with hull cleaners on In-Water Hull-Cleaning Regulations via IWHC regulation processes. • Coordination with SIMLG on SIYB TMDL annual report. • Coordination with other agencies (such as Newport Beach and Marina Del Rey) on regional information sharing regarding Copper TMDL issues. • Regular participation in state-led Interagency Coordinating Committee (IACC) meetings for antifouling and marina-related topics. • Regular meetings with tenants to discuss reports and TMDL status.
Education/ Outreach	Website Development	SIYB/Bay-wide	Be an information source for staying up-to-date with boating trends, news, events and environmental issues. Provide tenants, stakeholders, and public information on copper hull paint related projects, policies and other items.	Change in Awareness/Change in Behavior	Web pages created and posted. Periodic updates to webpages (as necessary)	Start Date: FY 10 Status: - On-going Past Annual Totals: • 2016 – 2 updates • 2015 -2 updates • 2014 – 1 update • 2013 - 2 updates • 2012 – 2 updates • 2011 – 1 update	• The website was routinely checked to ensure content was available to the public and that information remained current and easy to find. • 36 Updates to In-Water Hull Cleaning permitted divers list (*the list is updated and distributed to marinas and yacht clubs weekly, unless there are not changes to the list from the previous week*).

Shelter Island Yacht Basin Total Maximum Daily Load BMP Work Plan – San Diego Unified Port District
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BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
Education/ Outreach	Literature Development: (brochures, handouts, print materials)	Bay-wide	Development and distribution of brochures and other educational materials for the public addressing the bay's copper problems and providing information on non-copper hull paint alternative hull paints.	Change in awareness	# of brochures or pamphlets created	Start Date: FY 10 Past Annual Totals: • 2016 – 1 item • 2015 - 1 item • 2014 – 2 items • 2013 - 4 items • 2012 – 1 item • 2011 – 2 items	• New information was not developed this fiscal year, previously developed material remained readily available via both web and print.
Education/ Outreach	Media Development: (Videos, Web tools, Testimonials, Press releases)	SIYB/Bay-wide	Development and distribution of information for the public addressing the bay's copper problems, non-copper hull paints, policies, and testimonials from boaters/tenants using non-copper hull paints.	Change in awareness	# of press releases or videos created	Start Date: FY 09 Status: On-going Past Annual Totals: • 2016 – 1 press release; 3 items completed • 2015 – 1 press release; 2 items completed • 2014 – 7 press releases; 1 item completed • 2013 - 5 press releases, 3 items completed; • 2012 – 9 press releases; 1 video, 2 posters • 2011 – 7 press releases • 2010 – 5 press releases • 2009 – 2 press releases	• 1 press release: "Port Launches Four 'Blue Economy' Pilot Projects" (June 28, 2017). o The Port's Blue Economy incubator is entering into agreements for four pilot projects, two of which relate to copper mitigation throughout the bay. • The Log Newspaper article o Article discussing the Port entering the final phase of the copper reduction mandate titled "Port of San Diego enters final phase of copper reduction mandate" (July 20, 2017). http://www.thelog.com/local/port-of-san-diego-enters-final-phase-of-copper-reduction-mandate/

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BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
Additional Efforts (Companion Programs)	Construction Site Inspections	Bay-wide	Construction inspections ensure that sites undergoing (re-)development control pollution and prevent discharges. For construction sites and facilities that do not comply, the Port will take enforcement action.	Change in Behavior	Total #sites, # Inspections; # of follow up inspections Overall BMP rate	Status: On-going	• 23[1] construction projects. • 237[1] inspections and 90 follow-up inspections. • 93.5%[1] BMP implementation rate overall. *[1]Data gathered from the Jurisdictional Runoff Management Program (JRMP), which has a permit-required data collection period of October 1, 2016-September 30, 2017. To stay consistent with previous SIYB BMP workplan reporting, these dates were used for this report.*
Additional Efforts (Companion Programs)	Commercial Business Inspections Program	Bay-wide	The Port inspects commercial facilities per the Municipal Permit in the SIYB and bay-wide. One particular component, the Port's marina inspection program, has been an effort to educate boat owners about pollution prevention, focusing on visual observations designed to identify sources of pollution and the pollution prevention practices being implemented at the marinas.	Change in Behavior	Total # Inspections; # of follow up inspections	Status: On-going Past Annual Totals: • 2015:57 inspection bay-wide, 16 follow-ups required. • 2014: 45 inspections bay-wide; 18 follow-ups required. • 2013 - 26 inspections bay-wide; 4 follow-ups required. • 2012 - 9 inspections bay-wide, 0 follow-ups required.	<u>Bay-wide</u> • 77 inspections and 38 follow-up inspections bay-wide in 2017. • Bay-wide - 28 administrative citations and 6 written warnings were issued to facilities to resolve deficiencies. <u>SIYB</u> • 8 facilities received written warnings (sometimes more than 1 deficiency), 6 had no issues (14 total were inspected). • 4 facilities received written warnings for the lack of properly stored hazardous materials. • 5 facilities received written warnings for trash. • 2 administrative citations were issued: one for an abundance of trash and a lack of sweeping , and one for downspout installation issues as part of a PDP BMP.
Additional Efforts (Companion Programs)	SUSMP and Development Regulations	Bay-wide	The Port incorporates SUSMP requirements on applicable development and redevelopment projects bay-wide. Depending on the type and size of the projects, SUSMP requirements could include site design, source controls, and treatment controls such	Change in Behavior: Compliance	# of projects having metals as priority pollutant / # of completed SUSMP BMPs / # acres(sq ft)	Status: On-going	• No new projects occurred in SIYB in 2017 having metals as priority pollutant.

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			as LID.				
Monitoring/ ***Reporting***	***SIYB Special Study – Enhanced Water Quality Special Study***	***SIYB***	***Gain a better understanding of what water quality looks like at additional sampling locations throughout SIYB, as well as throughout the water column at the selected stations***	***Change in SIYB water quality concentrations at both TMDL stations and additional sampling locations as well as at different depths at each location.***	***Completeness: Assess water quality monitoring data and complete report.***	***Status: Completed and reported in the 2016 Annual Monitoring Report (March 2017)***	• ***18 Total Enhanced Study Stations (6 TMDL Compliance Stations and 12 New Stations).*** • ***A Surface, Mid-Depth, and Bottom Sample was collected and analyzed at each of the 18 stations.*** • ***Reporting included as part of the 2016 Dissolved Copper TMDL Monitoring and Progress Report (March 2017).***
Monitoring/ Reporting	SIYB Special Study – Time Series Special Study	SIYB	Gain a better understanding on the effects tidal variations may have on concentrations of dissolved copper in surface waters at SIYB	Change in SIYB water quality concentrations during different stages of a full mixed semidiurnal tidal cycle.	Completeness: Assess water quality monitoring data and complete report.	Status: Final Report anticipated March 2018	• 3 Special Study sites were located throughout SIYB and sampled every 2 hours for an entire mixed semidiurnal tidal cycle (26 hours). • Work plan and QAPP completed in December 2017, Samples collected in January 2018 at mouth, mid basin and back basin. • Reporting to be finalized in early 2018.
Monitoring/ Reporting	***Conduct annual SIYB TMDL Water Quality Monitoring***	***SIYB***	***Assess water quality in SIYB basin; determine when vessel conversion starts to show water quality improvements***	***Completeness***	***Completed Report***	***Status: Monitoring Complete***	• ***For 2017: Basin average for dissolved copper was 7.9 µg/L, a decrease of 9.5% from the 2005-2008 baseline basin average of 8.3 µg/L.***
Monitoring/ Reporting	Revisions to QAPP & Monitoring Plan	SIYB	Develop a water sampling and vessel tracking program to 1) use annually to assess conditions in SIYB, and 2) determine compliance with the TMDL.	Completeness	Submittal of plan updates	-Start Date: July 2017 Completion Date: November 2017 Start Date: March 2013 Completion Date: Dec 2013 Status: 2017	• Revisions to both plans occur annually and are submitted with the Annual Report

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
						Revisions Complete	
Monitoring/ Reporting	***Updates to SIYB TMDL Conceptual Model (as-needed)***	***SIYB***	***Update model using accepted modeling techniques that can predict current conditions and copper loading changes as paints are transitioned from current leach rates to AB425 Category 1leach rates. Updates would include list of data inputs and comparisons to existing modeling efforts and data.***	***Completeness; annual review and update (when applicable)***	***Completed report; updates as needed***	***Start Date: March 2013 Completion Date: By March 2016 Status: Completed***	• ***Data from DPR Report was included in conceptual model.*** • ***SIYB-Specific MAMPEC model study completed; Identification of recent studies to fill data gaps and uncertainties completed.*** • ***Information provided in the SIYB 2015 Annual Report as Appendix E. (March 2016; see link below) https://www.portofsandiego.org/environment/copper-reduction-program/monitoring-and-data-assessment/shelter-island-yacht-basin-tmdl-annual-reports/7286-shelter-island-yacht-basin-tmdl-annual-report-2015.html***
Monitoring/ Reporting	Regional Harbor Monitoring Program (RHMP): 2018 Core Monitoring Program	Bay-wide	Assesses conditions found in San Diego Bay based on comparisons to historical data and comparisons to contaminant concentrations to known surface water and sediment thresholds.	Completeness	Water, sediment, & fish sampling in bay Report on findings of the study	Start Date: FY17 Completion Date: FY22 Status: Ongoing	• Planning for the 2018 Core Monitoring event resulted in 4 planning meetings held between September-December 2017.
Monitoring/ Reporting	***Regional Harbor Monitoring Program (RHMP): 2013 Core Monitoring Program***	***Bay-wide***	***Assesses conditions found in San Diego Bay based on comparisons to historical data and comparisons to contaminant concentrations to known surface water and sediment thresholds.***	***Completeness***	***Water, sediment, & fish sampling in bay Report on findings of the study***	***Start Date: FY13 Completion Date: FY15 Status: 2013 Completed***	• ***Final report completed January 2016 (see link below) https://www.portofsandiego.org/document/environment/regional-harbor-monitoring-program/rhmp-2013.html***

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Monitoring/ Reporting	*SIYB Hydrology Study*	*SIYB*	*Evaluate the potential for enhanced flushing of SIYB by adding culverts or pipes through to America's Cup Harbor or directly to the bay's main channel. Develop a preliminary engineering feasibility and cost assessment for the modeled scenarios.*	*Completeness*	*Completed report*	*Start Date: FY11* *Completion Date: FY13* *Status: Completed Feb 2013*	- ***A culvert between SIYB and ACH was modeled to provide the greatest benefit in reducing copper in SIYB. The study predicted a potential 17% reduction on average throughout the basin and 21% reduction at the head (or enclosed end) of the basin.***
Potential Projects/Initiatives for Stage 4 (2018-2022)							
Policy/ Regulation	Legislative or Policy Efforts	State-wide	Seek options for state controls on copper through legislative efforts.	Completeness: Adoption of bill Load Reduction: TBD dependent on bill content		Start Date: FY11 Completion Date: TBD Status: pending	- Will be provided as needed.
Policy/Regulation	Support for DPR Paint Reformulation	State-wide	Establish timeline to phase-out high leach copper paint.	Completeness	Verification of Policy Notifications to Boatyards Removal of high leach products from the market	Start Date: FY18	- Per DPR Rule adopted August 2017, with an anticipated start date effective July 1, 2018
Policy/ Regulation	Policy Efforts as deemed applicable and appropriate	SIYB/Regionally/ State-wide	Evaluate potential policy efforts locally, regionally and statewide, as deemed appropriate.		Policy development	Will be completed as needed	- Explore collaborations between Port and other agencies regarding Copper TMDLs
Testing and Research	Blue Tech Pilot Studies	SIYB	Further utilize the Port's Blue Tech business incubator to discover and test potentially useful copper reduction technologies.	Further development of technologies exhibiting successful trials.	Measured reduction in copper concentrations in the water column.	Status: Ongoing	- Further develop potential partnerships between the Port and companies proposing copper reducing technologies through the Blue Economy Incubator.

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Testing and Research	Long-term Hull Paint Testing Program Development: Development of a testing program to evaluate new and emerging coatings	SIYB	The objective of the project was to identify effective non-copper antifouling paints through panel testing.	Completeness/Change in Awareness	A standardized protocol for testing the effectiveness of new coatings has been developed.	Start Date: FY09 Completion Date: On-going	• Testing will occur as budget allows.
Education/ Outreach	Presentations to Stakeholder Groups	SIYB/Bay-wide	Educate boating community on environmental impacts of copper-based hull paints; Provide information on alternative hull paints; Inform stakeholders of programs or policies.	Change in Awareness/Change in Behavior	# of attendees and/or pamphlets distributed	Status: Ongoing	• Will be provided as needed. • Annual reports will identify efforts conducted during the reporting period.
Education/ Outreach	Booths at Outreach Events: The Port annually sponsors booths at various boating relating events, such as the Sunroad Boat Show or Day at the Docks.	SIYB/Bay-wide	Educate boating community on environmental impacts of copper-based hull paints; Provide information on alternative hull paints; Inform boat owners of the Hull Paint Conversion Project.	Change in Awareness/Change in Behavior	# of posted advertisements or pamphlets distributed; # of attendees Results from public opinion/awareness surveys (as applicable)	Status: Ongoing	• Will be provided as needed. • Annual reports will identify efforts conducted during the reporting period.
Education/ Outreach	Literature Development: (brochures, handouts, print materials)	SIYB/Bay-wide	Development and distribution of brochures and other educational materials for the public addressing the bay's copper problems and providing information on non-copper hull paint alternative hull paints.	Change in awareness	# of brochures or pamphlets created & # distributed	Status: Ongoing	• Proposed collateral: TBD
Education/ Outreach	Media Development: (Videos, Testimonials, Press releases) – Ongoing task	SIYB/Bay-wide	Development and distribution of information for the public addressing the bay's copper problems, non-copper hull paints, policies, and testimonials from boaters/tenants using non-copper hull	Change in Awareness/Change in Behavior	# of press releases or videos created	Status: Ongoing	

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
			paints.				
Monitoring/ Reporting	Conduct annual SIYB TMDL Water Quality Monitoring	SIYB	Assess water quality in SIYB basin; determine when vessel conversion starts to show water quality improvement.	Completeness	Completed Report	Status: Annually	
Monitoring/ Reporting	Regional Harbor Monitoring Program (RHMP): Core Monitoring Program	Bay-wide		Completeness	Report on findings of the study results completed by Weston for RHMP	Start Date: FY17 Completion Date: FY22	- Project partners include City of San Diego, City of Oceanside, County of Orange.
Grant Funding/ Incentives	Explore grant opportunities for construction of a culvert between SIYB and America's Cup Harbor	SIYB	Increase water movement within the SIYB	Grant award	Completion of grant agreement	Start Date: TBD pending potential grants	

Ongoing Partnerships & Cooperative Efforts							
Policy/ Regulation	Coordination with other Regions on Copper TMDLs/impairments	Statewide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities, lessons learned, and build upon successful activity models.	Consistency in regulations	Assessment mechanism is dependent on information being considered.	As-needed coordination	- TBD
Vessel Tracking Program	Track vessel conversion from copper to non-copper and low-copper hull paints to determine	SIYB	Monitor implementation progress and assess progress towards interim and final loading targets	Interim and final loading reduction targets	Annual basin-wide vessel tracking assessments and loading reduction	Annually beginning in 2011; reporting to Regional Board March 31 annually	- All Named Parties.

BMP TYPE	PROJECT NAME / DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE / STATUS	FINDINGS / ACCOMPLISHMENTS
	annual loading reductions				calculations		
Water Quality Monitoring	Monitor water quality basin wide to assess long term trends in dissolved copper levels and attainment of WQOs	SIYB	Monitor implementation progress and assess progress towards attaining dissolved copper concentrations protective of SIYB beneficial uses	Water quality conditions protective of beneficial uses	Annual basin-wide chemistry and toxicity assessments	Annually beginning August 2011; reporting to Regional Board March 31 annually	• All Named Parties.
Education/ Outreach	IACC Meetings	Statewide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities, lessons learned, and build upon successful activity models.	Information transfer; consistency in messaging	Assessment mechanism is dependent on information being considered.	As-needed coordination	• TBD

* This list is subject to modification based on the availability of resources and results from other projects.

**Projects in bold italics denote projects completed during this reporting period

BEST MANAGEMENT PRACTICE PLANS

SHELTER ISLAND MASTER LEASEHOLDERS

2017

BEST MANAGEMENT PRACTICES AND RECOMMENDED ACTIONS FOR SHELTER ISLAND MARINAS AND YACHT CLUBS

Prepared by:
Shelter Island Master Leaseholder TMDL Group
For the Marinas and Yacht Clubs in Shelter Island Yacht Basin

Table of Contents

This document is prepared solely for exclusive use by participating members of the Shelter Island Master Leaseholders TMDL Group

MISSION STATEMENT

Our goal is to apply Best Management Practices to marinas and yacht clubs to help reduce non-point sources of copper.

DEFINITIONS

- **SIMLG-** In an effort to comply with the TMDL, the Shelter Island Master Leaseholders TMDL Group (SIMLG) was formed in 2007. This group, which has proven to be an extremely important tool for compliance, unifying numerous individual efforts so that a single entity does not fail to comply. While participation in the group is voluntary, all MO’s working in the SIYB are strongly urged to participate as much as possible. The following entities make up the leaseholders in SIYB: Kona Kai Marina, Shelter Island Marina, Silver Gate Yacht Club, Bay Club Hotel and Marina, Humphrey’s Half Moon Inn, Gold Coast Marina, Tonga Landing, Crow’s Nest, San Diego Yacht Club, Southwestern Yacht Club, and La Playa Yacht Club.

- **BMP’s –** Best Management Practices.

  BMPs are practices or procedures. They include methods to lessen or prevent identified substances from reaching receiving waters. A BMP plan organizes these actions, identifies goals, documents implementation, and evaluates progress and thereby assures effective use.

  BMPs are qualitative.
  They are designed to address a particular goal and the identification of that goal is a crucial part of the guidance plan.

  BMPs are flexible.
  Similar environmentally protective results can be achieved by multiple differing different practices. Marinas may elect to either use BMPs recommended by this guidance or selected by the marina.

  BMPs fill an unfilled role.
  Copper antifouling paints are legally sold for use in California. The use of these coatings however has been identified as a source of water quality impairment. Marinas have been identified as a responsible party in this impairment. Communicating this possible impairment seems to have been placed upon the shoulders of marina operators.

Background

Impairment of water quality due to dissolved copper, SIYB TMDL Resolution No. R9-2005-0019 amended the Water Quality Control Plan for the San Diego Basin (Basin Plan) to incorporate the SIYB TMDL, on February 9, 2005. The purpose of the TMDL is to identify and implement actions to reduce dissolved copper loads discharging into the SIYB to attain numeric water quality objectives for dissolved copper in San Diego Bay, which are equal to the California Toxics Rule (CTR) water quality values for dissolved copper in sea water. Chronic exposure concentrations must not exceed 3.1 micrograms per liter (µg/L) over a 4-day average, and acute exposure concentrations must not exceed 4.8 µg/L over a 1-hour average.

The SIYB TMDL requires that loading of dissolved copper into the water column be reduced by 76 percent to 567 kg/yr over a 17-year period (Regional Board, 2005). A 10 percent reduction in dissolved copper loading is required within seven years (December 2012); a 40 percent reduction in loading is required within 12 years, and a 76 percent reduction within 17 years (December 2022).

BMPs and the Investigative Order

Investigative Order, No. R9-2011-0036, issued to the Port on March 11, 2011, requires that the Port prepare and submit designated plans and annual technical reports on the progress of the SIYB TMDL implementation.

- The order states that data on the number of boat hulls converted from copper to alternative hull paints are needed to monitor the progress of implementing the SIYB Dissolved Copper TMDL and achieving the required dissolved copper load reductions.
- Water quality monitoring data are needed to quantify the dissolved copper concentrations in the water column in SIYB to determine when the water quality objectives are attained and beneficial uses restored.
- “Annual monitoring and progress reports must include a discussion of any BMPs or other actions that have been implemented by the Dischargers to reduce dissolved copper discharges from boat hulls into SIYB.”

BMPs selection and use under Section 319

Amendments to the Clean Water Act (CWA) established the Section 319 Nonpoint Source Management Program. Under this program, parties must identify best management practices and measures for impaired non-point sources, along with an implementation plan.

GUIDELINES

BMP 1-Marina Operators: TMDL Introduction, Compliance, Shelter Island Master Leaseholders Group (SIMLG), and Key Reference Articles

- **OVERVIEW-**The Total Maximum Daily Load (TMDL) for copper in Shelter Island Yacht Basin (SIYB) was adopted by the California Regional Water Quality Control Board (CRWQCB) in 2005, and over the years its implications have grown in complexity. The document adopting the CRWQCB's efforts is known as Resolution R9-2005-0019. Among many other important issues, the Resolution named Marina Operators (MO's), marina owners, boat owners, the Unified Port of San Diego (Port), and underwater hull cleaners (Divers) as "Dischargers."

- **VESSEL TRACKING-** Each MO is ultimately responsible for reporting the composition of hulls painted using copper, non-copper, and low-copper paint to the Port. The SIMLG offers a great deal of help on this submission, mainly through the hiring of a consultant, John Adriany, who is the Principal Scientist at ChemMetrics. The importance of complying with this aspect of the TMDL cannot be overstated. Completion and submission of an accurate report to the Port is mandatory for all MO's. Each year, our report is due by approximately January 15th. At this time, our report of BMP's is also submitted. A sheet of Guidelines can be found in the Appendix.

- **COMPLIANCE -**As "dischargers accountable for copper load and wasteload reductions" (R9-2005-0019 Technical Report), it is imperative that all MO's in Shelter Island Yacht Basin understand specific components of the TMDL. Examples of these components include surveying boaters, meeting copper loading reduction timelines, and the utilization of Best Management Practices (BMP's) in an effort to voluntarily comply with the TMDL.

- **TIMELINE-** As of the date of this document, the TMDL is in stage three, of four (Port Presentation, 2007). Stage three entails meeting a benchmark of a 40% reduction of the number of hulls in our marina with copper paint by the end of 2017. The next and final stage involves a 76% reduction in the number of hulls, *and* a measurement of 3.1 parts per billion (ppb), or less, of copper in the water column. Stage four ends in 2022.

BMP 2-Port of San Diego: Port's Role, Grant, Expectations, and Diver Regulations

- **OVERVIEW-**SIYB, which consists of 153 acres, was placed onto the 303(d) Impaired Water Bodies List in 1996. This List currently categorizes our TMDL as a "high" priority.

- **TECHNICAL REPORT-** The 2005 Technical Report directed the Port to develop an Implementation Plan. A draft of this Plan was developed in 2009, and a final draft was submitted in May, 2011. This Plan pointed to BMP's to facilitate the conversion of boat hulls with copper anti-fouling paints (AFP) to AFP's with little or no copper.

- **INVESTIGATIVE ORDER** - On March 11, 2011, an Investigative Order (R9-2011-0036) was issued by the Water Board to the Port. This Order dictates that the Port reports to the Board measurements toward successful compliance by monitoring and tracking data on the number of hulls that have converted from copper to a non-copper or low-copper alternative, and monitoring the concentrations of dissolved copper and levels of toxicity in the water. This Order also requires the Port to submit BMP's as part of their report. Accordingly, this document will be updated as necessary and submitted to the Port each year.

- **IMPLEMENTATION PLAN-** In May, 2011 the Port submitted their Implementation Plan to the Water Board. This document contains the quality assurance plan lays the groundwork for the efforts made to achieve appropriate reductions of copper in SIYB (Shelter Island Yacht Basin Dissolved Copper TMDL Implementation Plan, May, 2011).

- **MONITORING PLAN-** The Monitoring plan, which includes a quality assurance plan described below, and a Conceptual Model, details the annual water quality testing conducted by the Port.

- **QAPP-** The Quality Assurance Project Plan (QAPP), which is part of the Implementation Plan, provides details for the methods used to assess reductions of dissolved copper by tracking the number of hulls converted from copper to non-copper paint. In addition, this document details the project's objectives and quality assurance (QAPP, 2017).

- **DISCHARGERS-** The 2005 Technical Report within Resolution R9-2005-19 named the Port of San Diego (Port) a Discharger. Due to the Port's role in managing the tidelands around San Diego Bay, the Water Board recognized their ability to regulate the environmental impact of copper. The Board points to the Port to manage the TMDL in SIYB, and reiterates their authority to hold MO's, owners, divers, and boat owners accountable for reducing copper loading.

- **REGULATIONS-** According to the Port's 2007 presentation of a plan to reduce copper in Shelter Island Yacht Basin (SIYB), regulatory mechanisms may be put in place to ensure compliance of the aforementioned benchmark. It is our intention to avoid such measures by voluntarily complying; and creating, following, and submitting BMP's is necessary to comply.

- **GRANT-** In an effort to increase the number of hulls converted to non-copper, the Port applied for and won grant monies ($600,000) to offset the cost of such conversion for boaters. With the help of the grant, 41 hulls were converted from 2012 through 2015.

- **DIVER ORDINANCE-** Port Ordinance 2681 originated in July, 2011, and became enforceable following a 90-day grace period that ended in November of the same year. This ordinance mandates Divers obtain a permit from the Port in order to clean hulls. In order to obtain a permit, Divers must display working knowledge of BMP's related to cleaning hulls in the SIYB. One example of these BMP's is Divers are supposed to use the least abrasive cleaning method possible to accomplish the job of cleaning the hull. The Port sends a list of Divers who are permitted to each MO in the SIYB. It is incumbent upon the MO's to disallow any Diver without a valid permit to work in their marina. Once permitted, a Diver will receive from the Port a card, which has green trim and a photo of the Diver. This card shall be displayed in a place where it can be observed by an MO or the Port.

BMP 3-Staff: Training Staff on Basic TMDL Fundamentals, Essential Information, and BMP’s

- **OVERVIEW-** In general, compliance efforts have proven to be demanding. And if your office has the ability to dedicate a staff person(s) to assist with the efforts, it is suggested that they undergo thorough and ongoing training, and receive updates regarding the TMDL and BMP’s.Marina staff should be made available and become familiarized with this BMP document, Port deadlines, and have input on expanding BMP’s.

- **DISSEMINATING GENERAL INFORMATION-** Having a staff that is informed about the TMDL can be very helpful. A MO may or may not be the first person a boater reaches out to about their questions regarding the TMDL and their bottom paint. And it is important that the correct information is disseminated, whether a tenant or member reaches the MO or someone else on their staff.

- **DISSEMINATING PORT INFORMATION-** Staff should be encouraged to assist, whenever possible, efforts made by the Port to educate boaters on the TMDL. From “literature and print media” to “booths at local events,” and “internal education” to an “Eco-friendly hull paint expo,” the Port has made a concerted effort to inform and assist boaters who are moored in the SIYB switch to non-copper paint (Shelter Island Yacht Basin Hull Paint Conversion Project, 2015). These efforts, which began in 2011, should be clearly, routinely and effectively communicated to boaters in our marinas. Staff in a marina office should remain current with knowledge related to such efforts, so they can refer boaters to the appropriate materials.

BMP 4- Divers: Check-In/Check-Out Procedures, Permits, and Monitoring

- **WARNING-** It is ultimately the job of the MO to ensure no work takes place in our marinas by unpermitted Divers. If work is taking place by an unpermitted Diver, and said Diver is noticed by the Port during an inspection, adverse action against your marina by the Port could take place. If a MO or their staff knew that the Diver did not have their permit, you can count on action being taken against your marina.

- **SIGNAGE-** It is helpful to convey messages to divers in English and Spanish. And signage can help facilitate the exchange with a Diver. This is especially true if you are unable to allow a Diver to work on a particular day because they do not have their card from the Port, discussed in BMP 2 above. You may be able to curtail any above occurrences by placing signage at the desk where Divers sign in. There are at least three reasons for having signs notifying Divers of the fact that they cannot work without a permit. First, signs offer a clear statement to Divers about your office’s policy. Second, if anyone on your staff is uncomfortable disallowing a Diver to work, they can more easily adhere to your office’s policy if it is in writing, in front of both them and the Diver. Finally, if the Port were to reach an unpermitted Diver working, having a sign that the Diver must’ve passed when signing in could go a long way in convincing the Port that your office genuinely tries to manage this practice.

- **SIGN IN SHEETS-**Sign in sheets should be used in order to track Diver activity. For reasons beyond the TMDL, MO’s should know who is in their marina working on boats or conducting business. Regarding the TMDL, the sign-in process is a great time to verify the Diver has their valid permit with them.

- **DOCK WALKS-** While on dock walks it is important to check for permits. We recognize that the sign-in process can be skirted when vendors walk through our entrance gates behind boaters, etc. And this is especially true of Divers who arrive by water. Just because a Diver arrives by water does not mean they are skirting the sign-in process; they may not know a policy is in place. By walking the docks, you can inspect permits for yourself, and direct any Diver arriving by water to visit your office.

BMP 5- Boaters: Communicating TMDL Basics to Boaters and Slip Holders.

- **OVERVIEW-** One BMP that is imperative to accomplish is communicating the latest news and information concerning the TMDL to your marina tenants or yacht club members. Choosing the medium for accomplishing this rests on the individual MO's, however it is very important that communication occurs. It is important to remember that, while MO's and long-time tenants/members may be familiar with this topic, it is likely to be a foreign topic to new boaters. And new boaters may be just as likely to convert their paint to non-copper; painting their bottom is sometimes one of the first moderately large maintenance tasks taken on.

- **NEWSLETTERS-** In general, newsletters are a great way to communicate with your boaters. Most marinas send them via email on a monthly basis. The SIMLG suggests mentioning the latest news concerning TMDL monthly. It can also be done via emails, events aimed at boater education, wharfage agreements, personal conversations, etc.

- **EMAILS-** Dedicated emails are effective because sending an email blast to tenants/members is usually a relatively easy task nowadays. News and updates are easily conveyed in emails dedicated to the TMDL.

- **EVENTS-** Hosting tenant events, such as potlucks, tenant appreciation parties, and picnics is a good idea. You may benefit from grabbing some of your tenants' attention at such events to discuss the TMDL.

- **SIGNAGE-** Wharfage contracts or Slip agreements set forth the arrangement you have with your tenants or members. As such, they may be an effective source for requiring bottom paint that is non-copper or low-copper. Or incentives, such as wait list priority or discounts, can be outlined in the slip agreement. At a minimum, each tenant should sign an agreement, whether it is in their contract or a supplemental contract, stating they will supply the TMDL Survey prior to November 1st each year.

DATE	TOPIC/SUBJECT	EMPLOYEE NAME	SIGNATURE

RECORD KEEPING

BMP 1- Sign-In Sheets

- **DIVER INFO-** All divers must sign in with their business name, diver name, date, time, slip locations. They should also sign out when done. The sign in sheet should include basic diver BMP info, such as no hard scrapers, no abrasives, no plumes, etc. Some marinas and yacht clubs will also require independent contractors, such as divers, to sign other documents and waivers, as needed. A copy of a sign in sheet can be found in the appendix. A web link to the Port of San Diego's In Water Hull Cleaning Permit program can be found in the Appendix on page 18.

- **PAPERWORK-** All paperwork such as sign in sheets and other paperwork should be kept in file for a minimum of 7 years.

- **SIGN IN SHEET-** Sign in sheets and other paperwork will help the Port of San Diego track divers permitted by the Port in addition to ensure they are following Port and diver established BMPs.

- **SIGN IN SHEETS FOR TRAINING-** Sign in sheets should be used in staff training, to help the employee understand the impact of diver activity at their marina/yacht club. Understanding which divers are on property, for which company they are working and if they have a Port issued diver ID card.

- **SIGN IN SHEETS FOR TMDL COMPLIANCE-** Sign in sheets help individual marinas and yacht clubs establish TMDL compliance as it relates to tracking the divers, who they work for, which boats they are working on and how often. This info should be used with dock walks and other interactions with divers and tenants.

BMP 2- Staff Training

- **DOCUMENT BMP TRAINING-** All marinas and yacht clubs should be documenting BMP training of their staff. This can be done by using this document as a guideline for individual training records as well as TMDL compliance. At the bottom of each page of this document, as an example, is a place for each employee to sign off they have reviewed the page and understand the contents. A copy of training records can be found in the appendix.

- **DOCUMENT DIVER POLICY/INTERACTIONS-** It is also important to document diver policy education and interactions. This includes the sign in sheets, independent contractor rules and policies, property waivers, other documentation given to divers. Other training can involve dock walks, diver interactions at the slips, other handouts and brochures given to divers, etc. Dates, times, locations and the diver info should all be kept in written form and on file in the marina manager/dockmaster office.

- **VESSEL TRACKING SURVEYS-** Another source of staff training can include boater/tenant vessel hull paint tracking surveys (used to collect hull paint data and diver information). Surveys can include items like type of bottom paint used, last date applied, boatyard who applied paint, dive company used and many other sources of data. The annual vessel tracking survey should be used as a training tool as well, as it can give a great overview of how the bottom paint and diver activity at your location is impacting the water. A copy of the vessel tracking survey is in the appendix.

BMP 3- Boater Education

- **EMAIL-** There are many ways to document how you educate and inform your tenants of the ever changing hull paint choices and their impacts on the water and your marina/yacht club. All emails sent to your tenants/members should be kept on file in their individual folders. Emails may contain info about the various hull paint options, current strategies to minimize copper loading of our waterways, upcoming events in the area focusing on hull paint applications and diver information, such as BMPs and your marina's/yacht club's approach to tracking and educating divers.

- **MARINA/YC EVENTS-** Another great option is to document tenant events at your location. These can be during other events, such as seasonal parties, clean up days, national marina day or other events. You can have local yard representatives on hand to help answer boater questions re bottom paint choices and cost estimates. If you have never had a tenant event , reach out to your marina/YC manager/dockmaster as many have done them in the past and may be able to give some ideas. Dates, times, who spoke at the event and who attended needs to be recorded.

- **HANDOUTS-** Tenant handouts can provide simple, relevant information about hull paint options and costs as well as who to contact for more information. Handouts are available from the Port of SD, hull paint manufacturers and boatyards. Keeping track of what is being handed out and how often can help show you are educating boaters on a regular basis.

- **MARKETING-** Keeping records of marketing done by the marina to your tenants/members helps to show a continual effort to educate. Keeping copies of the marketing materials and who received them is a good idea. Marketing could include discounts at local boatyards, slip fee reductions, wait list priorities for slip applicants, etc.

BMP 4- Meetings

- **INTERNAL/STAFF MEETINGS-** Internal organizational meetings should be documented with topics, date, time, who attended and any goals set.
- **EXTERNAL/PORT/CITY MEETINGS-** Document other meetings times, locations and items discussed. These could be local group meetings, dockmaster group meetings and other meetings with local boatyards, etc.

DATE	TOPIC/SUBJECT	EMPLOYEE NAME	SIGNATURE

STAFF TRAINING/BOATER EDUCATION

BMP 1- Staff Training

- **OVERVIEW-** Staff training should include a review of office procedures, marina/YC policies/bylaws, and policies for allowing independent contractors/divers on property and associated documents.

- **RECORDING INFORMATION-** All employees should be shown how to properly record important information and where that information is kept. Training should include reviewing past training efforts to other staff.

- **ROLES-** Part of the employee training should include their role in the TMDL process. Information should include TMDL history, impacts to local waterways, impacts to the tenants and marina/YC, efforts to comply with the TMDL as well as future regulations/fines if TMDL compliance is not met.

- **BOATERS AND DIVERS-** TMDL regulations have changed how boaters interact with their divers and the boatyards as well as the myriad of new hull paints being brought to market. This impacts the boaters not only from a time stand point (more time devoted to speaking with their hull cleaners, the boat yards and possibly local stores selling hull paints), but also the economics of annual boating costs. These additional expenses may play into where a boater decides to moor their boats, which impacts every marina. Divers are impacted as they are regulated by the Port of SD and must show they are using BMPs in their daily operations and to minimize copper loading from their in-water activities. Staff training should take this into account.

BMP 2 – Boater Education

- **EMAILS-** Email blasts are a great way to "get the word out" quickly and cheaply to your boaters. Email can be used as a marketing tool as well as an educational tool. These emails can be to the entire marina/YC, small groups of boaters or even to individual boaters. Email also allows quick interactions as well as Q&A with your boat owners.

- **MAILINGS-** Next step up from an email is a mailing. This obviously costs more and takes longer, but is also a great way to reach out. Sometimes sending a letter is taken as a more formal way to notify your tenants/members about important news or other education information. It lacks a quick way to get more immediate feedback, but may give a longer lasting impression of the information sent.

- **MEETINGS-** Sometimes face to face meetings with your boaters is the best way to communicate news and educate them on topics such as hull paints, local water quality studies and other pertinent information. It allows for immediate Q&A as well as an avenue to hand out new marketing/educational materials. Having speakers from the local boatyards and chandleries may help boat owners a more personal educational experience. Port of SD hull paint expos and marina events are great ways to gather your boaters together.

- **MARKETING-** Internal and external marketing is another way to reach out to your boaters and educate them on issues impacting the boating community. Marketing could include bottom paints, boat yard discounts, marina/YC incentives, etc.

- **ONE ON ONE-** Day to day conversations with tenants allows a more "one on one" experience. This allows the boat owner to ask specific questions and take the time needed to help them understand their bottom paint choices and maybe even make recommendations, such as category 1 hull paints (non-copper, biocide free and low leach copper bottom paints). A web link to the Port's list of alternative hull paint can be found in the Appendix on page 18. Also, a link to the Port's Alternative Hull Paint website can be found on the same page.

DATE	TOPIC/SUBJECT	EMPLOYEE NAME	SIGNATURE

APPENDIX

SIYB Master Leaseholders

TMDL Group

YC/Marina Logo

BOTTOM PAINT SURVEY FORM

The California Regional Water Quality Control Board has stipulated that the Marinas and Yacht Clubs of Shelter Island Yacht Basin are legally required to reduce copper concentrations in our basin. Please help us complete our annual report, in order to fulfill our legal obligation, for the Port of San Diego by completing this questionnaire ASAP and returning it to your Marina or Club office by (date).

Today's Date: _________________ Slip #: __________________

SECTION A

Percentage of Time Slip is occupied: ______________________

Vessel Type (circle one): Power Sail Multi-hull

Registered Vessel Length: ___________ Vessel Beam: _____________

Paint Type: (circle one) Copper Low Copper (<36%) Non-Copper

Paint Product Name ___________________Product Number: _______________Color: _____________

Bottom paint last applied: Month ______________ Year________

Boatyard name that applied paint: ____

If paint is unknown due to a recent purchase, please provide purchase date: Month_______ Year____________

SECTION B (all information below will remain confidential and is not submitted in our report)

Owner Name: ____

Vessel Doc./Reg. #: ________________Boat Name ____________________ Make _________________

Signature: ____ Date: _______________________

Thank you for your cooperation completing and returning this required survey. Please contact the marina office if you have any questions…619-999-9999 or email@yourmarina.com.

Attachment I
SIYB Dissolved Copper TMDL
Hull Tracking Template Form

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper

All hulls with paint greater than 40% copper are counted as high-copper

All hulls equal to zero are counted as non-copper

All hulls between 1 and 39.9% copper are counted as low-copper

Non and low-copper paint types are considered "confirmed" if the paint brand and product number is listed and can be cross checked with the SIML TMDL Group and/or Port paint list

Hulls with aged-copper paint are considered low-copper

Guidelines to Port's Vessel Tracking Template

COMPLETENESS. ACCUARACY. CONSISTENCY.

DO NOT FORMAT ANY CELLS. TO ENABLE US TO MERGE ALL DOCUMENTS SUCCESSFULLY FOR FINAL SUBMISSION, PLEASE FOLLOW THESE GUIDELINES-

1) **FACILITY –** Your marina or yacht club name or abbreviation

2) **SLIP/MOORING REFERENCE NUMBER –** Use the correct slip number according your slip assignments. We will assign reference numbers for privacy reasons before we submit merged data.

3) **PERCENTAGE OF TIME OCCUPIED –** Do not format cell. Example – For 98% occupied, use 98, if left blank, the Port will default it to 100 percent occupied. Make sure you calculate in vacant slips here.

4) **VESSEL TYPE (POWER OR SAIL) –** Use a P or S

5) **VESSEL LENGTH –** Use what you have

6) **VESSEL BEAM -** Use what you have

7) **PAINT TYPE: COPPER, LOW OR NON**
• All hulls with paint greater than 40% copper are reported as **Copper**
• All hulls equal to zero are counted as non-copper and reported as **Non**
• All hulls between 1 and 39.9% copper are counted as low-copper and reported as **Low**
• No-copper and low-copper paint types are considered "confirmed" if the paint brand and product number is listed and can be cross-checked with Port paint lists
• Aged paints are calculated by painting date Month and Year and must have the Boatyard name to qualify. Do not write LOW for aged paints. You must include the painting date with the month, year and name of boat yard or purchase date to qualify the data.

8) **PAINT PRODUCT NAME –** Please spell out the word, do not abbreviate.

9) **PRODUCT NUMBER –** To qualify for non-copper or low-copper, you must record this information.

10) **BOATYARD NAME or PURCHASE DATE –** Necessary to qualify aged paints.

11) **PAINTING DATE MONTH MM –** Use 2 digits such as 01 for January or 02 for February, etc.

12) **PAINTING YEAR YYYY –** Use 4 digits such as 2005.

13) **PERCENTAGE OF COPPER –** Do not format cells. If you have the paint product information record the % associated with that product. If the product is unknown leave the space blank.

Important Links

Port Alternative Hull Paint Website:

http://www.sandiegobaycopperreduction.org/

February 2005 Technical Report

https://www.portofsandiego.org/document/environment/alternative-hull-paint/3061-total-maximum-daily-load-for-dissolved-copper-in-shelter-island-yacht-basin-technical-report/file.html

March 2013 Annual Monitoring Report

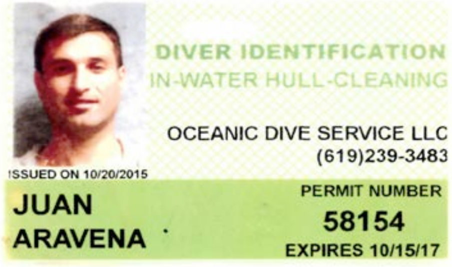
https://www.portofsandiego.org/environmental/copper-reduction-program/monitoring-and-data-assessment/shelter-island-yacht-basin-tmdl-annual-reports/7283-shelter-island-yacht-basin-tmdl-annual-report-2012/file.html

Port Alternative Hull Paint Partial List

https://www.portofsandiego.org/environment/environmental-downloads/copper-reduction-program/3530-how-to-select-an-alternative-hull-paint/file.html

Port of San Diego Issued Diver Permit Card*

Front



DIVER IDENTIFICATION
IN-WATER HULL-CLEANING

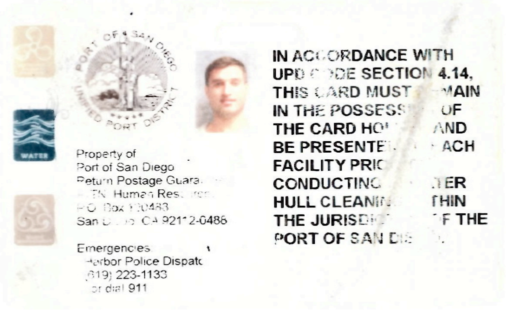
OCEANIC DIVE SERVICE LLC
(619)239-3483

ISSUED ON 10/20/2015

**JUAN
ARAVENA**

PERMIT NUMBER
58154
EXPIRES 10/15/17

Back



Property of
Port of San Diego
Return Postage Guaranteed
ATTN: Human Resources
P.O. Box 120483
San Diego, CA 92112-0486

Emergencies:
Harbor Police Dispatch
(619) 223-1133
or dial 911

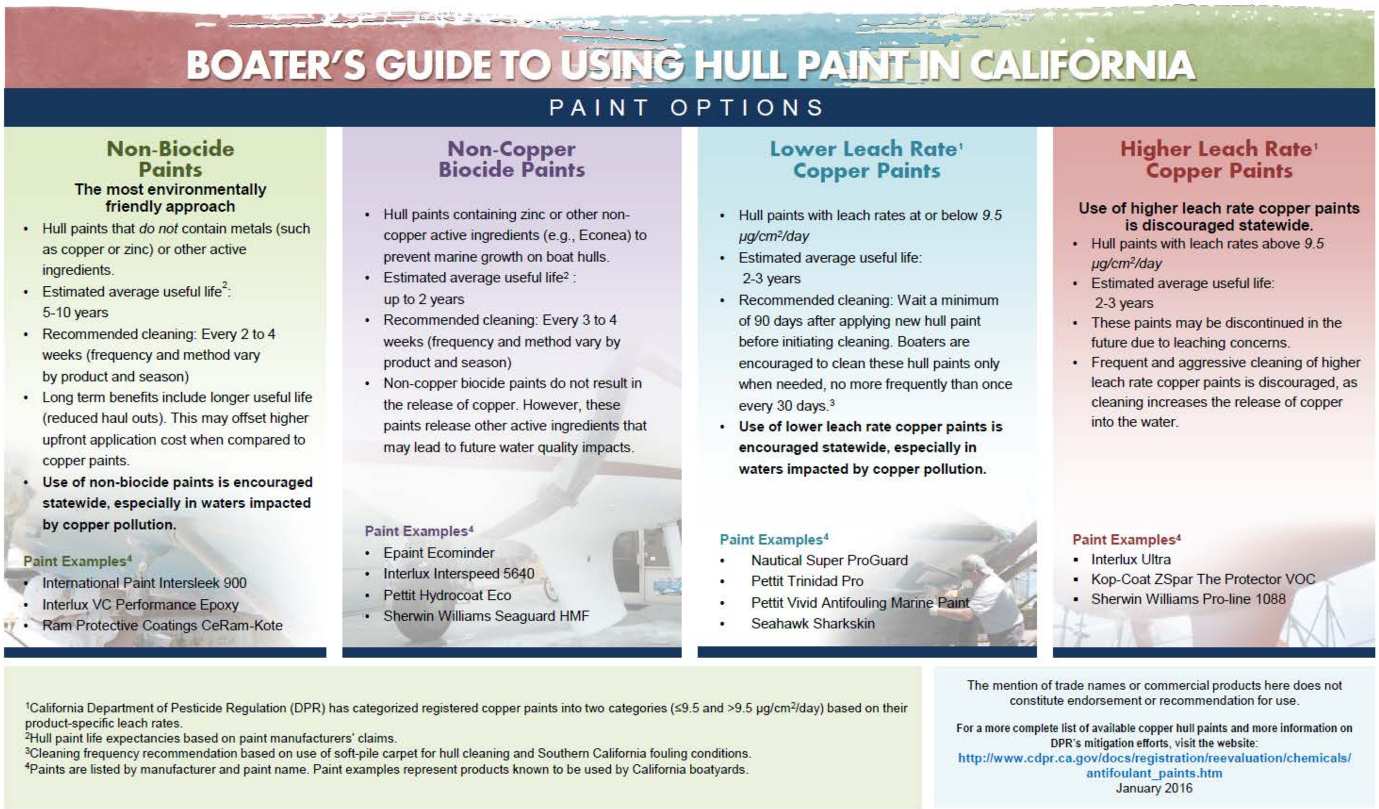
IN ACCORDANCE WITH
UPD CODE SECTION 4.14,
THIS CARD MUST REMAIN
IN THE POSSESSION OF
THE CARD HOLDER AND
BE PRESENTED [illegible] EACH
FACILITY PRIOR [illegible]
CONDUCTING [illegible] ATER
HULL CLEANING WITHIN
THE JURISDICTION OF THE
PORT OF SAN DIEGO.

*Note: Diver, Juan Aravena furnished Joe Ravitch, of Shelter Island Marina permission to use his Diver card as an example on Friday, January 13, 2017.

BMP Tracking and Self-Certification

BMP Type	Project Name Description	Purpose	Participant	Manager	Start Date	Assessment Mechanism	Results	Modifications	End Date
Education	communicate the availability of low leach copper paints	Reduce copper load							

Port of San Diego Alternative Hull Paint Options Brochure



BOATER'S GUIDE TO USING HULL PAINT IN CALIFORNIA

PAINT OPTIONS

Non-Biocide Paints

The most environmentally friendly approach

- Hull paints that *do not* contain metals (such as copper or zinc) or other active ingredients.
- Estimated average useful life[2]: 5-10 years
- Recommended cleaning: Every 2 to 4 weeks (frequency and method vary by product and season)
- Long term benefits include longer useful life (reduced haul outs). This may offset higher upfront application cost when compared to copper paints.
- **Use of non-biocide paints is encouraged statewide, especially in waters impacted by copper pollution.**

Paint Examples[4]

- International Paint Intersleek 900
- Interlux VC Performance Epoxy
- Ram Protective Coatings CeRam-Kote

Non-Copper Biocide Paints

- Hull paints containing zinc or other non-copper active ingredients (e.g., Econea) to prevent marine growth on boat hulls.
- Estimated average useful life[2] : up to 2 years
- Recommended cleaning: Every 3 to 4 weeks (frequency and method vary by product and season)
- Non-copper biocide paints do not result in the release of copper. However, these paints release other active ingredients that may lead to future water quality impacts.

Paint Examples[4]

- Epaint Ecominder
- Interlux Interspeed 5640
- Pettit Hydrocoat Eco
- Sherwin Williams Seaguard HMF

Lower Leach Rate[1] Copper Paints

- Hull paints with leach rates at or below *9.5* $\mu g/cm^2/day$
- Estimated average useful life: 2-3 years
- Recommended cleaning: Wait a minimum of 90 days after applying new hull paint before initiating cleaning. Boaters are encouraged to clean these hull paints only when needed, no more frequently than once every 30 days.[3]
- **Use of lower leach rate copper paints is encouraged statewide, especially in waters impacted by copper pollution.**

Paint Examples[4]

- Nautical Super ProGuard
- Pettit Trinidad Pro
- Pettit Vivid Antifouling Marine Paint
- Seahawk Sharkskin

Higher Leach Rate[1] Copper Paints

Use of higher leach rate copper paints is discouraged statewide.

- Hull paints with leach rates above *9.5* $\mu g/cm^2/day$
- Estimated average useful life: 2-3 years
- These paints may be discontinued in the future due to leaching concerns.
- Frequent and aggressive cleaning of higher leach rate copper paints is discouraged, as cleaning increases the release of copper into the water.

Paint Examples[4]

- Interlux Ultra
- Kop-Coat ZSpar The Protector VOC
- Sherwin Williams Pro-line 1088

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[1] California Department of Pesticide Regulation (DPR) has categorized registered copper paints into two categories (≤9.5 and >9.5 $\mu g/cm^2/day$) based on their product-specific leach rates.

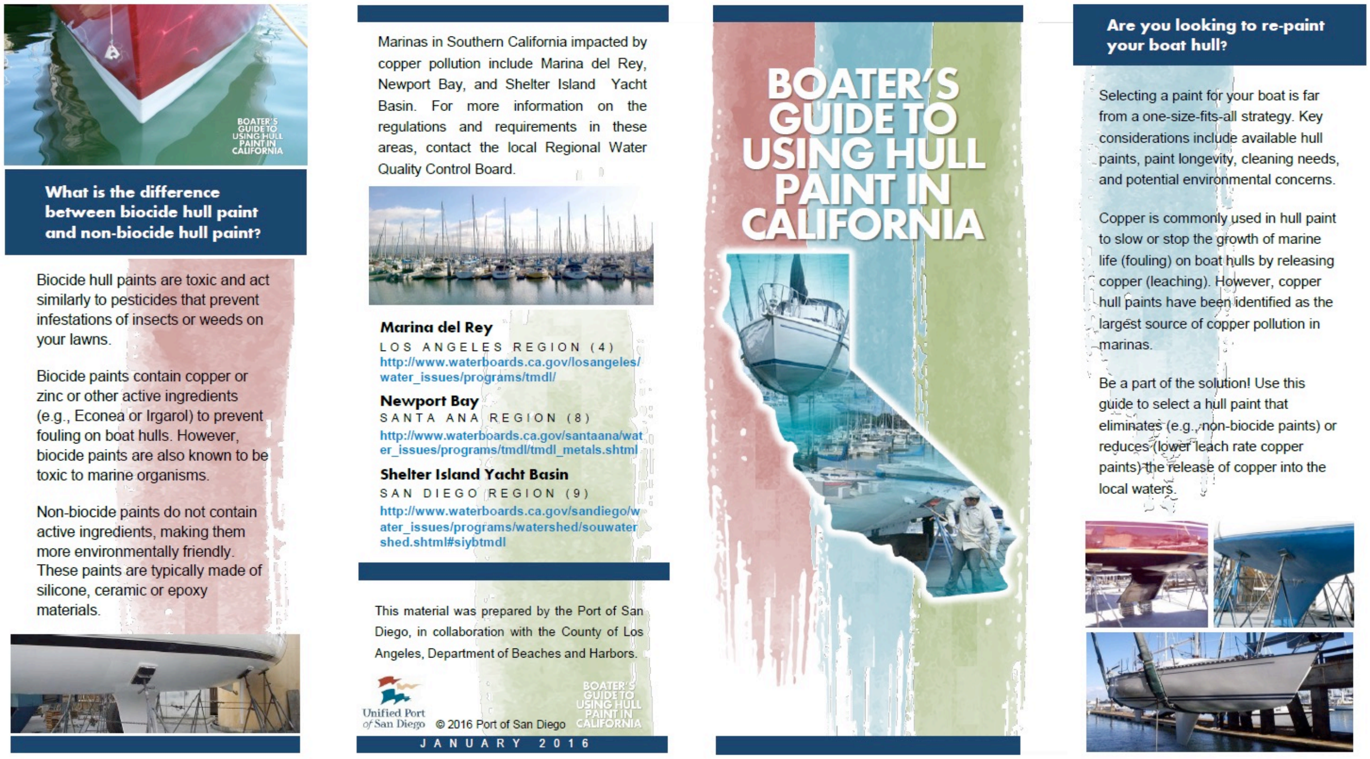
[2] Hull paint life expectancies based on paint manufacturers' claims.

[3] Cleaning frequency recommendation based on use of soft-pile carpet for hull cleaning and Southern California fouling conditions.

[4] Paints are listed by manufacturer and paint name. Paint examples represent products known to be used by California boatyards.

The mention of trade names or commercial products here does not constitute endorsement or recommendation for use.

For a more complete list of available copper hull paints and more information on DPR's mitigation efforts, visit the website:
http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/antifoulant_paints.htm
January 2016



What is the difference between biocide hull paint and non-biocide hull paint?

Biocide hull paints are toxic and act similarly to pesticides that prevent infestations of insects or weeds on your lawns.

Biocide paints contain copper or zinc or other active ingredients (e.g., Econea or Irgarol) to prevent fouling on boat hulls. However, biocide paints are also known to be toxic to marine organisms.

Non-biocide paints do not contain active ingredients, making them more environmentally friendly. These paints are typically made of silicone, ceramic or epoxy materials.

Marinas in Southern California impacted by copper pollution include Marina del Rey, Newport Bay, and Shelter Island Yacht Basin. For more information on the regulations and requirements in these areas, contact the local Regional Water Quality Control Board.

Marina del Rey
LOS ANGELES REGION (4)
http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/

Newport Bay
SANTA ANA REGION (8)
http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/tmdl_metals.shtml

Shelter Island Yacht Basin
SAN DIEGO REGION (9)
http://www.waterboards.ca.gov/sandiego/water_issues/programs/watershed/souwatershed.shtml#siybtmdl

This material was prepared by the Port of San Diego, in collaboration with the County of Los Angeles, Department of Beaches and Harbors.

Unified Port of San Diego

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BOATER'S GUIDE TO USING HULL PAINT IN CALIFORNIA

JANUARY 2016

BOATER'S GUIDE TO USING HULL PAINT IN CALIFORNIA

Are you looking to re-paint your boat hull?

Selecting a paint for your boat is far from a one-size-fits-all strategy. Key considerations include available hull paints, paint longevity, cleaning needs, and potential environmental concerns.

Copper is commonly used in hull paint to slow or stop the growth of marine life (fouling) on boat hulls by releasing copper (leaching). However, copper hull paints have been identified as the largest source of copper pollution in marinas.

Be a part of the solution! Use this guide to select a hull paint that eliminates (e.g., non-biocide paints) or reduces (lower leach rate copper paints) the release of copper into the local waters.

Port of San Diego Diver BMP Notice for Marina Offices

MARINA
RECREATION
ASSOCIATION

SAN DIEGO PORT TENANTS ASSOCIATION

CLEAN
MARINA

ATTENTION

DIVERS & BOAT OWNERS

Please help reduce pollution from bottom paints containing copper, zinc, biocides or any other toxic substance by following these basic best management practices when cleaning bottom paint.

This marina and the other California marinas have established the following
Rules for In-Water Hull Cleaning
For Bottom Paints Containing Copper, Zinc, Biocides, or any other toxic substance:

- **All in-water hull cleaning must be done by hand only - no power equipment allowed.**
- **The Marina shall prohibit in-the-water hull scraping or any process that occurs under water which results in the removal of paint from boat hulls. This does not apply to bare metal parts.**

Remember:

- **NO Scrapers (metal/plastic/wood)**
- **NO Abrasives (sandpaper/cleanser/soft scrub)**
- **NO Scotchbrite®/3M® pads except the White pad**
- **NO Powered Rotary Brushes**
- **USE soft cloth or fleece mitt only**

According to paint manufacturers, properly functioning antifouling paint will repel all hard growth and requires only occasional light wiping with a soft cloth to remove slime. Use only soft rags or a sponge or fleece mitt when light wiping is required.

Thank you for your cooperation.

Marina Office Sign In Sheet Example

✍ Diver Sign in Sheet

By signing below I agree to assume all risk of working on marine property, including, but not limited to work in the water, and I agree, in the absence of gross negligence or willful misconduct by the marina, to indemnify, protect, defend, and hold the marina harmless from and against all actual or potential liability for personal injury, death or property damage, suffered by me or any other person.

DATE	PRINT NAME	SIGNATURE	COMPANY	SLIP #	TIME	
					IN	OUT

PLEASE PRINT CLEARLY

☞ Divers: You must be on file with us to work in our marina! We require:

*Valid/current Port of San Diego Diver ID Card

*Proof of Ship Repairers Legal Liability insurance with $500,000 minimum. Marina must be listed as additional insured)

*A signed copy of our vendor policy

*A copy of your current business license tax

*Proof of workman's comp insurance and a list of your employees

If you're not sure, please ask an office staff member. Thank You!

APPENDIX C

VESSEL TRACKING DATA

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VESSEL TRACKING

PORT OF SAN DIEGO

Port Fleet Hull Paint Information

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Document # or Registration #	Vessel Type	Vessel Length	Vessel Beam	Paint Type	Paint Name	Product Number	Boatyard	Painting Date	% Copper
01/17/18	HPD		100	Marine 1 (# 9157)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 2 (#9162)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 3 (# 9139)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 4 (# 9138)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 5 (#9163)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 6 (# 7762)	P - Patrol Boat	31'	10'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 7 (# 7763)	P - Patrol Boat	31'	10'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Marine 8 (# 9066)	P - Patrol Boat	36'	10'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD	23	100	Phoenix (# 7730)	P - GS Dive Boat	34'	8'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD	24	100	Coral Reef (# 7708)	P - GS Work Boat	40'	14'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A
01/17/18	HPD		100	Bay Shore 1 (7712)	P - GS Work Boat	17'	12'	Non	VC Performance Epoxy	V127/A	SIBY	2011	N/A
01/17/18	HPD		on trailer	Marine 10 (9079)	P - Patrol Boat	22		Non	No bottom paint	N/A	N/A	N/A	N/A
01/17/18	GST		100	Enviro (# 7720)	P - Work Boat	20'	7'	Non	Intersleek 900	FXA972/A	SIBY	2010	N/A
01/17/18	GST		100	Tsunamii II (# 9144)	P - GS Boat	20'	6'	Non	Intersleek 900	FXA972/A	SIBY	2011	N/A
01/17/18	GST		on trailer	Surveyors boat (7702)	P - GS Boat	12		Non	No bottom paint	N/A	N/A	N/A	N/A
01/17/18	HPD		100	Marine 9 (#9229)	P - Patrol Boat	39'	11'	Org	Interspeed 5640	BZA646	Driscoll	2017	N/A

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/6/2017	A1 Anchorage	Mooring			37'		3	Cu
1/6/2017	A1 Anchorage	Mooring			47'		3	Cu
1/6/2017	A1 Anchorage	Mooring			27'		3	Cu
1/6/2017	A1 Anchorage	Mooring			27'		3	Cu
1/6/2017	A1 Anchorage	Mooring			29'		3	Cu
1/6/2017	A1 Anchorage	Mooring			30'		3	Cu
1/6/2017	A1 Anchorage	Mooring			30'		3	Cu
1/6/2017	A1 Anchorage	Mooring			33'		3	Cu
1/6/2017	A1 Anchorage	Mooring			34'		3	Cu
1/6/2017	A1 Anchorage	Mooring			42'		3	Cu
1/6/2017	A1 Anchorage	Mooring			42'		3	Cu
1/6/2017	A1 Anchorage	Mooring			44'		3	Cu
1/6/2017	A1 Anchorage	Mooring			47'		3	Cu
1/6/2017	A1 Anchorage	Mooring			32'		3	Cu
1/6/2017	A1 Anchorage	Mooring			27'		3	Cu
1/13/2017	A1 Anchorage	Mooring			27'		3	Cu
1/13/2017	A1 Anchorage	Mooring			28'		3	Cu
1/13/2017	A1 Anchorage	Mooring			30'		3	Cu
1/13/2017	A1 Anchorage	Mooring			30'		3	Cu
1/13/2017	A1 Anchorage	Mooring			35'		3	Cu
1/13/2017	A1 Anchorage	Mooring			37'		3	Cu
1/13/2017	A1 Anchorage	Mooring			40'		3	Cu
1/13/2017	A1 Anchorage	Mooring			42'		3	Cu
1/13/2017	A1 Anchorage	Mooring			47'		3	Cu
1/13/2017	A1 Anchorage	Mooring			43'		3	Cu
1/20/2017	A1 Anchorage	Mooring			30'		3	Cu
1/20/2017	A1 Anchorage	Mooring			32'		3	Cu
1/20/2017	A1 Anchorage	Mooring			34'		3	Cu
1/20/2017	A1 Anchorage	Mooring			37'		3	Cu
1/20/2017	A1 Anchorage	Mooring			37'		3	Cu
1/20/2017	A1 Anchorage	Mooring			38'		3	Cu
1/20/2017	A1 Anchorage	Mooring			40'		3	Cu
1/20/2017	A1 Anchorage	Mooring			41'		3	Cu
1/20/2017	A1 Anchorage	Mooring			42'		3	Cu
1/20/2017	A1 Anchorage	Mooring			42'		3	Cu
1/20/2017	A1 Anchorage	Mooring			45'		3	Cu
1/20/2017	A1 Anchorage	Mooring			48'		3	Cu
1/20/2017	A1 Anchorage	Mooring			50'		3	Cu
1/20/2017	A1 Anchorage	Mooring			56'		3	Cu
1/20/2017	A1 Anchorage	Mooring			29'		3	Cu
1/27/2017	A1 Anchorage	Mooring			22'		3	Cu
1/27/2017	A1 Anchorage	Mooring			27'		3	Cu
1/27/2017	A1 Anchorage	Mooring			27'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/27/2017	A1 Anchorage	Mooring			30'		3	Cu
1/27/2017	A1 Anchorage	Mooring			30'		3	Cu
1/27/2017	A1 Anchorage	Mooring			32'		3	Cu
1/27/2017	A1 Anchorage	Mooring			34'		3	Cu
1/27/2017	A1 Anchorage	Mooring			34'		3	Cu
1/27/2017	A1 Anchorage	Mooring			35'		3	Cu
1/27/2017	A1 Anchorage	Mooring			35'		3	Cu
1/27/2017	A1 Anchorage	Mooring			36'		3	Cu
1/27/2017	A1 Anchorage	Mooring			36'		3	Cu
1/27/2017	A1 Anchorage	Mooring			37'		3	Cu
1/27/2017	A1 Anchorage	Mooring			37'		3	Cu
1/27/2017	A1 Anchorage	Mooring			38'		3	Cu
1/27/2017	A1 Anchorage	Mooring			41'		3	Cu
1/27/2017	A1 Anchorage	Mooring			44'		3	Cu
1/27/2017	A1 Anchorage	Mooring			47'		3	Cu
1/27/2017	A1 Anchorage	Mooring			49'		3	Cu
1/27/2017	A1 Anchorage	Mooring			52'		3	Cu
1/27/2017	A1 Anchorage	Mooring			60'		3	Cu
2/3/2017	A1 Anchorage	Mooring			44'		3	Cu
2/3/2017	A1 Anchorage	Mooring			27'		3	Cu
2/3/2017	A1 Anchorage	Mooring			27'		3	Cu
2/3/2017	A1 Anchorage	Mooring			27'		3	Cu
2/3/2017	A1 Anchorage	Mooring			28'		3	Cu
2/3/2017	A1 Anchorage	Mooring			30'		3	Cu
2/3/2017	A1 Anchorage	Mooring			30'		3	Cu
2/3/2017	A1 Anchorage	Mooring			33'		3	Cu
2/3/2017	A1 Anchorage	Mooring			37'		3	Cu
2/3/2017	A1 Anchorage	Mooring			37'		3	Cu
2/3/2017	A1 Anchorage	Mooring			41'		3	Cu
2/3/2017	A1 Anchorage	Mooring			41'		3	Cu
2/3/2017	A1 Anchorage	Mooring			49'		3	Cu
2/3/2017	A1 Anchorage	Mooring			52'		3	Cu
2/3/2017	A1 Anchorage	Mooring			58'		3	Cu
2/3/2017	A1 Anchorage	Mooring			32'		3	Cu
2/3/2017	A1 Anchorage	Mooring			43'		3	Cu
2/7/2017	A1 Anchorage	Mooring			57'		3	Cu
2/10/2017	A1 Anchorage	Mooring			26'		3	Cu
2/10/2017	A1 Anchorage	Mooring			27'		3	Cu
2/10/2017	A1 Anchorage	Mooring			29'		3	Cu
2/10/2017	A1 Anchorage	Mooring			30'		3	Cu
2/10/2017	A1 Anchorage	Mooring			30'		3	Cu
2/10/2017	A1 Anchorage	Mooring			30'		3	Cu
2/10/2017	A1 Anchorage	Mooring			30'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/10/2017	A1 Anchorage	Mooring			32'		3	Cu
2/10/2017	A1 Anchorage	Mooring			32'		3	Cu
2/10/2017	A1 Anchorage	Mooring			32'		3	Cu
2/10/2017	A1 Anchorage	Mooring			32'		3	Cu
2/10/2017	A1 Anchorage	Mooring			32'		3	Cu
2/10/2017	A1 Anchorage	Mooring			33'		3	Cu
2/10/2017	A1 Anchorage	Mooring			35'		3	Cu
2/10/2017	A1 Anchorage	Mooring			35'		3	Cu
2/10/2017	A1 Anchorage	Mooring			35'		3	Cu
2/10/2017	A1 Anchorage	Mooring			36'		3	Cu
2/10/2017	A1 Anchorage	Mooring			36'		3	Cu
2/10/2017	A1 Anchorage	Mooring			36'		3	Cu
2/10/2017	A1 Anchorage	Mooring			37'		3	Cu
2/10/2017	A1 Anchorage	Mooring			40'		3	Cu
2/10/2017	A1 Anchorage	Mooring			40'		3	Cu
2/10/2017	A1 Anchorage	Mooring			40'		3	Cu
2/10/2017	A1 Anchorage	Mooring			41'		3	Cu
2/10/2017	A1 Anchorage	Mooring			43'		3	Cu
2/10/2017	A1 Anchorage	Mooring			44'		3	Cu
2/10/2017	A1 Anchorage	Mooring			47'		3	Cu
2/10/2017	A1 Anchorage	Mooring			47'		3	Cu
2/10/2017	A1 Anchorage	Mooring			49'		3	Cu
2/10/2017	A1 Anchorage	Mooring			29'		3	Cu
2/17/2017	A1 Anchorage	Mooring			27'		3	Cu
2/17/2017	A1 Anchorage	Mooring			29'		3	Cu
2/17/2017	A1 Anchorage	Mooring			32'		3	Cu
2/17/2017	A1 Anchorage	Mooring			35'		3	Cu
2/17/2017	A1 Anchorage	Mooring			35'		3	Cu
2/17/2017	A1 Anchorage	Mooring			35'		3	Cu
2/17/2017	A1 Anchorage	Mooring			36'		3	Cu
2/17/2017	A1 Anchorage	Mooring			37'		3	Cu
2/17/2017	A1 Anchorage	Mooring			37'		3	Cu
2/17/2017	A1 Anchorage	Mooring			37'		3	Cu
2/17/2017	A1 Anchorage	Mooring			38'		3	Cu
2/17/2017	A1 Anchorage	Mooring			39'		3	Cu
2/17/2017	A1 Anchorage	Mooring			40'		3	Cu
2/17/2017	A1 Anchorage	Mooring			41'		3	Cu
2/17/2017	A1 Anchorage	Mooring			45'		3	Cu
2/17/2017	A1 Anchorage	Mooring			46'		3	Cu
2/17/2017	A1 Anchorage	Mooring			48'		3	Cu
2/17/2017	A1 Anchorage	Mooring			48'		3	Cu
2/17/2017	A1 Anchorage	Mooring			50'		3	Cu
2/17/2017	A1 Anchorage	Mooring			53'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/17/2017	A1 Anchorage	Mooring			59'		3	Cu
2/17/2017	A1 Anchorage	Mooring			60'		3	Cu
2/24/2017	A1 Anchorage	Mooring			26'		3	Cu
2/24/2017	A1 Anchorage	Mooring			26'		3	Cu
2/24/2017	A1 Anchorage	Mooring			26'		3	Cu
2/24/2017	A1 Anchorage	Mooring			27'		3	Cu
2/24/2017	A1 Anchorage	Mooring			27'		3	Cu
2/24/2017	A1 Anchorage	Mooring			29'		3	Cu
2/24/2017	A1 Anchorage	Mooring			30'		3	Cu
2/24/2017	A1 Anchorage	Mooring			30'		3	Cu
2/24/2017	A1 Anchorage	Mooring			31'		3	Cu
2/24/2017	A1 Anchorage	Mooring			32'		3	Cu
2/24/2017	A1 Anchorage	Mooring			32'		3	Cu
2/24/2017	A1 Anchorage	Mooring			34'		3	Cu
2/24/2017	A1 Anchorage	Mooring			34'		3	Cu
2/24/2017	A1 Anchorage	Mooring			35'		3	Cu
2/24/2017	A1 Anchorage	Mooring			40'		3	Cu
2/24/2017	A1 Anchorage	Mooring			47'		3	Cu
2/24/2017	A1 Anchorage	Mooring			50'		3	Cu
2/24/2017	A1 Anchorage	Mooring			59'		3	Cu
2/24/2017	A1 Anchorage	Mooring			29'		3	Cu
3/3/2017	A1 Anchorage	Mooring			51'		3	Cu
3/3/2017	A1 Anchorage	Mooring			27'		3	Cu
3/3/2017	A1 Anchorage	Mooring			27'		3	Cu
3/3/2017	A1 Anchorage	Mooring			30'		3	Cu
3/3/2017	A1 Anchorage	Mooring			30'		3	Cu
3/3/2017	A1 Anchorage	Mooring			32'		3	Cu
3/3/2017	A1 Anchorage	Mooring			34'		3	Cu
3/3/2017	A1 Anchorage	Mooring			35'		3	Cu
3/3/2017	A1 Anchorage	Mooring			37'		3	Cu
3/3/2017	A1 Anchorage	Mooring			40'		3	Cu
3/3/2017	A1 Anchorage	Mooring			40'		3	Cu
3/3/2017	A1 Anchorage	Mooring			43'		3	Cu
3/3/2017	A1 Anchorage	Mooring			44'		3	Cu
3/3/2017	A1 Anchorage	Mooring			47'		3	Cu
3/3/2017	A1 Anchorage	Mooring			49'		3	Cu
3/3/2017	A1 Anchorage	Mooring			60'		3	Cu
3/3/2017	A1 Anchorage	Mooring			32'		3	Cu
3/10/2017	A1 Anchorage	Mooring			29'		3	Cu
3/10/2017	A1 Anchorage	Mooring			29'		3	Cu
3/10/2017	A1 Anchorage	Mooring			30'		3	Cu
3/10/2017	A1 Anchorage	Mooring			32'		3	Cu
3/10/2017	A1 Anchorage	Mooring			35'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/10/2017	A1 Anchorage	Mooring			35'		3	Cu
3/10/2017	A1 Anchorage	Mooring			36'		3	Cu
3/10/2017	A1 Anchorage	Mooring			37'		3	Cu
3/10/2017	A1 Anchorage	Mooring			37'		3	Cu
3/10/2017	A1 Anchorage	Mooring			39'		3	Cu
3/10/2017	A1 Anchorage	Mooring			40'		3	Cu
3/10/2017	A1 Anchorage	Mooring			41'		3	Cu
3/10/2017	A1 Anchorage	Mooring			42'		3	Cu
3/10/2017	A1 Anchorage	Mooring			42'		3	Cu
3/10/2017	A1 Anchorage	Mooring			43'		3	Cu
3/10/2017	A1 Anchorage	Mooring			43'		3	Cu
3/10/2017	A1 Anchorage	Mooring			49'		3	Cu
3/10/2017	A1 Anchorage	Mooring			59'		3	Cu
3/17/2017	A1 Anchorage	Mooring			27'		3	Cu
3/17/2017	A1 Anchorage	Mooring			27'		3	Cu
3/17/2017	A1 Anchorage	Mooring			27'		3	Cu
3/17/2017	A1 Anchorage	Mooring			29'		3	Cu
3/17/2017	A1 Anchorage	Mooring			30'		3	Cu
3/17/2017	A1 Anchorage	Mooring			32'		3	Cu
3/17/2017	A1 Anchorage	Mooring			32'		3	Cu
3/17/2017	A1 Anchorage	Mooring			32'		3	Cu
3/17/2017	A1 Anchorage	Mooring			33'		3	Cu
3/17/2017	A1 Anchorage	Mooring			35'		3	Cu
3/17/2017	A1 Anchorage	Mooring			35'		3	Cu
3/17/2017	A1 Anchorage	Mooring			36'		3	Cu
3/17/2017	A1 Anchorage	Mooring			36'		3	Cu
3/17/2017	A1 Anchorage	Mooring			37'		3	Cu
3/17/2017	A1 Anchorage	Mooring			39'		3	Cu
3/17/2017	A1 Anchorage	Mooring			40'		3	Cu
3/17/2017	A1 Anchorage	Mooring			41'		3	Cu
3/17/2017	A1 Anchorage	Mooring			42'		3	Cu
3/17/2017	A1 Anchorage	Mooring			42'		3	Cu
3/17/2017	A1 Anchorage	Mooring			44'		3	Cu
3/17/2017	A1 Anchorage	Mooring			45'		3	Cu
3/17/2017	A1 Anchorage	Mooring			47'		3	Cu
3/17/2017	A1 Anchorage	Mooring			49'		3	Cu
3/17/2017	A1 Anchorage	Mooring			50'		3	Cu
3/24/2017	A1 Anchorage	Mooring			21'		3	Cu
3/24/2017	A1 Anchorage	Mooring			27'		3	Cu
3/24/2017	A1 Anchorage	Mooring			30'		3	Cu
3/24/2017	A1 Anchorage	Mooring			32'		3	Cu
3/24/2017	A1 Anchorage	Mooring			33'		3	Cu
3/24/2017	A1 Anchorage	Mooring			35'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/24/2017	A1 Anchorage	Mooring			38'		3	Cu
3/24/2017	A1 Anchorage	Mooring			39'		3	Cu
3/24/2017	A1 Anchorage	Mooring			44'		3	Cu
3/24/2017	A1 Anchorage	Mooring			45'		3	Cu
3/24/2017	A1 Anchorage	Mooring			51'		3	Cu
3/31/2017	A1 Anchorage	Mooring			26'		3	Cu
3/31/2017	A1 Anchorage	Mooring			27'		3	Cu
3/31/2017	A1 Anchorage	Mooring			27'		3	Cu
3/31/2017	A1 Anchorage	Mooring			27'		3	Cu
3/31/2017	A1 Anchorage	Mooring			28'		3	Cu
3/31/2017	A1 Anchorage	Mooring			29'		3	Cu
3/31/2017	A1 Anchorage	Mooring			30'		3	Cu
3/31/2017	A1 Anchorage	Mooring			30'		3	Cu
3/31/2017	A1 Anchorage	Mooring			30'		3	Cu
3/31/2017	A1 Anchorage	Mooring			30'		3	Cu
3/31/2017	A1 Anchorage	Mooring			30'		3	Cu
3/31/2017	A1 Anchorage	Mooring			33'		3	Cu
3/31/2017	A1 Anchorage	Mooring			34'		3	Cu
3/31/2017	A1 Anchorage	Mooring			34'		3	Cu
3/31/2017	A1 Anchorage	Mooring			35'		3	Cu
3/31/2017	A1 Anchorage	Mooring			36'		3	Cu
3/31/2017	A1 Anchorage	Mooring			36'		3	Cu
3/31/2017	A1 Anchorage	Mooring			37'		3	Cu
3/31/2017	A1 Anchorage	Mooring			40'		3	Cu
3/31/2017	A1 Anchorage	Mooring			40'		3	Cu
3/31/2017	A1 Anchorage	Mooring			40'		3	Cu
3/31/2017	A1 Anchorage	Mooring			41'		3	Cu
3/31/2017	A1 Anchorage	Mooring			42'		3	Cu
3/31/2017	A1 Anchorage	Mooring			42'		3	Cu
3/31/2017	A1 Anchorage	Mooring			48'		3	Cu
3/31/2017	A1 Anchorage	Mooring			49'		3	Cu
3/31/2017	A1 Anchorage	Mooring			49'		3	Cu
3/31/2017	A1 Anchorage	Mooring			49'		3	Cu
3/31/2017	A1 Anchorage	Mooring			50'		3	Cu
3/31/2017	A1 Anchorage	Mooring			50'		3	Cu
3/31/2017	A1 Anchorage	Mooring			26'		3	Cu
3/31/2017	A1 Anchorage	Mooring			36'		3	Cu
3/31/2017	A1 Anchorage	Mooring			51'		3	Cu
4/7/2017	A1 Anchorage	Mooring			27'		3	Cu
4/7/2017	A1 Anchorage	Mooring			29'		3	Cu
4/7/2017	A1 Anchorage	Mooring			30'		3	Cu
4/7/2017	A1 Anchorage	Mooring			30'		3	Cu
4/7/2017	A1 Anchorage	Mooring			32'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
4/7/2017	A1 Anchorage	Mooring			32'		3	Cu
4/7/2017	A1 Anchorage	Mooring			33'		3	Cu
4/7/2017	A1 Anchorage	Mooring			35'		3	Cu
4/7/2017	A1 Anchorage	Mooring			37'		3	Cu
4/7/2017	A1 Anchorage	Mooring			39'		3	Cu
4/7/2017	A1 Anchorage	Mooring			40'		3	Cu
4/7/2017	A1 Anchorage	Mooring			42'		3	Cu
4/7/2017	A1 Anchorage	Mooring			42'		3	Cu
4/7/2017	A1 Anchorage	Mooring			46'		3	Cu
4/7/2017	A1 Anchorage	Mooring			52'		3	Cu
4/7/2017	A1 Anchorage	Mooring			55'		3	Cu
4/11/2017	A1 Anchorage	Mooring			32'		3	Cu
4/14/2017	A1 Anchorage	Mooring			25'		3	Cu
4/14/2017	A1 Anchorage	Mooring			25'		3	Cu
4/14/2017	A1 Anchorage	Mooring			27'		3	Cu
4/14/2017	A1 Anchorage	Mooring			27'		3	Cu
4/14/2017	A1 Anchorage	Mooring			30'		3	Cu
4/14/2017	A1 Anchorage	Mooring			30'		3	Cu
4/14/2017	A1 Anchorage	Mooring			30'		3	Cu
4/14/2017	A1 Anchorage	Mooring			33'		3	Cu
4/14/2017	A1 Anchorage	Mooring			34'		3	Cu
4/14/2017	A1 Anchorage	Mooring			34'		3	Cu
4/14/2017	A1 Anchorage	Mooring			35'		3	Cu
4/14/2017	A1 Anchorage	Mooring			35'		3	Cu
4/14/2017	A1 Anchorage	Mooring			36'		3	Cu
4/14/2017	A1 Anchorage	Mooring			36'		3	Cu
4/14/2017	A1 Anchorage	Mooring			40'		3	Cu
4/14/2017	A1 Anchorage	Mooring			40'		3	Cu
4/14/2017	A1 Anchorage	Mooring			42'		3	Cu
4/14/2017	A1 Anchorage	Mooring			44'		3	Cu
4/14/2017	A1 Anchorage	Mooring			44'		3	Cu
4/14/2017	A1 Anchorage	Mooring			46'		3	Cu
4/14/2017	A1 Anchorage	Mooring			47'		3	Cu
4/14/2017	A1 Anchorage	Mooring			47'		3	Cu
4/14/2017	A1 Anchorage	Mooring			49'		3	Cu
4/14/2017	A1 Anchorage	Mooring			52'		3	Cu
4/14/2017	A1 Anchorage	Mooring			55'		3	Cu
4/14/2017	A1 Anchorage	Mooring			57'		3	Cu
4/14/2017	A1 Anchorage	Mooring			60'		3	Cu
4/21/2017	A1 Anchorage	Mooring			25'		3	Cu
4/21/2017	A1 Anchorage	Mooring			27'		3	Cu
4/21/2017	A1 Anchorage	Mooring			30'		3	Cu
4/21/2017	A1 Anchorage	Mooring			30'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
4/21/2017	A1 Anchorage	Mooring			30'		3	Cu
4/21/2017	A1 Anchorage	Mooring			32'		3	Cu
4/21/2017	A1 Anchorage	Mooring			33'		3	Cu
4/21/2017	A1 Anchorage	Mooring			34'		3	Cu
4/21/2017	A1 Anchorage	Mooring			34'		3	Cu
4/21/2017	A1 Anchorage	Mooring			35'		3	Cu
4/21/2017	A1 Anchorage	Mooring			38'		3	Cu
4/21/2017	A1 Anchorage	Mooring			39'		3	Cu
4/21/2017	A1 Anchorage	Mooring			40'		3	Cu
4/21/2017	A1 Anchorage	Mooring			40'		3	Cu
4/21/2017	A1 Anchorage	Mooring			42'		3	Cu
4/21/2017	A1 Anchorage	Mooring			42'		3	Cu
4/21/2017	A1 Anchorage	Mooring			49'		3	Cu
4/21/2017	A1 Anchorage	Mooring			50'		3	Cu
4/21/2017	A1 Anchorage	Mooring			60'		3	Cu
4/21/2017	A1 Anchorage	Mooring			62'		3	Cu
4/28/2017	A1 Anchorage	Mooring			21'		3	Cu
4/28/2017	A1 Anchorage	Mooring			25'		3	Cu
4/28/2017	A1 Anchorage	Mooring			27'		3	Cu
4/28/2017	A1 Anchorage	Mooring			29'		3	Cu
4/28/2017	A1 Anchorage	Mooring			30'		3	Cu
4/28/2017	A1 Anchorage	Mooring			30'		3	Cu
4/28/2017	A1 Anchorage	Mooring			33'		3	Cu
4/28/2017	A1 Anchorage	Mooring			35'		3	Cu
4/28/2017	A1 Anchorage	Mooring			36'		3	Cu
4/28/2017	A1 Anchorage	Mooring			42'		3	Cu
4/28/2017	A1 Anchorage	Mooring			44'		3	Cu
4/28/2017	A1 Anchorage	Mooring			49'		3	Cu
4/28/2017	A1 Anchorage	Mooring			49'		3	Cu
4/28/2017	A1 Anchorage	Mooring			49'		3	Cu
4/28/2017	A1 Anchorage	Mooring			50'		3	Cu
4/28/2017	A1 Anchorage	Mooring			50'		3	Cu
4/28/2017	A1 Anchorage	Mooring			53'		3	Cu
4/28/2017	A1 Anchorage	Mooring			54'		3	Cu
4/28/2017	A1 Anchorage	Mooring			60'		3	Cu
4/28/2017	A1 Anchorage	Mooring			62'		3	Cu
4/28/2017	A1 Anchorage	Mooring			46'		3	Cu
4/28/2017	A1 Anchorage	Mooring			32'		3	Cu
4/28/2017	A1 Anchorage	Mooring			50'		3	Cu
5/5/2017	A1 Anchorage	Mooring			25'		3	Cu
5/5/2017	A1 Anchorage	Mooring			27'		3	Cu
5/5/2017	A1 Anchorage	Mooring			28'		3	Cu
5/5/2017	A1 Anchorage	Mooring			30'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/5/2017	A1 Anchorage	Mooring			30'		3	Cu
5/5/2017	A1 Anchorage	Mooring			32'		3	Cu
5/5/2017	A1 Anchorage	Mooring			32'		3	Cu
5/5/2017	A1 Anchorage	Mooring			33'		3	Cu
5/5/2017	A1 Anchorage	Mooring			34'		3	Cu
5/5/2017	A1 Anchorage	Mooring			34'		3	Cu
5/5/2017	A1 Anchorage	Mooring			40'		3	Cu
5/5/2017	A1 Anchorage	Mooring			44'		3	Cu
5/5/2017	A1 Anchorage	Mooring			50'		3	Cu
5/5/2017	A1 Anchorage	Mooring			32'		3	Cu
5/12/2017	A1 Anchorage	Mooring			27'		3	Cu
5/12/2017	A1 Anchorage	Mooring			29'		3	Cu
5/12/2017	A1 Anchorage	Mooring			30'		3	Cu
5/12/2017	A1 Anchorage	Mooring			30'		3	Cu
5/12/2017	A1 Anchorage	Mooring			30'		3	Cu
5/12/2017	A1 Anchorage	Mooring			32'		3	Cu
5/12/2017	A1 Anchorage	Mooring			32'		3	Cu
5/12/2017	A1 Anchorage	Mooring			33'		3	Cu
5/12/2017	A1 Anchorage	Mooring			33'		3	Cu
5/12/2017	A1 Anchorage	Mooring			36'		3	Cu
5/12/2017	A1 Anchorage	Mooring			38'		3	Cu
5/12/2017	A1 Anchorage	Mooring			40'		3	Cu
5/12/2017	A1 Anchorage	Mooring			43'		3	Cu
5/16/2017	A1 Anchorage	Mooring			42'		3	Cu
5/19/2017	A1 Anchorage	Mooring			27'		3	Cu
5/19/2017	A1 Anchorage	Mooring			27'		3	Cu
5/19/2017	A1 Anchorage	Mooring			28'		3	Cu
5/19/2017	A1 Anchorage	Mooring			30'		3	Cu
5/19/2017	A1 Anchorage	Mooring			30'		3	Cu
5/19/2017	A1 Anchorage	Mooring			30'		3	Cu
5/19/2017	A1 Anchorage	Mooring			30'		3	Cu
5/19/2017	A1 Anchorage	Mooring			30'		3	Cu
5/19/2017	A1 Anchorage	Mooring			32'		3	Cu
5/19/2017	A1 Anchorage	Mooring			32'		3	Cu
5/19/2017	A1 Anchorage	Mooring			33'		3	Cu
5/19/2017	A1 Anchorage	Mooring			33'		3	Cu
5/19/2017	A1 Anchorage	Mooring			34'		3	Cu
5/19/2017	A1 Anchorage	Mooring			34'		3	Cu
5/19/2017	A1 Anchorage	Mooring			34'		3	Cu
5/19/2017	A1 Anchorage	Mooring			34'		3	Cu
5/19/2017	A1 Anchorage	Mooring			35'		3	Cu
5/19/2017	A1 Anchorage	Mooring			36'		3	Cu
5/19/2017	A1 Anchorage	Mooring			36'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/19/2017	A1 Anchorage	Mooring			37'		3	Cu
5/19/2017	A1 Anchorage	Mooring			38'		3	Cu
5/19/2017	A1 Anchorage	Mooring			38'		3	Cu
5/19/2017	A1 Anchorage	Mooring			40'		3	Cu
5/19/2017	A1 Anchorage	Mooring			43'		3	Cu
5/19/2017	A1 Anchorage	Mooring			43'		3	Cu
5/19/2017	A1 Anchorage	Mooring			44'		3	Cu
5/19/2017	A1 Anchorage	Mooring			45'		3	Cu
5/19/2017	A1 Anchorage	Mooring			45'		3	Cu
5/19/2017	A1 Anchorage	Mooring			46'		3	Cu
5/19/2017	A1 Anchorage	Mooring			49'		3	Cu
5/19/2017	A1 Anchorage	Mooring			49'		3	Cu
5/19/2017	A1 Anchorage	Mooring			49'		3	Cu
5/19/2017	A1 Anchorage	Mooring			50'		3	Cu
5/19/2017	A1 Anchorage	Mooring			54'		3	Cu
5/26/2017	A1 Anchorage	Mooring			25'		3	Cu
5/26/2017	A1 Anchorage	Mooring			30'		3	Cu
5/26/2017	A1 Anchorage	Mooring			30'		3	Cu
5/26/2017	A1 Anchorage	Mooring			32'		3	Cu
5/26/2017	A1 Anchorage	Mooring			33'		3	Cu
5/26/2017	A1 Anchorage	Mooring			34'		3	Cu
5/26/2017	A1 Anchorage	Mooring			34'		3	Cu
5/26/2017	A1 Anchorage	Mooring			34'		3	Cu
5/26/2017	A1 Anchorage	Mooring			36'		3	Cu
5/26/2017	A1 Anchorage	Mooring			36'		3	Cu
5/26/2017	A1 Anchorage	Mooring			37'		3	Cu
5/26/2017	A1 Anchorage	Mooring			37'		3	Cu
5/26/2017	A1 Anchorage	Mooring			37'		3	Cu
5/26/2017	A1 Anchorage	Mooring			37'		3	Cu
5/26/2017	A1 Anchorage	Mooring			39'		3	Cu
5/26/2017	A1 Anchorage	Mooring			40'		3	Cu
5/26/2017	A1 Anchorage	Mooring			40'		3	Cu
5/26/2017	A1 Anchorage	Mooring			40'		3	Cu
5/26/2017	A1 Anchorage	Mooring			40'		3	Cu
5/26/2017	A1 Anchorage	Mooring			41'		3	Cu
5/26/2017	A1 Anchorage	Mooring			42'		3	Cu
5/26/2017	A1 Anchorage	Mooring			42'		3	Cu
5/26/2017	A1 Anchorage	Mooring			43'		3	Cu
5/26/2017	A1 Anchorage	Mooring			43'		3	Cu
5/26/2017	A1 Anchorage	Mooring			43'		3	Cu
5/26/2017	A1 Anchorage	Mooring			44'		3	Cu
5/26/2017	A1 Anchorage	Mooring			47'		3	Cu
5/26/2017	A1 Anchorage	Mooring			47'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/26/2017	A1 Anchorage	Mooring			47'		3	Cu
5/26/2017	A1 Anchorage	Mooring			49'		3	Cu
5/26/2017	A1 Anchorage	Mooring			49'		3	Cu
5/26/2017	A1 Anchorage	Mooring			50'		3	Cu
5/26/2017	A1 Anchorage	Mooring			50'		3	Cu
5/26/2017	A1 Anchorage	Mooring			52'		3	Cu
5/26/2017	A1 Anchorage	Mooring			56'		3	Cu
5/26/2017	A1 Anchorage	Mooring			56'		3	Cu
5/26/2017	A1 Anchorage	Mooring			59'		3	Cu
5/26/2017	A1 Anchorage	Mooring			62'		3	Cu
5/26/2017	A1 Anchorage	Mooring					3	Cu
6/2/2017	A1 Anchorage	Mooring			27'		3	Cu
6/2/2017	A1 Anchorage	Mooring			27'		3	Cu
6/2/2017	A1 Anchorage	Mooring			29'		3	Cu
6/2/2017	A1 Anchorage	Mooring			30'		3	Cu
6/2/2017	A1 Anchorage	Mooring			30'		3	Cu
6/2/2017	A1 Anchorage	Mooring			33'		3	Cu
6/2/2017	A1 Anchorage	Mooring			34'		3	Cu
6/2/2017	A1 Anchorage	Mooring			34'		3	Cu
6/2/2017	A1 Anchorage	Mooring			34'		3	Cu
6/2/2017	A1 Anchorage	Mooring			34'		3	Cu
6/2/2017	A1 Anchorage	Mooring			35'		3	Cu
6/2/2017	A1 Anchorage	Mooring			36'		3	Cu
6/2/2017	A1 Anchorage	Mooring			36'		3	Cu
6/2/2017	A1 Anchorage	Mooring			37'		3	Cu
6/2/2017	A1 Anchorage	Mooring			38'		3	Cu
6/2/2017	A1 Anchorage	Mooring			38'		3	Cu
6/2/2017	A1 Anchorage	Mooring			39'		3	Cu
6/2/2017	A1 Anchorage	Mooring			40'		3	Cu
6/2/2017	A1 Anchorage	Mooring			41'		3	Cu
6/2/2017	A1 Anchorage	Mooring			41'		3	Cu
6/2/2017	A1 Anchorage	Mooring			42'		3	Cu
6/2/2017	A1 Anchorage	Mooring			42'		3	Cu
6/2/2017	A1 Anchorage	Mooring			43'		3	Cu
6/2/2017	A1 Anchorage	Mooring			47'		3	Cu
6/2/2017	A1 Anchorage	Mooring			48'		3	Cu
6/2/2017	A1 Anchorage	Mooring			60'		3	Cu
6/2/2017	A1 Anchorage	Mooring			32'		3	Cu
6/2/2017	A1 Anchorage	Mooring			27'		3	Cu
6/6/2017	A1 Anchorage	Mooring			36'		3	Cu
6/9/2017	A1 Anchorage	Mooring			25'		3	Cu
6/9/2017	A1 Anchorage	Mooring			27'		3	Cu
6/9/2017	A1 Anchorage	Mooring			28'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/9/2017	A1 Anchorage	Mooring			30'		3	Cu
6/9/2017	A1 Anchorage	Mooring			30'		3	Cu
6/9/2017	A1 Anchorage	Mooring			32'		3	Cu
6/9/2017	A1 Anchorage	Mooring			32'		3	Cu
6/9/2017	A1 Anchorage	Mooring			33'		3	Cu
6/9/2017	A1 Anchorage	Mooring			34'		3	Cu
6/9/2017	A1 Anchorage	Mooring			35'		3	Cu
6/9/2017	A1 Anchorage	Mooring			36'		3	Cu
6/9/2017	A1 Anchorage	Mooring			36'		3	Cu
6/9/2017	A1 Anchorage	Mooring			40'		3	Cu
6/9/2017	A1 Anchorage	Mooring			44'		3	Cu
6/9/2017	A1 Anchorage	Mooring			45'		3	Cu
6/9/2017	A1 Anchorage	Mooring			46'		3	Cu
6/9/2017	A1 Anchorage	Mooring			47'		3	Cu
6/9/2017	A1 Anchorage	Mooring			47'		3	Cu
6/9/2017	A1 Anchorage	Mooring			49'		3	Cu
6/9/2017	A1 Anchorage	Mooring			49'		3	Cu
6/9/2017	A1 Anchorage	Mooring			50'		3	Cu
6/9/2017	A1 Anchorage	Mooring			50'		3	Cu
6/13/2017	A1 Anchorage	Mooring			40'		3	Cu
6/16/2017	A1 Anchorage	Mooring			25'		3	Cu
6/16/2017	A1 Anchorage	Mooring			26'		3	Cu
6/16/2017	A1 Anchorage	Mooring			26'		3	Cu
6/16/2017	A1 Anchorage	Mooring			26'		3	Cu
6/16/2017	A1 Anchorage	Mooring			27'		3	Cu
6/16/2017	A1 Anchorage	Mooring			30'		3	Cu
6/16/2017	A1 Anchorage	Mooring			30'		3	Cu
6/16/2017	A1 Anchorage	Mooring			32'		3	Cu
6/16/2017	A1 Anchorage	Mooring			33'		3	Cu
6/16/2017	A1 Anchorage	Mooring			33'		3	Cu
6/16/2017	A1 Anchorage	Mooring			34'		3	Cu
6/16/2017	A1 Anchorage	Mooring			35'		3	Cu
6/16/2017	A1 Anchorage	Mooring			35'		3	Cu
6/16/2017	A1 Anchorage	Mooring			36'		3	Cu
6/16/2017	A1 Anchorage	Mooring			36'		3	Cu
6/16/2017	A1 Anchorage	Mooring			37'		3	Cu
6/16/2017	A1 Anchorage	Mooring			38'		3	Cu
6/16/2017	A1 Anchorage	Mooring			38'		3	Cu
6/16/2017	A1 Anchorage	Mooring			41'		3	Cu
6/16/2017	A1 Anchorage	Mooring			42'		3	Cu
6/16/2017	A1 Anchorage	Mooring			44'		3	Cu
6/16/2017	A1 Anchorage	Mooring			47'		3	Cu
6/16/2017	A1 Anchorage	Mooring			48'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/16/2017	A1 Anchorage	Mooring			49'		3	Cu
6/16/2017	A1 Anchorage	Mooring			50'		3	Cu
6/16/2017	A1 Anchorage	Mooring			50'		3	Cu
6/16/2017	A1 Anchorage	Mooring			50'		3	Cu
6/16/2017	A1 Anchorage	Mooring			42'		3	Cu
6/20/2017	A1 Anchorage	Mooring			41'		3	Cu
6/23/2017	A1 Anchorage	Mooring			26'		3	Cu
6/23/2017	A1 Anchorage	Mooring			27'		3	Cu
6/23/2017	A1 Anchorage	Mooring			27'		3	Cu
6/23/2017	A1 Anchorage	Mooring			30'		3	Cu
6/23/2017	A1 Anchorage	Mooring			32'		3	Cu
6/23/2017	A1 Anchorage	Mooring			32'		3	Cu
6/23/2017	A1 Anchorage	Mooring			32'		3	Cu
6/23/2017	A1 Anchorage	Mooring			35'		3	Cu
6/23/2017	A1 Anchorage	Mooring			36'		3	Cu
6/23/2017	A1 Anchorage	Mooring			37'		3	Cu
6/23/2017	A1 Anchorage	Mooring			37'		3	Cu
6/23/2017	A1 Anchorage	Mooring			37'		3	Cu
6/23/2017	A1 Anchorage	Mooring			37'		3	Cu
6/23/2017	A1 Anchorage	Mooring			37'		3	Cu
6/23/2017	A1 Anchorage	Mooring			40'		3	Cu
6/23/2017	A1 Anchorage	Mooring			40'		3	Cu
6/23/2017	A1 Anchorage	Mooring			40'		3	Cu
6/23/2017	A1 Anchorage	Mooring			41'		3	Cu
6/23/2017	A1 Anchorage	Mooring			45'		3	Cu
6/23/2017	A1 Anchorage	Mooring			46'		3	Cu
6/23/2017	A1 Anchorage	Mooring			46'		3	Cu
6/23/2017	A1 Anchorage	Mooring			50'		3	Cu
6/23/2017	A1 Anchorage	Mooring			50'		3	Cu
6/23/2017	A1 Anchorage	Mooring			50'		3	Cu
6/23/2017	A1 Anchorage	Mooring			59'		3	Cu
6/23/2017	A1 Anchorage	Mooring			60'		3	Cu
6/30/2017	A1 Anchorage	Mooring			24'		3	Cu
6/30/2017	A1 Anchorage	Mooring			27'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			30'		3	Cu
6/30/2017	A1 Anchorage	Mooring			31'		3	Cu
6/30/2017	A1 Anchorage	Mooring			31'		3	Cu
6/30/2017	A1 Anchorage	Mooring			32'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/30/2017	A1 Anchorage	Mooring			34'		3	Cu
6/30/2017	A1 Anchorage	Mooring			34'		3	Cu
6/30/2017	A1 Anchorage	Mooring			35'		3	Cu
6/30/2017	A1 Anchorage	Mooring			36'		3	Cu
6/30/2017	A1 Anchorage	Mooring			38'		3	Cu
6/30/2017	A1 Anchorage	Mooring			38'		3	Cu
6/30/2017	A1 Anchorage	Mooring			40'		3	Cu
6/30/2017	A1 Anchorage	Mooring			41'		3	Cu
6/30/2017	A1 Anchorage	Mooring			41'		3	Cu
6/30/2017	A1 Anchorage	Mooring			42'		3	Cu
6/30/2017	A1 Anchorage	Mooring			42'		3	Cu
6/30/2017	A1 Anchorage	Mooring			42'		3	Cu
6/30/2017	A1 Anchorage	Mooring			44'		3	Cu
6/30/2017	A1 Anchorage	Mooring			47'		3	Cu
6/30/2017	A1 Anchorage	Mooring			47'		3	Cu
6/30/2017	A1 Anchorage	Mooring			47'		3	Cu
6/30/2017	A1 Anchorage	Mooring			48'		3	Cu
6/30/2017	A1 Anchorage	Mooring			49'		3	Cu
6/30/2017	A1 Anchorage	Mooring			49'		3	Cu
6/30/2017	A1 Anchorage	Mooring			49'		3	Cu
6/30/2017	A1 Anchorage	Mooring			49'		3	Cu
6/30/2017	A1 Anchorage	Mooring			50'		3	Cu
6/30/2017	A1 Anchorage	Mooring			50'		3	Cu
6/30/2017	A1 Anchorage	Mooring			53'		3	Cu
6/30/2017	A1 Anchorage	Mooring			56'		3	Cu
6/30/2017	A1 Anchorage	Mooring			62'		3	Cu
6/30/2017	A1 Anchorage	Mooring			45'		3	Cu
6/30/2017	A1 Anchorage	Mooring			25'		3	Cu
6/30/2017	A1 Anchorage	Mooring			42'		3	Cu
7/7/2017	A1 Anchorage	Mooring			27'		3	Cu
7/7/2017	A1 Anchorage	Mooring			27'		3	Cu
7/7/2017	A1 Anchorage	Mooring			30'		3	Cu
7/7/2017	A1 Anchorage	Mooring			30'		3	Cu
7/7/2017	A1 Anchorage	Mooring			32'		3	Cu
7/7/2017	A1 Anchorage	Mooring			33'		3	Cu
7/7/2017	A1 Anchorage	Mooring			33'		3	Cu
7/7/2017	A1 Anchorage	Mooring			34'		3	Cu
7/7/2017	A1 Anchorage	Mooring			34'		3	Cu
7/7/2017	A1 Anchorage	Mooring			36'		3	Cu
7/7/2017	A1 Anchorage	Mooring			37'		3	Cu
7/7/2017	A1 Anchorage	Mooring			38'		3	Cu
7/7/2017	A1 Anchorage	Mooring			38'		3	Cu
7/7/2017	A1 Anchorage	Mooring			39'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/7/2017	A1 Anchorage	Mooring			40'		3	Cu
7/7/2017	A1 Anchorage	Mooring			40'		3	Cu
7/7/2017	A1 Anchorage	Mooring			41'		3	Cu
7/7/2017	A1 Anchorage	Mooring			41'		3	Cu
7/7/2017	A1 Anchorage	Mooring			42'		3	Cu
7/7/2017	A1 Anchorage	Mooring			42'		3	Cu
7/7/2017	A1 Anchorage	Mooring			44'		3	Cu
7/7/2017	A1 Anchorage	Mooring			46'		3	Cu
7/7/2017	A1 Anchorage	Mooring			46'		3	Cu
7/7/2017	A1 Anchorage	Mooring			48'		3	Cu
7/7/2017	A1 Anchorage	Mooring			49'		3	Cu
7/7/2017	A1 Anchorage	Mooring			50'		3	Cu
7/7/2017	A1 Anchorage	Mooring			50'		3	Cu
7/7/2017	A1 Anchorage	Mooring			50'		3	Cu
7/11/2017	A1 Anchorage	Mooring			40'		3	Cu
7/14/2017	A1 Anchorage	Mooring			22'		3	Cu
7/14/2017	A1 Anchorage	Mooring			26'		3	Cu
7/14/2017	A1 Anchorage	Mooring			26'		3	Cu
7/14/2017	A1 Anchorage	Mooring			27'		3	Cu
7/14/2017	A1 Anchorage	Mooring			27'		3	Cu
7/14/2017	A1 Anchorage	Mooring			29'		3	Cu
7/14/2017	A1 Anchorage	Mooring			30'		3	Cu
7/14/2017	A1 Anchorage	Mooring			30'		3	Cu
7/14/2017	A1 Anchorage	Mooring			32'		3	Cu
7/14/2017	A1 Anchorage	Mooring			32'		3	Cu
7/14/2017	A1 Anchorage	Mooring			32'		3	Cu
7/14/2017	A1 Anchorage	Mooring			32'		3	Cu
7/14/2017	A1 Anchorage	Mooring			33'		3	Cu
7/14/2017	A1 Anchorage	Mooring			33'		3	Cu
7/14/2017	A1 Anchorage	Mooring			34'		3	Cu
7/14/2017	A1 Anchorage	Mooring			34'		3	Cu
7/14/2017	A1 Anchorage	Mooring			35'		3	Cu
7/14/2017	A1 Anchorage	Mooring			36'		3	Cu
7/14/2017	A1 Anchorage	Mooring			36'		3	Cu
7/14/2017	A1 Anchorage	Mooring			37'		3	Cu
7/14/2017	A1 Anchorage	Mooring			40'		3	Cu
7/14/2017	A1 Anchorage	Mooring			40'		3	Cu
7/14/2017	A1 Anchorage	Mooring			40'		3	Cu
7/14/2017	A1 Anchorage	Mooring			41'		3	Cu
7/14/2017	A1 Anchorage	Mooring			41'		3	Cu
7/14/2017	A1 Anchorage	Mooring			42'		3	Cu
7/14/2017	A1 Anchorage	Mooring			43'		3	Cu
7/14/2017	A1 Anchorage	Mooring			44'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/14/2017	A1 Anchorage	Mooring			44'		3	Cu
7/14/2017	A1 Anchorage	Mooring			46'		3	Cu
7/14/2017	A1 Anchorage	Mooring			47'		3	Cu
7/14/2017	A1 Anchorage	Mooring			47'		3	Cu
7/14/2017	A1 Anchorage	Mooring			49'		3	Cu
7/14/2017	A1 Anchorage	Mooring			49'		3	Cu
7/14/2017	A1 Anchorage	Mooring			50'		3	Cu
7/14/2017	A1 Anchorage	Mooring			50'		3	Cu
7/14/2017	A1 Anchorage	Mooring			50'		3	Cu
7/14/2017	A1 Anchorage	Mooring			52'		3	Cu
7/14/2017	A1 Anchorage	Mooring			56'		3	Cu
7/18/2017	A1 Anchorage	Mooring			42'		3	Cu
7/21/2017	A1 Anchorage	Mooring			26'		3	Cu
7/21/2017	A1 Anchorage	Mooring			27'		3	Cu
7/21/2017	A1 Anchorage	Mooring			27'		3	Cu
7/21/2017	A1 Anchorage	Mooring			30'		3	Cu
7/21/2017	A1 Anchorage	Mooring			30'		3	Cu
7/21/2017	A1 Anchorage	Mooring			30'		3	Cu
7/21/2017	A1 Anchorage	Mooring			30'		3	Cu
7/21/2017	A1 Anchorage	Mooring			30'		3	Cu
7/21/2017	A1 Anchorage	Mooring			32'		3	Cu
7/21/2017	A1 Anchorage	Mooring			32'		3	Cu
7/21/2017	A1 Anchorage	Mooring			32'		3	Cu
7/21/2017	A1 Anchorage	Mooring			32'		3	Cu
7/21/2017	A1 Anchorage	Mooring			35'		3	Cu
7/21/2017	A1 Anchorage	Mooring			35'		3	Cu
7/21/2017	A1 Anchorage	Mooring			36'		3	Cu
7/21/2017	A1 Anchorage	Mooring			36'		3	Cu
7/21/2017	A1 Anchorage	Mooring			37'		3	Cu
7/21/2017	A1 Anchorage	Mooring			37'		3	Cu
7/21/2017	A1 Anchorage	Mooring			38'		3	Cu
7/21/2017	A1 Anchorage	Mooring			40'		3	Cu
7/21/2017	A1 Anchorage	Mooring			40'		3	Cu
7/21/2017	A1 Anchorage	Mooring			41'		3	Cu
7/21/2017	A1 Anchorage	Mooring			42'		3	Cu
7/21/2017	A1 Anchorage	Mooring			42'		3	Cu
7/21/2017	A1 Anchorage	Mooring			44'		3	Cu
7/21/2017	A1 Anchorage	Mooring			46'		3	Cu
7/21/2017	A1 Anchorage	Mooring			47'		3	Cu
7/21/2017	A1 Anchorage	Mooring			49'		3	Cu
7/21/2017	A1 Anchorage	Mooring			50'		3	Cu
7/21/2017	A1 Anchorage	Mooring			50'		3	Cu
7/21/2017	A1 Anchorage	Mooring			56'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/21/2017	A1 Anchorage	Mooring			60'		3	Cu
7/21/2017	A1 Anchorage	Mooring			65'		3	Cu
7/25/2017	A1 Anchorage	Mooring			43'		3	Cu
7/28/2017	A1 Anchorage	Mooring			25'		3	Cu
7/28/2017	A1 Anchorage	Mooring			27'		3	Cu
7/28/2017	A1 Anchorage	Mooring			27'		3	Cu
7/28/2017	A1 Anchorage	Mooring			30'		3	Cu
7/28/2017	A1 Anchorage	Mooring			30'		3	Cu
7/28/2017	A1 Anchorage	Mooring			30'		3	Cu
7/28/2017	A1 Anchorage	Mooring			31'		3	Cu
7/28/2017	A1 Anchorage	Mooring			31'		3	Cu
7/28/2017	A1 Anchorage	Mooring			32'		3	Cu
7/28/2017	A1 Anchorage	Mooring			34'		3	Cu
7/28/2017	A1 Anchorage	Mooring			35'		3	Cu
7/28/2017	A1 Anchorage	Mooring			35'		3	Cu
7/28/2017	A1 Anchorage	Mooring			35'		3	Cu
7/28/2017	A1 Anchorage	Mooring			36'		3	Cu
7/28/2017	A1 Anchorage	Mooring			36'		3	Cu
7/28/2017	A1 Anchorage	Mooring			37'		3	Cu
7/28/2017	A1 Anchorage	Mooring			38'		3	Cu
7/28/2017	A1 Anchorage	Mooring			40'		3	Cu
7/28/2017	A1 Anchorage	Mooring			40'		3	Cu
7/28/2017	A1 Anchorage	Mooring			41'		3	Cu
7/28/2017	A1 Anchorage	Mooring			42'		3	Cu
7/28/2017	A1 Anchorage	Mooring			42'		3	Cu
7/28/2017	A1 Anchorage	Mooring			42'		3	Cu
7/28/2017	A1 Anchorage	Mooring			42'		3	Cu
7/28/2017	A1 Anchorage	Mooring			42'		3	Cu
7/28/2017	A1 Anchorage	Mooring			44'		3	Cu
7/28/2017	A1 Anchorage	Mooring			46'		3	Cu
7/28/2017	A1 Anchorage	Mooring			46'		3	Cu
7/28/2017	A1 Anchorage	Mooring			47'		3	Cu
7/28/2017	A1 Anchorage	Mooring			48'		3	Cu
7/28/2017	A1 Anchorage	Mooring			49'		3	Cu
7/28/2017	A1 Anchorage	Mooring			50'		3	Cu
7/28/2017	A1 Anchorage	Mooring			50'		3	Cu
7/28/2017	A1 Anchorage	Mooring			50'		3	Cu
8/4/2017	A1 Anchorage	Mooring			27'		3	Cu
8/4/2017	A1 Anchorage	Mooring			28'		3	Cu
8/4/2017	A1 Anchorage	Mooring			30'		3	Cu
8/4/2017	A1 Anchorage	Mooring			30'		3	Cu
8/4/2017	A1 Anchorage	Mooring			32'		3	Cu
8/4/2017	A1 Anchorage	Mooring			33'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/4/2017	A1 Anchorage	Mooring			33'		3	Cu
8/4/2017	A1 Anchorage	Mooring			33'		3	Cu
8/4/2017	A1 Anchorage	Mooring			34'		3	Cu
8/4/2017	A1 Anchorage	Mooring			34'		3	Cu
8/4/2017	A1 Anchorage	Mooring			34'		3	Cu
8/4/2017	A1 Anchorage	Mooring			35'		3	Cu
8/4/2017	A1 Anchorage	Mooring			35'		3	Cu
8/4/2017	A1 Anchorage	Mooring			35'		3	Cu
8/4/2017	A1 Anchorage	Mooring			36'		3	Cu
8/4/2017	A1 Anchorage	Mooring			37'		3	Cu
8/4/2017	A1 Anchorage	Mooring			38'		3	Cu
8/4/2017	A1 Anchorage	Mooring			40'		3	Cu
8/4/2017	A1 Anchorage	Mooring			40'		3	Cu
8/4/2017	A1 Anchorage	Mooring			42'		3	Cu
8/4/2017	A1 Anchorage	Mooring			42'		3	Cu
8/4/2017	A1 Anchorage	Mooring			43'		3	Cu
8/4/2017	A1 Anchorage	Mooring			43'		3	Cu
8/4/2017	A1 Anchorage	Mooring			43'		3	Cu
8/4/2017	A1 Anchorage	Mooring			46'		3	Cu
8/4/2017	A1 Anchorage	Mooring			46'		3	Cu
8/4/2017	A1 Anchorage	Mooring			47'		3	Cu
8/4/2017	A1 Anchorage	Mooring			47'		3	Cu
8/4/2017	A1 Anchorage	Mooring			49'		3	Cu
8/4/2017	A1 Anchorage	Mooring			50'		3	Cu
8/4/2017	A1 Anchorage	Mooring			57'		3	Cu
8/4/2017	A1 Anchorage	Mooring			32'		3	Cu
8/4/2017	A1 Anchorage	Mooring			48'		3	Cu
8/4/2017	A1 Anchorage	Mooring			27'		3	Cu
8/8/2017	A1 Anchorage	Mooring			40'		3	Cu
8/11/2017	A1 Anchorage	Mooring			26'		3	Cu
8/11/2017	A1 Anchorage	Mooring			28'		3	Cu
8/11/2017	A1 Anchorage	Mooring			29'		3	Cu
8/11/2017	A1 Anchorage	Mooring			30'		3	Cu
8/11/2017	A1 Anchorage	Mooring			30'		3	Cu
8/11/2017	A1 Anchorage	Mooring			30'		3	Cu
8/11/2017	A1 Anchorage	Mooring			30'		3	Cu
8/11/2017	A1 Anchorage	Mooring			32'		3	Cu
8/11/2017	A1 Anchorage	Mooring			32'		3	Cu
8/11/2017	A1 Anchorage	Mooring			32'		3	Cu
8/11/2017	A1 Anchorage	Mooring			34'		3	Cu
8/11/2017	A1 Anchorage	Mooring			34'		3	Cu
8/11/2017	A1 Anchorage	Mooring			35'		3	Cu
8/11/2017	A1 Anchorage	Mooring			35'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/11/2017	A1 Anchorage	Mooring			35'		3	Cu
8/11/2017	A1 Anchorage	Mooring			35'		3	Cu
8/11/2017	A1 Anchorage	Mooring			36'		3	Cu
8/11/2017	A1 Anchorage	Mooring			36'		3	Cu
8/11/2017	A1 Anchorage	Mooring			36'		3	Cu
8/11/2017	A1 Anchorage	Mooring			36'		3	Cu
8/11/2017	A1 Anchorage	Mooring			36'		3	Cu
8/11/2017	A1 Anchorage	Mooring			37'		3	Cu
8/11/2017	A1 Anchorage	Mooring			38'		3	Cu
8/11/2017	A1 Anchorage	Mooring			38'		3	Cu
8/11/2017	A1 Anchorage	Mooring			40'		3	Cu
8/11/2017	A1 Anchorage	Mooring			40'		3	Cu
8/11/2017	A1 Anchorage	Mooring			40'		3	Cu
8/11/2017	A1 Anchorage	Mooring			40'		3	Cu
8/11/2017	A1 Anchorage	Mooring			42'		3	Cu
8/11/2017	A1 Anchorage	Mooring			42'		3	Cu
8/11/2017	A1 Anchorage	Mooring			46'		3	Cu
8/11/2017	A1 Anchorage	Mooring			48'		3	Cu
8/11/2017	A1 Anchorage	Mooring			48'		3	Cu
8/11/2017	A1 Anchorage	Mooring			49'		3	Cu
8/11/2017	A1 Anchorage	Mooring			53'		3	Cu
8/11/2017	A1 Anchorage	Mooring			54'		3	Cu
8/11/2017	A1 Anchorage	Mooring			55'		3	Cu
8/11/2017	A1 Anchorage	Mooring			60'		3	Cu
8/15/2017	A1 Anchorage	Mooring			27'		3	Cu
8/18/2017	A1 Anchorage	Mooring			25'		3	Cu
8/18/2017	A1 Anchorage	Mooring			25'		3	Cu
8/18/2017	A1 Anchorage	Mooring			27'		3	Cu
8/18/2017	A1 Anchorage	Mooring			27'		3	Cu
8/18/2017	A1 Anchorage	Mooring			27'		3	Cu
8/18/2017	A1 Anchorage	Mooring			28'		3	Cu
8/18/2017	A1 Anchorage	Mooring			28'		3	Cu
8/18/2017	A1 Anchorage	Mooring			30'		3	Cu
8/18/2017	A1 Anchorage	Mooring			30'		3	Cu
8/18/2017	A1 Anchorage	Mooring			30'		3	Cu
8/18/2017	A1 Anchorage	Mooring			30'		3	Cu
8/18/2017	A1 Anchorage	Mooring			30'		3	Cu
8/18/2017	A1 Anchorage	Mooring			32'		3	Cu
8/18/2017	A1 Anchorage	Mooring			33'		3	Cu
8/18/2017	A1 Anchorage	Mooring			33'		3	Cu
8/18/2017	A1 Anchorage	Mooring			34'		3	Cu
8/18/2017	A1 Anchorage	Mooring			34'		3	Cu
8/18/2017	A1 Anchorage	Mooring			35'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/18/2017	A1 Anchorage	Mooring			35'		3	Cu
8/18/2017	A1 Anchorage	Mooring			37'		3	Cu
8/18/2017	A1 Anchorage	Mooring			37'		3	Cu
8/18/2017	A1 Anchorage	Mooring			38'		3	Cu
8/18/2017	A1 Anchorage	Mooring			38'		3	Cu
8/18/2017	A1 Anchorage	Mooring			40'		3	Cu
8/18/2017	A1 Anchorage	Mooring			40'		3	Cu
8/18/2017	A1 Anchorage	Mooring			40'		3	Cu
8/18/2017	A1 Anchorage	Mooring			42'		3	Cu
8/18/2017	A1 Anchorage	Mooring			42'		3	Cu
8/18/2017	A1 Anchorage	Mooring			46'		3	Cu
8/18/2017	A1 Anchorage	Mooring			46'		3	Cu
8/18/2017	A1 Anchorage	Mooring			47'		3	Cu
8/18/2017	A1 Anchorage	Mooring			53'		3	Cu
8/18/2017	A1 Anchorage	Mooring			56'		3	Cu
8/18/2017	A1 Anchorage	Mooring			57'		3	Cu
8/18/2017	A1 Anchorage	Mooring			60'		3	Cu
8/22/2017	A1 Anchorage	Mooring			64'		3	Cu
8/25/2017	A1 Anchorage	Mooring			32'		3	Cu
8/25/2017	A1 Anchorage	Mooring			21'		3	Cu
8/25/2017	A1 Anchorage	Mooring			25'		3	Cu
8/25/2017	A1 Anchorage	Mooring			27'		3	Cu
8/25/2017	A1 Anchorage	Mooring			27'		3	Cu
8/25/2017	A1 Anchorage	Mooring			27'		3	Cu
8/25/2017	A1 Anchorage	Mooring			28'		3	Cu
8/25/2017	A1 Anchorage	Mooring			30'		3	Cu
8/25/2017	A1 Anchorage	Mooring			30'		3	Cu
8/25/2017	A1 Anchorage	Mooring			30'		3	Cu
8/25/2017	A1 Anchorage	Mooring			32'		3	Cu
8/25/2017	A1 Anchorage	Mooring			33'		3	Cu
8/25/2017	A1 Anchorage	Mooring			33'		3	Cu
8/25/2017	A1 Anchorage	Mooring			33'		3	Cu
8/25/2017	A1 Anchorage	Mooring			33'		3	Cu
8/25/2017	A1 Anchorage	Mooring			35'		3	Cu
8/25/2017	A1 Anchorage	Mooring			35'		3	Cu
8/25/2017	A1 Anchorage	Mooring			37'		3	Cu
8/25/2017	A1 Anchorage	Mooring			37'		3	Cu
8/25/2017	A1 Anchorage	Mooring			38'		3	Cu
8/25/2017	A1 Anchorage	Mooring			38'		3	Cu
8/25/2017	A1 Anchorage	Mooring			38'		3	Cu
8/25/2017	A1 Anchorage	Mooring			38'		3	Cu
8/25/2017	A1 Anchorage	Mooring			38'		3	Cu
8/25/2017	A1 Anchorage	Mooring			40'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/25/2017	A1 Anchorage	Mooring			44'		3	Cu
8/25/2017	A1 Anchorage	Mooring			44'		3	Cu
8/25/2017	A1 Anchorage	Mooring			47'		3	Cu
8/25/2017	A1 Anchorage	Mooring			48'		3	Cu
8/25/2017	A1 Anchorage	Mooring			50'		3	Cu
8/25/2017	A1 Anchorage	Mooring			50'		3	Cu
8/25/2017	A1 Anchorage	Mooring			52'		3	Cu
8/25/2017	A1 Anchorage	Mooring			54'		3	Cu
8/25/2017	A1 Anchorage	Mooring			60'		3	Cu
8/25/2017	A1 Anchorage	Mooring			60'		3	Cu
8/25/2017	A1 Anchorage	Mooring			62'		3	Cu
8/25/2017	A1 Anchorage	Mooring			63'		3	Cu
8/25/2017	A1 Anchorage	Mooring			64'		3	Cu
8/25/2017	A1 Anchorage	Mooring			64'		3	Cu
8/25/2017	A1 Anchorage	Mooring			65'		3	Cu
9/1/2017	A1 Anchorage	Mooring					3	Cu
9/1/2017	A1 Anchorage	Mooring			21'		3	Cu
9/1/2017	A1 Anchorage	Mooring			21'		3	Cu
9/1/2017	A1 Anchorage	Mooring			25'		3	Cu
9/1/2017	A1 Anchorage	Mooring			26'		3	Cu
9/1/2017	A1 Anchorage	Mooring			27'		3	Cu
9/1/2017	A1 Anchorage	Mooring			30'		3	Cu
9/1/2017	A1 Anchorage	Mooring			30'		3	Cu
9/1/2017	A1 Anchorage	Mooring			30'		3	Cu
9/1/2017	A1 Anchorage	Mooring			33'		3	Cu
9/1/2017	A1 Anchorage	Mooring			34'		3	Cu
9/1/2017	A1 Anchorage	Mooring			35'		3	Cu
9/1/2017	A1 Anchorage	Mooring			36'		3	Cu
9/1/2017	A1 Anchorage	Mooring			36'		3	Cu
9/1/2017	A1 Anchorage	Mooring			36'		3	Cu
9/1/2017	A1 Anchorage	Mooring			37'		3	Cu
9/1/2017	A1 Anchorage	Mooring			38'		3	Cu
9/1/2017	A1 Anchorage	Mooring			38'		3	Cu
9/1/2017	A1 Anchorage	Mooring			38'		3	Cu
9/1/2017	A1 Anchorage	Mooring			40'		3	Cu
9/1/2017	A1 Anchorage	Mooring			40'		3	Cu
9/1/2017	A1 Anchorage	Mooring			40'		3	Cu
9/1/2017	A1 Anchorage	Mooring			41'		3	Cu
9/1/2017	A1 Anchorage	Mooring			42'		3	Cu
9/1/2017	A1 Anchorage	Mooring			42'		3	Cu
9/1/2017	A1 Anchorage	Mooring			42'		3	Cu
9/1/2017	A1 Anchorage	Mooring			47'		3	Cu
9/1/2017	A1 Anchorage	Mooring			48'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/1/2017	A1 Anchorage	Mooring			49'		3	Cu
9/1/2017	A1 Anchorage	Mooring			49'		3	Cu
9/1/2017	A1 Anchorage	Mooring			50'		3	Cu
9/1/2017	A1 Anchorage	Mooring			50'		3	Cu
9/1/2017	A1 Anchorage	Mooring			53'		3	Cu
9/1/2017	A1 Anchorage	Mooring			56'		3	Cu
9/1/2017	A1 Anchorage	Mooring			56'		3	Cu
9/1/2017	A1 Anchorage	Mooring			56'		3	Cu
9/1/2017	A1 Anchorage	Mooring			48'		3	Cu
9/8/2017	A1 Anchorage	Mooring			28'		3	Cu
9/8/2017	A1 Anchorage	Mooring			25'		3	Cu
9/8/2017	A1 Anchorage	Mooring			27'		3	Cu
9/8/2017	A1 Anchorage	Mooring			27'		3	Cu
9/8/2017	A1 Anchorage	Mooring			27'		3	Cu
9/8/2017	A1 Anchorage	Mooring			28'		3	Cu
9/8/2017	A1 Anchorage	Mooring			29'		3	Cu
9/8/2017	A1 Anchorage	Mooring			30'		3	Cu
9/8/2017	A1 Anchorage	Mooring			30'		3	Cu
9/8/2017	A1 Anchorage	Mooring			30'		3	Cu
9/8/2017	A1 Anchorage	Mooring			33'		3	Cu
9/8/2017	A1 Anchorage	Mooring			34'		3	Cu
9/8/2017	A1 Anchorage	Mooring			35'		3	Cu
9/8/2017	A1 Anchorage	Mooring			35'		3	Cu
9/8/2017	A1 Anchorage	Mooring			36'		3	Cu
9/8/2017	A1 Anchorage	Mooring			36'		3	Cu
9/8/2017	A1 Anchorage	Mooring			38'		3	Cu
9/8/2017	A1 Anchorage	Mooring			38'		3	Cu
9/8/2017	A1 Anchorage	Mooring			40'		3	Cu
9/8/2017	A1 Anchorage	Mooring			41'		3	Cu
9/8/2017	A1 Anchorage	Mooring			41'		3	Cu
9/8/2017	A1 Anchorage	Mooring			42'		3	Cu
9/8/2017	A1 Anchorage	Mooring			43'		3	Cu
9/8/2017	A1 Anchorage	Mooring			44'		3	Cu
9/8/2017	A1 Anchorage	Mooring			46'		3	Cu
9/8/2017	A1 Anchorage	Mooring			47'		3	Cu
9/8/2017	A1 Anchorage	Mooring			48'		3	Cu
9/8/2017	A1 Anchorage	Mooring			50'		3	Cu
9/8/2017	A1 Anchorage	Mooring			54'		3	Cu
9/8/2017	A1 Anchorage	Mooring			28'		3	Cu
9/8/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring					3	Cu
9/15/2017	A1 Anchorage	Mooring			27'		3	Cu
9/15/2017	A1 Anchorage	Mooring			28'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/15/2017	A1 Anchorage	Mooring			30'		3	Cu
9/15/2017	A1 Anchorage	Mooring			30'		3	Cu
9/15/2017	A1 Anchorage	Mooring			30'		3	Cu
9/15/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring			33'		3	Cu
9/15/2017	A1 Anchorage	Mooring			33'		3	Cu
9/15/2017	A1 Anchorage	Mooring			33'		3	Cu
9/15/2017	A1 Anchorage	Mooring			33'		3	Cu
9/15/2017	A1 Anchorage	Mooring			33'		3	Cu
9/15/2017	A1 Anchorage	Mooring			34'		3	Cu
9/15/2017	A1 Anchorage	Mooring			34'		3	Cu
9/15/2017	A1 Anchorage	Mooring			34'		3	Cu
9/15/2017	A1 Anchorage	Mooring			35'		3	Cu
9/15/2017	A1 Anchorage	Mooring			35'		3	Cu
9/15/2017	A1 Anchorage	Mooring			35'		3	Cu
9/15/2017	A1 Anchorage	Mooring			36'		3	Cu
9/15/2017	A1 Anchorage	Mooring			37'		3	Cu
9/15/2017	A1 Anchorage	Mooring			37'		3	Cu
9/15/2017	A1 Anchorage	Mooring			38'		3	Cu
9/15/2017	A1 Anchorage	Mooring			38'		3	Cu
9/15/2017	A1 Anchorage	Mooring			38'		3	Cu
9/15/2017	A1 Anchorage	Mooring			40'		3	Cu
9/15/2017	A1 Anchorage	Mooring			40'		3	Cu
9/15/2017	A1 Anchorage	Mooring			40'		3	Cu
9/15/2017	A1 Anchorage	Mooring			43'		3	Cu
9/15/2017	A1 Anchorage	Mooring			43'		3	Cu
9/15/2017	A1 Anchorage	Mooring			45'		3	Cu
9/15/2017	A1 Anchorage	Mooring			47'		3	Cu
9/15/2017	A1 Anchorage	Mooring			47'		3	Cu
9/15/2017	A1 Anchorage	Mooring			48'		3	Cu
9/15/2017	A1 Anchorage	Mooring			28'		3	Cu
9/15/2017	A1 Anchorage	Mooring			32'		3	Cu
9/15/2017	A1 Anchorage	Mooring			58'		3	Cu
9/15/2017	A1 Anchorage	Mooring			27'		3	Cu
9/22/2017	A1 Anchorage	Mooring			26'		3	Cu
9/22/2017	A1 Anchorage	Mooring			27'		3	Cu
9/22/2017	A1 Anchorage	Mooring			27'		3	Cu
9/22/2017	A1 Anchorage	Mooring			28'		3	Cu
9/22/2017	A1 Anchorage	Mooring			28'		3	Cu
9/22/2017	A1 Anchorage	Mooring			30'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/22/2017	A1 Anchorage	Mooring			30'		3	Cu
9/22/2017	A1 Anchorage	Mooring			30'		3	Cu
9/22/2017	A1 Anchorage	Mooring			30'		3	Cu
9/22/2017	A1 Anchorage	Mooring			30'		3	Cu
9/22/2017	A1 Anchorage	Mooring			32'		3	Cu
9/22/2017	A1 Anchorage	Mooring			32'		3	Cu
9/22/2017	A1 Anchorage	Mooring			33'		3	Cu
9/22/2017	A1 Anchorage	Mooring			33'		3	Cu
9/22/2017	A1 Anchorage	Mooring			34'		3	Cu
9/22/2017	A1 Anchorage	Mooring			34'		3	Cu
9/22/2017	A1 Anchorage	Mooring			35'		3	Cu
9/22/2017	A1 Anchorage	Mooring			35'		3	Cu
9/22/2017	A1 Anchorage	Mooring			36'		3	Cu
9/22/2017	A1 Anchorage	Mooring			36'		3	Cu
9/22/2017	A1 Anchorage	Mooring			36'		3	Cu
9/22/2017	A1 Anchorage	Mooring			37'		3	Cu
9/22/2017	A1 Anchorage	Mooring			37'		3	Cu
9/22/2017	A1 Anchorage	Mooring			38'		3	Cu
9/22/2017	A1 Anchorage	Mooring			40'		3	Cu
9/22/2017	A1 Anchorage	Mooring			40'		3	Cu
9/22/2017	A1 Anchorage	Mooring			41'		3	Cu
9/22/2017	A1 Anchorage	Mooring			42'		3	Cu
9/22/2017	A1 Anchorage	Mooring			43'		3	Cu
9/22/2017	A1 Anchorage	Mooring			43'		3	Cu
9/22/2017	A1 Anchorage	Mooring			43'		3	Cu
9/22/2017	A1 Anchorage	Mooring			44'		3	Cu
9/22/2017	A1 Anchorage	Mooring			46'		3	Cu
9/22/2017	A1 Anchorage	Mooring			47'		3	Cu
9/22/2017	A1 Anchorage	Mooring			47'		3	Cu
9/22/2017	A1 Anchorage	Mooring			50'		3	Cu
9/22/2017	A1 Anchorage	Mooring			64'		3	Cu
9/22/2017	A1 Anchorage	Mooring			32'		3	Cu
9/22/2017	A1 Anchorage	Mooring			58'		3	Cu
9/22/2017	A1 Anchorage	Mooring			27'		3	Cu
9/29/2017	A1 Anchorage	Mooring			27'		3	Cu
9/29/2017	A1 Anchorage	Mooring			27'		3	Cu
9/29/2017	A1 Anchorage	Mooring			28'		3	Cu
9/29/2017	A1 Anchorage	Mooring			29'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			30'		3	Cu
9/29/2017	A1 Anchorage	Mooring			32'		3	Cu
9/29/2017	A1 Anchorage	Mooring			32'		3	Cu
9/29/2017	A1 Anchorage	Mooring			33'		3	Cu
9/29/2017	A1 Anchorage	Mooring			33'		3	Cu
9/29/2017	A1 Anchorage	Mooring			34'		3	Cu
9/29/2017	A1 Anchorage	Mooring			34'		3	Cu
9/29/2017	A1 Anchorage	Mooring			35'		3	Cu
9/29/2017	A1 Anchorage	Mooring			35'		3	Cu
9/29/2017	A1 Anchorage	Mooring			36'		3	Cu
9/29/2017	A1 Anchorage	Mooring			36'		3	Cu
9/29/2017	A1 Anchorage	Mooring			38'		3	Cu
9/29/2017	A1 Anchorage	Mooring			38'		3	Cu
9/29/2017	A1 Anchorage	Mooring			39'		3	Cu
9/29/2017	A1 Anchorage	Mooring			40'		3	Cu
9/29/2017	A1 Anchorage	Mooring			41'		3	Cu
9/29/2017	A1 Anchorage	Mooring			42'		3	Cu
9/29/2017	A1 Anchorage	Mooring			43'		3	Cu
9/29/2017	A1 Anchorage	Mooring			43'		3	Cu
9/29/2017	A1 Anchorage	Mooring			46'		3	Cu
9/29/2017	A1 Anchorage	Mooring			48'		3	Cu
9/29/2017	A1 Anchorage	Mooring			49'		3	Cu
9/29/2017	A1 Anchorage	Mooring			50'		3	Cu
9/29/2017	A1 Anchorage	Mooring			50'		3	Cu
9/29/2017	A1 Anchorage	Mooring			53'		3	Cu
9/29/2017	A1 Anchorage	Mooring			57'		3	Cu
9/29/2017	A1 Anchorage	Mooring			60'		3	Cu
9/29/2017	A1 Anchorage	Mooring			32'		3	Cu
10/6/2017	A1 Anchorage	Mooring			27'		3	Cu
10/6/2017	A1 Anchorage	Mooring			27'		3	Cu
10/6/2017	A1 Anchorage	Mooring			28'		3	Cu
10/6/2017	A1 Anchorage	Mooring			29'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			30'		3	Cu
10/6/2017	A1 Anchorage	Mooring			32'		3	Cu
10/6/2017	A1 Anchorage	Mooring			33'		3	Cu
10/6/2017	A1 Anchorage	Mooring			33'		3	Cu
10/6/2017	A1 Anchorage	Mooring			34'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/6/2017	A1 Anchorage	Mooring			35'		3	Cu
10/6/2017	A1 Anchorage	Mooring			36'		3	Cu
10/6/2017	A1 Anchorage	Mooring			37'		3	Cu
10/6/2017	A1 Anchorage	Mooring			38'		3	Cu
10/6/2017	A1 Anchorage	Mooring			39'		3	Cu
10/6/2017	A1 Anchorage	Mooring			40'		3	Cu
10/6/2017	A1 Anchorage	Mooring			40'		3	Cu
10/6/2017	A1 Anchorage	Mooring			40'		3	Cu
10/6/2017	A1 Anchorage	Mooring			43'		3	Cu
10/6/2017	A1 Anchorage	Mooring			43'		3	Cu
10/6/2017	A1 Anchorage	Mooring			44'		3	Cu
10/6/2017	A1 Anchorage	Mooring			44'		3	Cu
10/6/2017	A1 Anchorage	Mooring			47'		3	Cu
10/6/2017	A1 Anchorage	Mooring			47'		3	Cu
10/6/2017	A1 Anchorage	Mooring			50'		3	Cu
10/6/2017	A1 Anchorage	Mooring			51'		3	Cu
10/6/2017	A1 Anchorage	Mooring			57'		3	Cu
10/6/2017	A1 Anchorage	Mooring			28'		3	Cu
10/6/2017	A1 Anchorage	Mooring			32'		3	Cu
10/6/2017	A1 Anchorage	Mooring			28'		3	Cu
10/13/2017	A1 Anchorage	Mooring			26'		3	Cu
10/13/2017	A1 Anchorage	Mooring			27'		3	Cu
10/13/2017	A1 Anchorage	Mooring			27'		3	Cu
10/13/2017	A1 Anchorage	Mooring			28'		3	Cu
10/13/2017	A1 Anchorage	Mooring			28'		3	Cu
10/13/2017	A1 Anchorage	Mooring			28'		3	Cu
10/13/2017	A1 Anchorage	Mooring			30'		3	Cu
10/13/2017	A1 Anchorage	Mooring			30'		3	Cu
10/13/2017	A1 Anchorage	Mooring			30'		3	Cu
10/13/2017	A1 Anchorage	Mooring			30'		3	Cu
10/13/2017	A1 Anchorage	Mooring			32'		3	Cu
10/13/2017	A1 Anchorage	Mooring			33'		3	Cu
10/13/2017	A1 Anchorage	Mooring			33'		3	Cu
10/13/2017	A1 Anchorage	Mooring			35'		3	Cu
10/13/2017	A1 Anchorage	Mooring			35'		3	Cu
10/13/2017	A1 Anchorage	Mooring			37'		3	Cu
10/13/2017	A1 Anchorage	Mooring			38'		3	Cu
10/13/2017	A1 Anchorage	Mooring			40'		3	Cu
10/13/2017	A1 Anchorage	Mooring			41'		3	Cu
10/13/2017	A1 Anchorage	Mooring			42'		3	Cu
10/13/2017	A1 Anchorage	Mooring			43'		3	Cu
10/13/2017	A1 Anchorage	Mooring			44'		3	Cu
10/13/2017	A1 Anchorage	Mooring			47'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/13/2017	A1 Anchorage	Mooring			48'		3	Cu
10/13/2017	A1 Anchorage	Mooring			50'		3	Cu
10/13/2017	A1 Anchorage	Mooring			50'		3	Cu
10/13/2017	A1 Anchorage	Mooring			50'		3	Cu
10/13/2017	A1 Anchorage	Mooring			32'		3	Cu
10/20/2017	A1 Anchorage	Mooring			25'		3	Cu
10/20/2017	A1 Anchorage	Mooring			26'		3	Cu
10/20/2017	A1 Anchorage	Mooring			26'		3	Cu
10/20/2017	A1 Anchorage	Mooring			26'		3	Cu
10/20/2017	A1 Anchorage	Mooring			27'		3	Cu
10/20/2017	A1 Anchorage	Mooring			27'		3	Cu
10/20/2017	A1 Anchorage	Mooring			27'		3	Cu
10/20/2017	A1 Anchorage	Mooring			28'		3	Cu
10/20/2017	A1 Anchorage	Mooring			30'		3	Cu
10/20/2017	A1 Anchorage	Mooring			31'		3	Cu
10/20/2017	A1 Anchorage	Mooring			32'		3	Cu
10/20/2017	A1 Anchorage	Mooring			32'		3	Cu
10/20/2017	A1 Anchorage	Mooring			33'		3	Cu
10/20/2017	A1 Anchorage	Mooring			34'		3	Cu
10/20/2017	A1 Anchorage	Mooring			34'		3	Cu
10/20/2017	A1 Anchorage	Mooring			35'		3	Cu
10/20/2017	A1 Anchorage	Mooring			35'		3	Cu
10/20/2017	A1 Anchorage	Mooring			35'		3	Cu
10/20/2017	A1 Anchorage	Mooring			35'		3	Cu
10/20/2017	A1 Anchorage	Mooring			36'		3	Cu
10/20/2017	A1 Anchorage	Mooring			36'		3	Cu
10/20/2017	A1 Anchorage	Mooring			37'		3	Cu
10/20/2017	A1 Anchorage	Mooring			38'		3	Cu
10/20/2017	A1 Anchorage	Mooring			40'		3	Cu
10/20/2017	A1 Anchorage	Mooring			40'		3	Cu
10/20/2017	A1 Anchorage	Mooring			40'		3	Cu
10/20/2017	A1 Anchorage	Mooring			40'		3	Cu
10/20/2017	A1 Anchorage	Mooring			40'		3	Cu
10/20/2017	A1 Anchorage	Mooring			42'		3	Cu
10/20/2017	A1 Anchorage	Mooring			43'		3	Cu
10/20/2017	A1 Anchorage	Mooring			46'		3	Cu
10/20/2017	A1 Anchorage	Mooring			48'		3	Cu
10/20/2017	A1 Anchorage	Mooring			50'		3	Cu
10/20/2017	A1 Anchorage	Mooring			50'		3	Cu
10/20/2017	A1 Anchorage	Mooring			50'		3	Cu
10/20/2017	A1 Anchorage	Mooring			57'		3	Cu
10/20/2017	A1 Anchorage	Mooring			59'		3	Cu
10/20/2017	A1 Anchorage	Mooring			49'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/20/2017	A1 Anchorage	Mooring			48'		3	Cu
10/27/2017	A1 Anchorage	Mooring			27'		3	Cu
10/27/2017	A1 Anchorage	Mooring			28'		3	Cu
10/27/2017	A1 Anchorage	Mooring			30'		3	Cu
10/27/2017	A1 Anchorage	Mooring			30'		3	Cu
10/27/2017	A1 Anchorage	Mooring			30'		3	Cu
10/27/2017	A1 Anchorage	Mooring			33'		3	Cu
10/27/2017	A1 Anchorage	Mooring			34'		3	Cu
10/27/2017	A1 Anchorage	Mooring			34'		3	Cu
10/27/2017	A1 Anchorage	Mooring			34'		3	Cu
10/27/2017	A1 Anchorage	Mooring			35'		3	Cu
10/27/2017	A1 Anchorage	Mooring			35'		3	Cu
10/27/2017	A1 Anchorage	Mooring			35'		3	Cu
10/27/2017	A1 Anchorage	Mooring			36'		3	Cu
10/27/2017	A1 Anchorage	Mooring			37'		3	Cu
10/27/2017	A1 Anchorage	Mooring			37'		3	Cu
10/27/2017	A1 Anchorage	Mooring			38'		3	Cu
10/27/2017	A1 Anchorage	Mooring			38'		3	Cu
10/27/2017	A1 Anchorage	Mooring			38'		3	Cu
10/27/2017	A1 Anchorage	Mooring			40'		3	Cu
10/27/2017	A1 Anchorage	Mooring			40'		3	Cu
10/27/2017	A1 Anchorage	Mooring			40'		3	Cu
10/27/2017	A1 Anchorage	Mooring			40'		3	Cu
10/27/2017	A1 Anchorage	Mooring			41'		3	Cu
10/27/2017	A1 Anchorage	Mooring			43'		3	Cu
10/27/2017	A1 Anchorage	Mooring			43'		3	Cu
10/27/2017	A1 Anchorage	Mooring			43'		3	Cu
10/27/2017	A1 Anchorage	Mooring			44'		3	Cu
10/27/2017	A1 Anchorage	Mooring			45'		3	Cu
10/27/2017	A1 Anchorage	Mooring			47'		3	Cu
10/27/2017	A1 Anchorage	Mooring			47'		3	Cu
10/27/2017	A1 Anchorage	Mooring			48'		3	Cu
10/27/2017	A1 Anchorage	Mooring			49'		3	Cu
10/27/2017	A1 Anchorage	Mooring			50'		3	Cu
10/27/2017	A1 Anchorage	Mooring			56'		3	Cu
10/27/2017	A1 Anchorage	Mooring			58'		3	Cu
10/27/2017	A1 Anchorage	Mooring			60'		3	Cu
10/27/2017	A1 Anchorage	Mooring			65'		3	Cu
10/27/2017	A1 Anchorage	Mooring			32'		3	Cu
10/27/2017	A1 Anchorage	Mooring			60'		3	Cu
10/27/2017	A1 Anchorage	Mooring			27'		3	Cu
10/27/2017	A1 Anchorage	Mooring			35'		3	Cu
11/3/2017	A1 Anchorage	Mooring			26'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/3/2017	A1 Anchorage	Mooring			27'		3	Cu
11/3/2017	A1 Anchorage	Mooring			28'		3	Cu
11/3/2017	A1 Anchorage	Mooring			29'		3	Cu
11/3/2017	A1 Anchorage	Mooring			30'		3	Cu
11/3/2017	A1 Anchorage	Mooring			30'		3	Cu
11/3/2017	A1 Anchorage	Mooring			30'		3	Cu
11/3/2017	A1 Anchorage	Mooring			30'		3	Cu
11/3/2017	A1 Anchorage	Mooring			30'		3	Cu
11/3/2017	A1 Anchorage	Mooring			31'		3	Cu
11/3/2017	A1 Anchorage	Mooring			34'		3	Cu
11/3/2017	A1 Anchorage	Mooring			35'		3	Cu
11/3/2017	A1 Anchorage	Mooring			35'		3	Cu
11/3/2017	A1 Anchorage	Mooring			35'		3	Cu
11/3/2017	A1 Anchorage	Mooring			36'		3	Cu
11/3/2017	A1 Anchorage	Mooring			36'		3	Cu
11/3/2017	A1 Anchorage	Mooring			38'		3	Cu
11/3/2017	A1 Anchorage	Mooring			40'		3	Cu
11/3/2017	A1 Anchorage	Mooring			41'		3	Cu
11/3/2017	A1 Anchorage	Mooring			41'		3	Cu
11/3/2017	A1 Anchorage	Mooring			43'		3	Cu
11/3/2017	A1 Anchorage	Mooring			45'		3	Cu
11/3/2017	A1 Anchorage	Mooring			46'		3	Cu
11/3/2017	A1 Anchorage	Mooring			46'		3	Cu
11/3/2017	A1 Anchorage	Mooring			49'		3	Cu
11/3/2017	A1 Anchorage	Mooring			49'		3	Cu
11/3/2017	A1 Anchorage	Mooring			32'		3	Cu
11/3/2017	A1 Anchorage	Mooring			28'		3	Cu
11/10/2017	A1 Anchorage	Mooring			26'		3	Cu
11/10/2017	A1 Anchorage	Mooring			27'		3	Cu
11/10/2017	A1 Anchorage	Mooring			27'		3	Cu
11/10/2017	A1 Anchorage	Mooring			28'		3	Cu
11/10/2017	A1 Anchorage	Mooring			28'		3	Cu
11/10/2017	A1 Anchorage	Mooring			30'		3	Cu
11/10/2017	A1 Anchorage	Mooring			30'		3	Cu
11/10/2017	A1 Anchorage	Mooring			30'		3	Cu
11/10/2017	A1 Anchorage	Mooring			30'		3	Cu
11/10/2017	A1 Anchorage	Mooring			30'		3	Cu
11/10/2017	A1 Anchorage	Mooring			33'		3	Cu
11/10/2017	A1 Anchorage	Mooring			34'		3	Cu
11/10/2017	A1 Anchorage	Mooring			34'		3	Cu
11/10/2017	A1 Anchorage	Mooring			35'		3	Cu
11/10/2017	A1 Anchorage	Mooring			36'		3	Cu
11/10/2017	A1 Anchorage	Mooring			37'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/10/2017	A1 Anchorage	Mooring			38'		3	Cu
11/10/2017	A1 Anchorage	Mooring			39'		3	Cu
11/10/2017	A1 Anchorage	Mooring			40'		3	Cu
11/10/2017	A1 Anchorage	Mooring			40'		3	Cu
11/10/2017	A1 Anchorage	Mooring			41'		3	Cu
11/10/2017	A1 Anchorage	Mooring			41'		3	Cu
11/10/2017	A1 Anchorage	Mooring			41'		3	Cu
11/10/2017	A1 Anchorage	Mooring			42'		3	Cu
11/10/2017	A1 Anchorage	Mooring			42'		3	Cu
11/10/2017	A1 Anchorage	Mooring			45'		3	Cu
11/10/2017	A1 Anchorage	Mooring			48'		3	Cu
11/10/2017	A1 Anchorage	Mooring			49'		3	Cu
11/10/2017	A1 Anchorage	Mooring			50'		3	Cu
11/10/2017	A1 Anchorage	Mooring			50'		3	Cu
11/10/2017	A1 Anchorage	Mooring			50'		3	Cu
11/10/2017	A1 Anchorage	Mooring			56'		3	Cu
11/10/2017	A1 Anchorage	Mooring			60'		3	Cu
11/10/2017	A1 Anchorage	Mooring			61'		3	Cu
11/10/2017	A1 Anchorage	Mooring			32'		3	Cu
11/17/2017	A1 Anchorage	Mooring			27'		3	Cu
11/17/2017	A1 Anchorage	Mooring			28'		3	Cu
11/17/2017	A1 Anchorage	Mooring			30'		3	Cu
11/17/2017	A1 Anchorage	Mooring			30'		3	Cu
11/17/2017	A1 Anchorage	Mooring			30'		3	Cu
11/17/2017	A1 Anchorage	Mooring			30'		3	Cu
11/17/2017	A1 Anchorage	Mooring			34'		3	Cu
11/17/2017	A1 Anchorage	Mooring			34'		3	Cu
11/17/2017	A1 Anchorage	Mooring			34'		3	Cu
11/17/2017	A1 Anchorage	Mooring			34'		3	Cu
11/17/2017	A1 Anchorage	Mooring			36'		3	Cu
11/17/2017	A1 Anchorage	Mooring			37'		3	Cu
11/17/2017	A1 Anchorage	Mooring			37'		3	Cu
11/17/2017	A1 Anchorage	Mooring			38'		3	Cu
11/17/2017	A1 Anchorage	Mooring			39'		3	Cu
11/17/2017	A1 Anchorage	Mooring			40'		3	Cu
11/17/2017	A1 Anchorage	Mooring			41'		3	Cu
11/17/2017	A1 Anchorage	Mooring			42'		3	Cu
11/17/2017	A1 Anchorage	Mooring			42'		3	Cu
11/17/2017	A1 Anchorage	Mooring			44'		3	Cu
11/17/2017	A1 Anchorage	Mooring			46'		3	Cu
11/17/2017	A1 Anchorage	Mooring			47'		3	Cu
11/17/2017	A1 Anchorage	Mooring			50'		3	Cu
11/17/2017	A1 Anchorage	Mooring			32'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/17/2017	A1 Anchorage	Mooring			28'		3	Cu
11/24/2017	A1 Anchorage	Mooring			44'		3	Cu
11/24/2017	A1 Anchorage	Mooring			26'		3	Cu
11/24/2017	A1 Anchorage	Mooring			27'		3	Cu
11/24/2017	A1 Anchorage	Mooring			27'		3	Cu
11/24/2017	A1 Anchorage	Mooring			28'		3	Cu
11/24/2017	A1 Anchorage	Mooring			28'		3	Cu
11/24/2017	A1 Anchorage	Mooring			28'		3	Cu
11/24/2017	A1 Anchorage	Mooring			30'		3	Cu
11/24/2017	A1 Anchorage	Mooring			30'		3	Cu
11/24/2017	A1 Anchorage	Mooring			30'		3	Cu
11/24/2017	A1 Anchorage	Mooring			32'		3	Cu
11/24/2017	A1 Anchorage	Mooring			34'		3	Cu
11/24/2017	A1 Anchorage	Mooring			35'		3	Cu
11/24/2017	A1 Anchorage	Mooring			36'		3	Cu
11/24/2017	A1 Anchorage	Mooring			37'		3	Cu
11/24/2017	A1 Anchorage	Mooring			38'		3	Cu
11/24/2017	A1 Anchorage	Mooring			40'		3	Cu
11/24/2017	A1 Anchorage	Mooring			41'		3	Cu
11/24/2017	A1 Anchorage	Mooring			41'		3	Cu
11/24/2017	A1 Anchorage	Mooring			42'		3	Cu
11/24/2017	A1 Anchorage	Mooring			42'		3	Cu
11/24/2017	A1 Anchorage	Mooring			43'		3	Cu
11/24/2017	A1 Anchorage	Mooring			43'		3	Cu
11/24/2017	A1 Anchorage	Mooring			44'		3	Cu
11/24/2017	A1 Anchorage	Mooring			44'		3	Cu
11/24/2017	A1 Anchorage	Mooring			46'		3	Cu
11/24/2017	A1 Anchorage	Mooring			47'		3	Cu
11/24/2017	A1 Anchorage	Mooring			47'		3	Cu
11/24/2017	A1 Anchorage	Mooring			49'		3	Cu
11/24/2017	A1 Anchorage	Mooring			50'		3	Cu
11/24/2017	A1 Anchorage	Mooring			53'		3	Cu
11/24/2017	A1 Anchorage	Mooring			53'		3	Cu
11/24/2017	A1 Anchorage	Mooring			60'		3	Cu
11/24/2017	A1 Anchorage	Mooring			32'		3	Cu
11/24/2017	A1 Anchorage	Mooring			34'		3	Cu
11/24/2017	A1 Anchorage	Mooring			28'		3	Cu
12/1/2017	A1 Anchorage	Mooring			27'		3	Cu
12/1/2017	A1 Anchorage	Mooring			27'		3	Cu
12/1/2017	A1 Anchorage	Mooring			30'		3	Cu
12/1/2017	A1 Anchorage	Mooring			30'		3	Cu
12/1/2017	A1 Anchorage	Mooring			30'		3	Cu
12/1/2017	A1 Anchorage	Mooring			32'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
12/1/2017	A1 Anchorage	Mooring			34'		3	Cu
12/1/2017	A1 Anchorage	Mooring			34'		3	Cu
12/1/2017	A1 Anchorage	Mooring			34'		3	Cu
12/1/2017	A1 Anchorage	Mooring			34'		3	Cu
12/1/2017	A1 Anchorage	Mooring			35'		3	Cu
12/1/2017	A1 Anchorage	Mooring			35'		3	Cu
12/1/2017	A1 Anchorage	Mooring			36'		3	Cu
12/1/2017	A1 Anchorage	Mooring			36'		3	Cu
12/1/2017	A1 Anchorage	Mooring			36'		3	Cu
12/1/2017	A1 Anchorage	Mooring			40'		3	Cu
12/1/2017	A1 Anchorage	Mooring			42'		3	Cu
12/1/2017	A1 Anchorage	Mooring			42'		3	Cu
12/1/2017	A1 Anchorage	Mooring			46'		3	Cu
12/1/2017	A1 Anchorage	Mooring			47'		3	Cu
12/1/2017	A1 Anchorage	Mooring			49'		3	Cu
12/1/2017	A1 Anchorage	Mooring			60'		3	Cu
12/1/2017	A1 Anchorage	Mooring			32'		3	Cu
12/8/2017	A1 Anchorage	Mooring			32'		3	Cu
12/8/2017	A1 Anchorage	Mooring			25'		3	Cu
12/8/2017	A1 Anchorage	Mooring			26'		3	Cu
12/8/2017	A1 Anchorage	Mooring			27'		3	Cu
12/8/2017	A1 Anchorage	Mooring			28'		3	Cu
12/8/2017	A1 Anchorage	Mooring			30'		3	Cu
12/8/2017	A1 Anchorage	Mooring			30'		3	Cu
12/8/2017	A1 Anchorage	Mooring			30'		3	Cu
12/8/2017	A1 Anchorage	Mooring			30'		3	Cu
12/8/2017	A1 Anchorage	Mooring			30'		3	Cu
12/8/2017	A1 Anchorage	Mooring			34'		3	Cu
12/8/2017	A1 Anchorage	Mooring			35'		3	Cu
12/8/2017	A1 Anchorage	Mooring			37'		3	Cu
12/8/2017	A1 Anchorage	Mooring			37'		3	Cu
12/8/2017	A1 Anchorage	Mooring			38'		3	Cu
12/8/2017	A1 Anchorage	Mooring			40'		3	Cu
12/8/2017	A1 Anchorage	Mooring			40'		3	Cu
12/8/2017	A1 Anchorage	Mooring			41'		3	Cu
12/8/2017	A1 Anchorage	Mooring			41'		3	Cu
12/8/2017	A1 Anchorage	Mooring			47'		3	Cu
12/8/2017	A1 Anchorage	Mooring			47'		3	Cu
12/8/2017	A1 Anchorage	Mooring			49'		3	Cu
12/8/2017	A1 Anchorage	Mooring			50'		3	Cu
12/8/2017	A1 Anchorage	Mooring			52'		3	Cu
12/8/2017	A1 Anchorage	Mooring			60'		3	Cu
12/15/2017	A1 Anchorage	Mooring			25'		3	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
12/15/2017	A1 Anchorage	Mooring			26'		3	Cu
12/15/2017	A1 Anchorage	Mooring			27'		3	Cu
12/15/2017	A1 Anchorage	Mooring			27'		3	Cu
12/15/2017	A1 Anchorage	Mooring			27'		3	Cu
12/15/2017	A1 Anchorage	Mooring			30'		3	Cu
12/15/2017	A1 Anchorage	Mooring			30'		3	Cu
12/15/2017	A1 Anchorage	Mooring			34'		3	Cu
12/15/2017	A1 Anchorage	Mooring			35'		3	Cu
12/15/2017	A1 Anchorage	Mooring			36'		3	Cu
12/15/2017	A1 Anchorage	Mooring			38'		3	Cu
12/15/2017	A1 Anchorage	Mooring			46'		3	Cu
12/15/2017	A1 Anchorage	Mooring			49'		3	Cu
12/15/2017	A1 Anchorage	Mooring			50'		3	Cu
12/15/2017	A1 Anchorage	Mooring			32'		3	Cu
12/15/2017	A1 Anchorage	Mooring			37'		3	Cu
12/15/2017	A1 Anchorage	Mooring			28'		3	Cu
12/22/2017	A1 Anchorage	Mooring			25'		3	Cu
12/22/2017	A1 Anchorage	Mooring			26'		3	Cu
12/22/2017	A1 Anchorage	Mooring			28'		3	Cu
12/22/2017	A1 Anchorage	Mooring			30'		3	Cu
12/22/2017	A1 Anchorage	Mooring			30'		3	Cu
12/22/2017	A1 Anchorage	Mooring			30'		3	Cu
12/22/2017	A1 Anchorage	Mooring			34'		3	Cu
12/22/2017	A1 Anchorage	Mooring			35'		3	Cu
12/22/2017	A1 Anchorage	Mooring			35'		3	Cu
12/22/2017	A1 Anchorage	Mooring			35'		3	Cu
12/22/2017	A1 Anchorage	Mooring			36'		3	Cu
12/22/2017	A1 Anchorage	Mooring			37'		3	Cu
12/22/2017	A1 Anchorage	Mooring			37'		3	Cu
12/22/2017	A1 Anchorage	Mooring			40'		3	Cu
12/22/2017	A1 Anchorage	Mooring			41'		3	Cu
12/22/2017	A1 Anchorage	Mooring			44'		3	Cu
12/22/2017	A1 Anchorage	Mooring			45'		3	Cu
12/22/2017	A1 Anchorage	Mooring			47'		3	Cu
12/22/2017	A1 Anchorage	Mooring			32'		3	Cu
12/22/2017	A1 Anchorage	Mooring			28'		3	Cu
12/22/2017	A1 Anchorage	Mooring			25'		3	Cu
12/29/2017	A1 Anchorage	Mooring					2	Cu
12/29/2017	A1 Anchorage	Mooring			25'		2	Cu
12/29/2017	A1 Anchorage	Mooring			25'		2	Cu
12/29/2017	A1 Anchorage	Mooring			26'		2	Cu
12/29/2017	A1 Anchorage	Mooring			26'		2	Cu
12/29/2017	A1 Anchorage	Mooring			26'		2	Cu

La Playa Mooring 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
12/29/2017	A1 Anchorage	Mooring			27'		2	Cu
12/29/2017	A1 Anchorage	Mooring			28'		2	Cu
12/29/2017	A1 Anchorage	Mooring			30'		2	Cu
12/29/2017	A1 Anchorage	Mooring			30'		2	Cu
12/29/2017	A1 Anchorage	Mooring			30'		2	Cu
12/29/2017	A1 Anchorage	Mooring			32'		2	Cu
12/29/2017	A1 Anchorage	Mooring			34'		2	Cu
12/29/2017	A1 Anchorage	Mooring			34'		2	Cu
12/29/2017	A1 Anchorage	Mooring			34'		2	Cu
12/29/2017	A1 Anchorage	Mooring			35'		2	Cu
12/29/2017	A1 Anchorage	Mooring			35'		2	Cu
12/29/2017	A1 Anchorage	Mooring			35'		2	Cu
12/29/2017	A1 Anchorage	Mooring			36'		2	Cu
12/29/2017	A1 Anchorage	Mooring			36'		2	Cu
12/29/2017	A1 Anchorage	Mooring			37'		2	Cu
12/29/2017	A1 Anchorage	Mooring			40'		2	Cu
12/29/2017	A1 Anchorage	Mooring			40'		2	Cu
12/29/2017	A1 Anchorage	Mooring			40'		2	Cu
12/29/2017	A1 Anchorage	Mooring			40'		2	Cu
12/29/2017	A1 Anchorage	Mooring			42'		2	Cu
12/29/2017	A1 Anchorage	Mooring			42'		2	Cu
12/29/2017	A1 Anchorage	Mooring			44'		2	Cu
12/29/2017	A1 Anchorage	Mooring			44'		2	Cu
12/29/2017	A1 Anchorage	Mooring			45'		2	Cu
12/29/2017	A1 Anchorage	Mooring			47'		2	Cu
12/29/2017	A1 Anchorage	Mooring			48'		2	Cu
12/29/2017	A1 Anchorage	Mooring			50'		2	Cu
12/29/2017	A1 Anchorage	Mooring			55'		2	Cu
12/29/2017	A1 Anchorage	Mooring			60'		2	Cu
12/29/2017	A1 Anchorage	Mooring			64'		2	Cu
12/29/2017	A1 Anchorage	Mooring			32'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/26/2017		2			38'		2	Cu
1/8/2017		2			39'		5	Cu
1/15/2017		2			39'		3	Cu
2/2/2017		2			26'		1	Cu
2/3/2017		2			26'		1	Cu
2/5/2017		2			26'		1	Cu
2/6/2017		2			20'		7	Cu
2/12/2017		2			26'		2	Cu
2/14/2017		2			16'		1	Cu
2/15/2017		2			16'		1	Cu
2/16/2017		2			35'		1	Cu
2/17/2017		2			35'		1	Cu
2/21/2017		2			32'		1	Cu
2/27/2017		2			32'		3	Cu
3/2/2017		2			32'		1	Cu
3/21/2017		2			28'		6	Cu
3/27/2017		2			28'		1	Cu
3/30/2017		2			27'		1	Cu
4/3/2017		2			30'		3	Cu
4/9/2017		2			25'		1	Cu
4/15/2017		2			19'		14	Cu
4/29/2017		2			27'		3	Cu
5/3/2017		2			33'		1	Cu
5/4/2017		2			33'		1	Cu
5/14/2017		2			36'		1	Cu
5/20/2017		2			21'		1	Cu
5/21/2017		2			38'		2	Cu
5/26/2017		2			21'		3	Cu
5/31/2017		2			36'		16	Cu
6/22/2017		2			38'		1	Cu
6/23/2017		2			23'		1	Cu
6/29/2017		2			27'		2	Cu
7/1/2017		2			21'		2	Cu
7/3/2017		2			19'		2	Cu
7/5/2017		2			34'		1	Cu
7/6/2017		2			27'		1	Cu
7/8/2017		2			27'		1	Cu
7/15/2017		2			35'		1	Cu
7/19/2017		2			38'		2	Cu
7/21/2017		2			26'		4	Cu
7/25/2017		2			26'		1	Cu
7/28/2017		2			25'		1	Cu
7/29/2017		2			28'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/30/2017		2			26'		2	Cu
8/2/2017		2			27'		2	Cu
8/4/2017		2			35'		1	Cu
8/5/2017		2			27'		1	Cu
8/6/2017		2			20'		5	Cu
8/11/2017		2			27'		1	Cu
8/12/2017		2			22'		1	Cu
8/13/2017		2			27'		4	Cu
8/17/2017		2			33'		3	Cu
8/20/2017		2			33'		3	Cu
8/23/2017		2			33'		1	Cu
8/24/2017		2			33'		1	Cu
8/25/2017		2			25'		2	Cu
8/31/2017		2			37'		1	Cu
9/1/2017		2			36'		1	Cu
9/2/2017		2			28'		2	Cu
9/4/2017		2			27'		3	Cu
9/11/2017		2			30'		2	Cu
9/14/2017		2			27'		1	Cu
9/15/2017		2			24'		1	Cu
9/16/2017		2			26'		7	Cu
9/23/2017		2			14'		3	Cu
9/26/2017		2			33'		3	Cu
9/29/2017		2			19'		5	Cu
10/4/2017		2			33'		1	Cu
10/5/2017		2			34'		1	Cu
10/7/2017		2			16'		1	Cu
10/8/2017		2			19'		5	Cu
10/15/2017		2			33'		1	Cu
10/16/2017		2			21'		2	Cu
10/18/2017		2			26'		2	Cu
10/20/2017		2			25'		1	Cu
10/21/2017		2			30'		1	Cu
10/22/2017		2			19'		5	Cu
10/27/2017		2			40'		2	Cu
10/29/2017		2			40'		1	Cu
10/30/2017		2			39'		2	Cu
11/1/2017		2			21'		2	Cu
11/6/2017		2			28'		1	Cu
11/7/2017		2			28'		1	Cu
11/8/2017		2			28'		1	Cu
11/11/2017		2			25'		1	Cu
11/13/2017		2			36'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/19/2017		2			46'		1	Cu
11/20/2017		2			28'		1	Cu
11/21/2017		2			40'		7	Cu
11/28/2017		2			40'		7	Cu
12/9/2017		2			25'		2	Cu
12/15/2017		2			37'		3	Cu
12/18/2017		2			37'		1	Cu
12/22/2017		2			25'		2	Cu
12/31/2017		2			10'		1	Cu
1/27/2017		2			22'		2	Cu
3/8/2017		2			26'		4	Cu
6/17/2017		2			28'		3	Cu
7/11/2017		2			42'		3	Cu
7/14/2017		2			35'		1	Cu
8/1/2017		2			26'		1	Cu
9/7/2017		2			19'		2	Cu
12/6/2017		2			37'		1	Cu
12/11/2017		2			37'		4	Cu
8/28/2017		2			28'		1	Cu
9/13/2017		2			36'		1	Cu
			66.3%				242	
1/17/2017		3			39'		2	Cu
1/19/2017		3			46'		3	Cu
1/22/2017		3			46'		2	Cu
1/24/2017		3			46'		1	Cu
1/28/2017		3			40'		1	Cu
1/29/2017		3			40'		1	Cu
1/30/2017		3			40'		1	Cu
1/31/2017		3			40'		1	Cu
2/1/2017		3			40'		1	Cu
2/4/2017		3			43'		3	Cu
2/7/2017		3			44'		2	Cu
2/9/2017		3			44'		1	Cu
2/10/2017		3			40'		6	Cu
2/16/2017		3			44'		1	Cu
2/17/2017		3			46'		1	Cu
2/18/2017		3			46'		1	Cu
2/21/2017		3			40'		1	Cu
2/22/2017		3			40'		1	Cu
2/23/2017		3			40'		1	Cu
2/24/2017		3			40'		3	Cu
2/28/2017		3			40'		1	Cu
3/2/2017		3			40'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/3/2017		3			24'		1	Cu
3/4/2017		3			52'		1	Cu
3/5/2017		3			51'		3	Cu
3/8/2017		3			51'		1	Cu
3/9/2017		3			51'		1	Cu
3/15/2017		3			44'		2	Cu
3/20/2017		3			46'		1	Cu
3/21/2017		3			46'		2	Cu
3/29/2017		3			27'		1	Cu
4/1/2017		3			45'		1	Cu
4/5/2017		3			44'		1	Cu
4/10/2017		3			42'		4	Cu
4/14/2017		3			42'		1	Cu
4/16/2017		3			40'		3	Cu
4/19/2017		3			40'		1	Cu
4/21/2017		3			38'		10	Cu
5/2/2017		3			33'		1	Cu
5/3/2017		3			45'		3	Cu
5/6/2017		3			30'		1	Cu
5/7/2017		3			30'		1	Cu
5/9/2017		3			55'		2	Cu
5/11/2017		3			26'		1	Cu
5/14/2017		3			42'		1	Cu
5/15/2017		3			24'		1	Cu
5/18/2017		3			51'		4	Cu
5/23/2017		3			57'		1	Cu
5/24/2017		3			57'		3	Cu
5/27/2017		3			52'		3	Cu
6/1/2017		3			41'		1	Cu
6/6/2017		3			53'		1	Cu
6/7/2017		3			28'		1	Cu
6/11/2017		3			46'		2	Cu
6/13/2017		3			46'		2	Cu
6/16/2017		3			46'		1	Cu
6/17/2017		3			33'		1	Cu
6/18/2017		3			28'		1	Cu
6/19/2017		3			28'		3	Cu
6/23/2017		3			38'		1	Cu
6/25/2017		3			27'		4	Cu
6/29/2017		3			18'		7	Cu
7/6/2017		3			17'		1	Cu
7/7/2017		3			30'		2	Cu
7/9/2017		3			42'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/14/2017		3			43'		2	Cu
7/22/2017		3			38'		14	Cu
8/5/2017		3			27'		4	Cu
8/9/2017		3			46'		2	Cu
8/11/2017		3			46'		1	Cu
8/12/2017		3			30'		2	Cu
8/14/2017		3			15'		4	Cu
8/18/2017		3			33'		1	Cu
8/19/2017		3			34'		1	Cu
8/20/2017		3			55'		4	Cu
8/25/2017		3			24'		7	Cu
9/3/2017		3			30'		1	Cu
9/4/2017		3			24'		7	Cu
9/11/2017		3			27'		1	Cu
9/12/2017		3			24'		3	Cu
9/15/2017		3			40'		1	Cu
9/16/2017		3			23'		1	Cu
9/18/2017		3			24'		4	Cu
9/22/2017		3			40'		2	Cu
9/25/2017		3			30'		1	Cu
9/26/2017		3			30'		1	Cu
9/28/2017		3			17'		7	Cu
10/5/2017		3			38'		2	Cu
10/7/2017		3			38'		1	Cu
10/8/2017		3			38'		5	Cu
10/13/2017		3			38'		2	Cu
10/15/2017		3			26'		3	Cu
10/18/2017		3			27'		1	Cu
10/23/2017		3			38'		4	Cu
11/1/2017		3			60'		4	Cu
11/5/2017		3			60'		1	Cu
11/6/2017		3			60'		1	Cu
11/7/2017		3			60'		2	Cu
11/9/2017		3			60'		3	Cu
11/12/2017		3			60'		2	Cu
11/14/2017		3			60'		1	Cu
11/15/2017		3			60'		1	Cu
11/16/2017		3			60'		2	Cu
11/18/2017		3			60'		2	Cu
11/27/2017		3			46'		1	Cu
12/6/2017		3			56'		2	Cu
12/11/2017		3			52'		1	Cu
12/21/2017		3			46'		7	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
12/28/2017		3			23'		3	Cu
12/31/2017		3			23'		1	Cu
3/1/2017		3			40'		1	Cu
4/15/2017		3			42'		1	Cu
5/1/2017		3			33'		1	Cu
7/11/2017		3			35'		3	Cu
10/19/2017		3			38'		4	Cu
10/27/2017		3			38'		5	Cu
11/20/2017		3			42'		7	Cu
11/28/2017		3			47'		1	Cu
9/11/2017		3			28'		1	Cu
			73.7%				269	
1/2/2017		4			28'		1	Cu
1/3/2017		4			28'		1	Cu
1/6/2017		4			40'		4	Cu
1/10/2017		4			37'		2	Cu
1/12/2017		4			30'		1	Cu
1/13/2017		4			40'		1	Cu
1/14/2017		4			40'		1	Cu
1/18/2017		4			30'		1	Cu
1/21/2017		4			36'		2	Cu
1/23/2017		4			36'		1	Cu
1/24/2017		4			36'		6	Cu
1/30/2017		4			29'		1	Cu
1/31/2017		4			30'		1	Cu
2/1/2017		4			37'		1	Cu
2/4/2017		4			32'		2	Cu
2/6/2017		4			30'		1	Cu
2/7/2017		4			26'		1	Cu
2/8/2017		4			30'		1	Cu
2/16/2017		4			36'		1	Cu
2/21/2017		4			28'		1	Cu
2/22/2017		4			30'		2	Cu
2/25/2017		4			38'		3	Cu
2/28/2017		4			40'		2	Cu
3/2/2017		4			40'		1	Cu
3/3/2017		4			30'		1	Cu
3/4/2017		4			21'		3	Cu
3/7/2017		4			21'		1	Cu
3/10/2017		4			28'		1	Cu
3/11/2017		4			22'		1	Cu
3/12/2017		4			38'		1	Cu
3/13/2017		4			40'		6	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/23/2017		4			25'		1	Cu
3/27/2017		4			44'		2	Cu
3/29/2017		4			26'		3	Cu
4/1/2017		4			26'		2	Cu
4/3/2017		4			26'		1	Cu
4/11/2017		4			25'		1	Cu
4/12/2017		4			25'		1	Cu
4/13/2017		4			25'		1	Cu
4/14/2017		4			35'		1	Cu
4/15/2017		4			26'		1	Cu
4/22/2017		4			36'		2	Cu
4/24/2017		4			40'		1	Cu
4/29/2017		4			25'		1	Cu
4/30/2017		4			32'		1	Cu
5/1/2017		4			44'		1	Cu
5/2/2017		4			25'		3	Cu
5/5/2017		4			25'		9	Cu
5/16/2017		4			43'		1	Cu
5/18/2017		4			44'		3	Cu
5/26/2017		4			20'		2	Cu
5/30/2017		4			25'		1	Cu
5/31/2017		4			25'		1	Cu
6/1/2017		4			25'		1	Cu
6/2/2017		4			25'		2	Cu
6/4/2017		4			28'		5	Cu
6/9/2017		4			28'		2	Cu
6/11/2017		4			44'		3	Cu
6/14/2017		4			19'		2	Cu
6/16/2017		4			21'		3	Cu
6/23/2017		4			33'		1	Cu
6/24/2017		4			22'		1	Cu
6/25/2017		4			37'		4	Cu
6/29/2017		4			34'		4	Cu
7/3/2017		4			21'		2	Cu
7/5/2017		4			44'		4	Cu
7/9/2017		4			25'		8	Cu
7/23/2017		4			26'		3	Cu
7/27/2017		4			35'		1	Cu
7/28/2017		4			42'		3	Cu
7/31/2017		4			40'		1	Cu
8/1/2017		4			32'		1	Cu
8/2/2017		4			27'		1	Cu
8/3/2017		4			22'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/5/2017		4			27'		2	Cu
8/7/2017		4			26'		3	Cu
8/10/2017		4			36'		1	Cu
8/11/2017		4			28'		2	Cu
8/13/2017		4			18'		2	Cu
8/15/2017		4			18'		1	Cu
8/18/2017		4			26'		1	Cu
8/20/2017		4			20'		1	Cu
8/23/2017		4			32'		2	Cu
8/25/2017		4			23'		2	Cu
8/27/2017		4			27'		1	Cu
8/28/2017		4			30'		1	Cu
8/29/2017		4			22'		2	Cu
8/31/2017		4			36'		1	Cu
9/1/2017		4			40'		1	Cu
9/2/2017		4			40'		2	Cu
9/5/2017		4			35'		3	Cu
9/8/2017		4			43'		2	Cu
9/10/2017		4			38'		8	Cu
9/18/2017		4			30'		1	Cu
9/19/2017		4			30'		1	Cu
9/21/2017		4			44'		1	Cu
9/23/2017		4			17'		1	Cu
9/24/2017		4			30'		1	Cu
9/29/2017		4			42'		1	Cu
9/30/2017		4			19'		1	Cu
10/2/2017		4			34'		3	Cu
10/6/2017		4			27'		1	Cu
10/7/2017		4			21'		2	Cu
10/9/2017		4			30'		1	Cu
10/10/2017		4			30'		1	Cu
10/11/2017		4			30'		1	Cu
10/12/2017		4			44'		3	Cu
10/16/2017		4			32'		4	Cu
10/20/2017		4			32'		1	Cu
10/21/2017		4			42'		1	Cu
10/22/2017		4			37'		1	Cu
10/23/2017		4			32'		3	Cu
10/26/2017		4			35'		1	Cu
10/27/2017		4			42'		3	Cu
10/30/2017		4			30'		1	Cu
11/1/2017		4			30'		1	Cu
11/2/2017		4			30'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/3/2017		4			38'		2	Cu
11/5/2017		4			43'		2	Cu
11/7/2017		4			44'		4	Cu
11/11/2017		4			44'		1	Cu
11/12/2017		4			44'		1	Cu
11/13/2017		4			28'		3	Cu
11/16/2017		4			35'		3	Cu
11/19/2017		4			42'		3	Cu
11/22/2017		4			42'		4	Cu
11/26/2017		4			30'		1	Cu
11/27/2017		4			44'		2	Cu
12/1/2017		4			38'		2	Cu
12/9/2017		4			10'		1	Cu
12/10/2017		4			42'		1	Cu
12/12/2017		4			34'		3	Cu
12/16/2017		4			40'		4	Cu
12/26/2017		4			34'		3	Cu
12/31/2017		4			27'		1	Cu
4/25/2017		4			35'		4	Cu
5/15/2017		4			10'		1	Cu
7/22/2017		4			22'		1	Cu
8/21/2017		4			27'		1	Cu
9/20/2017		4			28'		1	Cu
9/25/2017		4			43'		3	Cu
10/5/2017		4			35'		1	Cu
10/31/2017		4			30'		1	Cu
11/29/2017		4			42'		2	Cu
12/6/2017		4			34'		2	Cu
12/11/2017		4			34'		1	Cu
8/22/2017		4			28'		1	Cu
8/24/2017		4			28'		1	Cu
			77.3%				282	
1/1/2017		5			29'		1	Cu
1/2/2017		5			31'		2	Cu
1/4/2017		5			29'		1	Cu
1/5/2017		5			29'		2	Cu
1/7/2017		5			29'		1	Cu
1/12/2017		5			40'		1	Cu
1/15/2017		5			40'		1	Cu
1/17/2017		5			27'		2	Cu
1/19/2017		5			37'		1	Cu
1/20/2017		5			40'		1	Cu
1/27/2017		5			29'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/29/2017		5			29'		1	Cu
1/30/2017		5			35'		2	Cu
2/2/2017		5			40'		1	Cu
2/3/2017		5			40'		1	Cu
2/6/2017		5			32'		3	Cu
2/12/2017		5			36'		1	Cu
2/13/2017		5			30'		1	Cu
2/14/2017		5			30'		1	Cu
2/15/2017		5			30'		2	Cu
2/17/2017		5			32'		1	Cu
2/18/2017		5			35'		2	Cu
2/21/2017		5			37'		3	Cu
2/26/2017		5			41'		1	Cu
2/28/2017		5			30'		2	Cu
3/2/2017		5			30'		1	Cu
3/3/2017		5			23'		2	Cu
3/5/2017		5			26'		3	Cu
3/8/2017		5			21'		4	Cu
3/12/2017		5			27'		5	Cu
3/17/2017		5			27'		1	Cu
3/18/2017		5			27'		1	Cu
3/20/2017		5			35'		2	Cu
3/22/2017		5			26'		1	Cu
3/27/2017		5			26'		2	Cu
3/29/2017		5			30'		2	Cu
4/5/2017		5			42'		1	Cu
4/6/2017		5			37'		4	Cu
4/10/2017		5			25'		1	Cu
4/14/2017		5			25'		2	Cu
4/17/2017		5			22'		2	Cu
4/20/2017		5			18'		3	Cu
4/23/2017		5			18'		2	Cu
4/29/2017		5			25'		1	Cu
4/30/2017		5			33'		1	Cu
5/1/2017		5			40'		1	Cu
5/2/2017		5			30'		1	Cu
5/5/2017		5			44'		5	Cu
5/12/2017		5			40'		3	Cu
5/17/2017		5			34'		3	Cu
5/20/2017		5			22'		1	Cu
5/22/2017		5			27'		1	Cu
5/27/2017		5			32'		2	Cu
5/30/2017		5			27'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/9/2017		5			24'		2	Cu
6/11/2017		5			28'		1	Cu
6/15/2017		5			25'		1	Cu
6/16/2017		5			23'		2	Cu
6/18/2017		5			33'		1	Cu
6/19/2017		5			25'		2	Cu
6/22/2017		5			38'		1	Cu
6/23/2017		5			22'		1	Cu
6/24/2017		5			40'		1	Cu
6/25/2017		5			31'		2	Cu
6/27/2017		5			31'		1	Cu
6/28/2017		5			31'		1	Cu
6/29/2017		5			34'		3	Cu
7/2/2017		5			18'		15	Cu
7/17/2017		5			43'		1	Cu
7/21/2017		5			38'		1	Cu
7/22/2017		5			38'		1	Cu
7/24/2017		5			28'		1	Cu
7/26/2017		5			38'		5	Cu
7/31/2017		5			32'		2	Cu
8/2/2017		5			27'		3	Cu
8/5/2017		5			32'		1	Cu
8/7/2017		5			36'		3	Cu
8/10/2017		5			36'		8	Cu
8/19/2017		5			40'		4	Cu
8/23/2017		5			38'		2	Cu
8/25/2017		5			21'		1	Cu
8/26/2017		5					1	Cu
8/28/2017		5			32'		1	Cu
8/29/2017		5			20'		1	Cu
8/30/2017		5			32'		1	Cu
9/5/2017		5			28'		3	Cu
9/9/2017		5			21'		1	Cu
9/11/2017		5			27'		1	Cu
9/13/2017		5			35'		2	Cu
9/16/2017		5			35'		1	Cu
9/19/2017		5			36'		8	Cu
9/29/2017		5			43'		7	Cu
10/6/2017		5			32'		2	Cu
10/9/2017		5			32'		4	Cu
10/13/2017		5			41'		1	Cu
10/17/2017		5			27'		1	Cu
10/18/2017		5			33'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/23/2017		5			33'		1	Cu
10/24/2017		5			42'		1	Cu
10/25/2017		5			40'		1	Cu
10/26/2017		5			40'		1	Cu
10/27/2017		5			42'		3	Cu
10/30/2017		5			41'		1	Cu
10/31/2017		5			44'		3	Cu
11/3/2017		5			35'		13	Cu
11/17/2017		5			38'		2	Cu
11/20/2017		5			44'		4	Cu
11/24/2017		5			38'		5	Cu
12/5/2017		5			44'		3	Cu
12/10/2017		5			38'		1	Cu
12/11/2017		5			30'		2	Cu
12/13/2017		5			30'		2	Cu
12/15/2017		5			38'		2	Cu
12/18/2017		5			30'		1	Cu
12/20/2017		5			32'		1	Cu
12/24/2017		5			35'		4	Cu
2/9/2017		5			28'		1	Cu
4/11/2017		5			34'		3	Cu
4/26/2017		5			30'		1	Cu
5/3/2017		5			21'		1	Cu
5/15/2017		5			34'		2	Cu
6/1/2017		5			44'		7	Cu
6/12/2017		5			28'		3	Cu
8/31/2017		5			24'		3	Cu
9/12/2017		5			35'		1	Cu
9/28/2017		5			43'		1	Cu
10/16/2017		5			10'		1	Cu
10/19/2017		5			47'		4	Cu
9/18/2017		5			28'		1	Cu
			76.7%				280	
1/6/2017		6			42'		1	Cu
1/9/2017		6			27'		1	Cu
1/17/2017		6			37'		2	Cu
1/24/2017		6			32'		6	Cu
2/6/2017		6			27'		1	Cu
2/8/2017		6			28'		1	Cu
2/9/2017		6			32'		1	Cu
2/10/2017		6			28'		1	Cu
2/11/2017		6			28'		1	Cu
2/15/2017		6			10'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/16/2017		6			37'		3	Cu
2/20/2017		6			30'		1	Cu
2/22/2017		6			26'		1	Cu
2/27/2017		6			30'		1	Cu
3/1/2017		6			35'		2	Cu
3/3/2017		6			18'		2	Cu
3/5/2017		6			44'		3	Cu
3/23/2017		6			44'		9	Cu
4/1/2017		6			44'		1	Cu
4/2/2017		6			44'		8	Cu
4/10/2017		6			27'		7	Cu
4/17/2017		6			27'		7	Cu
4/24/2017		6			27'		1	Cu
4/25/2017		6			27'		1	Cu
4/26/2017		6			27'		1	Cu
4/28/2017		6			27'		1	Cu
4/29/2017		6			27'		1	Cu
4/30/2017		6			40'		1	Cu
5/1/2017		6			27'		2	Cu
5/3/2017		6			27'		1	Cu
5/8/2017		6			32'		4	Cu
5/15/2017		6			27'		3	Cu
5/20/2017		6			24'		1	Cu
5/25/2017		6			27'		1	Cu
5/26/2017		6			27'		1	Cu
5/31/2017		6			27'		2	Cu
6/2/2017		6			25'		2	Cu
6/4/2017		6			25'		1	Cu
6/5/2017		6			25'		1	Cu
6/6/2017		6			25'		1	Cu
6/7/2017		6			25'		1	Cu
6/8/2017		6			25'		1	Cu
6/11/2017		6			24'		1	Cu
6/12/2017		6			36'		1	Cu
6/13/2017		6			25'		1	Cu
6/15/2017		6			33'		1	Cu
6/16/2017		6			19'		1	Cu
6/17/2017		6			35'		1	Cu
6/20/2017		6			32'		1	Cu
6/22/2017		6			32'		1	Cu
6/23/2017		6			37'		2	Cu
6/25/2017		6			38'		4	Cu
6/29/2017		6			30'		3	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/2/2017		6			33'		2	Cu
7/4/2017		6			23'		1	Cu
7/5/2017		6			38'		1	Cu
7/6/2017		6			38'		1	Cu
7/7/2017		6			27'		1	Cu
7/8/2017		6			42'		1	Cu
7/9/2017		6			16'		1	Cu
7/10/2017		6			27'		2	Cu
7/12/2017		6			27'		3	Cu
7/15/2017		6			35'		1	Cu
7/16/2017		6			27'		4	Cu
7/20/2017		6			27'		4	Cu
7/24/2017		6			26'		1	Cu
7/27/2017		6			25'		2	Cu
7/29/2017		6			30'		2	Cu
7/31/2017		6			32'		1	Cu
8/1/2017		6			30'		6	Cu
8/7/2017		6			30'		3	Cu
8/11/2017		6			38'		1	Cu
8/12/2017		6			18'		1	Cu
8/14/2017		6			30'		2	Cu
8/16/2017		6			31'		1	Cu
8/19/2017		6			17'		2	Cu
8/23/2017		6			32'		2	Cu
8/25/2017		6			30'		4	Cu
9/1/2017		6			24'		2	Cu
9/3/2017		6			33'		1	Cu
9/4/2017		6			33'		1	Cu
9/5/2017		6			27'		1	Cu
9/6/2017		6			41'		1	Cu
9/7/2017		6			41'		3	Cu
9/10/2017		6			27'		1	Cu
9/11/2017		6			27'		1	Cu
9/12/2017		6			25'		1	Cu
9/13/2017		6			27'		1	Cu
9/14/2017		6			10'		1	Cu
9/18/2017		6			38'		4	Cu
9/24/2017		6			33'		1	Cu
9/25/2017		6			33'		3	Cu
9/29/2017		6			24'		1	Cu
9/30/2017		6			17'		14	Cu
10/15/2017		6			38'		15	Cu
10/30/2017		6			44'		7	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/6/2017		6			28'		1	Cu
11/7/2017		6			32'		2	Cu
11/9/2017		6			34'		1	Cu
11/11/2017		6			38'		1	Cu
11/13/2017		6			32'		4	Cu
11/20/2017		6			21'		3	Cu
11/27/2017		6			44'		4	Cu
12/2/2017		6			44'		1	Cu
12/5/2017		6			35'		1	Cu
12/9/2017		6			35'		3	Cu
12/12/2017		6			35'		1	Cu
12/13/2017		6			35'		2	Cu
12/15/2017		6			35'		1	Cu
12/16/2017		6			35'		1	Cu
12/18/2017		6			30'		4	Cu
12/22/2017		6			25'		3	Cu
12/25/2017		6			25'		2	Cu
12/27/2017		6			26'		3	Cu
1/19/2017		6			30'		1	Cu
9/15/2017		6			27'		3	Cu
8/29/2017		6			28'		1	Cu
8/31/2017		6			28'		1	Cu
			71.0%				259	
1/6/2017		7			30'		1	Cu
1/8/2017		7			30'		1	Cu
1/9/2017		7			30'		1	Cu
1/10/2017		7			37'		2	Cu
1/17/2017		7			29'		1	Cu
1/19/2017		7			10'		1	Cu
1/24/2017		7			27'		1	Cu
1/31/2017		7			37'		2	Cu
2/2/2017		7			37'		6	Cu
2/8/2017		7			26'		1	Cu
2/9/2017		7			26'		1	Cu
2/10/2017		7			40'		2	Cu
2/16/2017		7			16'		1	Cu
2/17/2017		7			16'		1	Cu
2/18/2017		7			16'		4	Cu
2/26/2017		7			33'		2	Cu
2/28/2017		7			33'		1	Cu
3/1/2017		7			33'		4	Cu
3/5/2017		7			33'		2	Cu
3/14/2017		7			29'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/15/2017		7			29'		1	Cu
3/29/2017		7			33'		2	Cu
4/4/2017		7			36'		2	Cu
4/10/2017		7			39'		11	Cu
4/22/2017		7			35'		1	Cu
4/24/2017		7			25'		1	Cu
4/25/2017		7			25'		1	Cu
4/27/2017		7			10'		1	Cu
4/29/2017		7			30'		1	Cu
4/30/2017		7			43'		1	Cu
5/1/2017		7			43'		11	Cu
5/18/2017		7			40'		1	Cu
5/19/2017		7			40'		1	Cu
5/22/2017		7			34'		3	Cu
5/26/2017		7			43'		1	Cu
5/27/2017		7			27'		1	Cu
5/28/2017		7			27'		1	Cu
5/30/2017		7			38'		6	Cu
6/6/2017		7			27'		3	Cu
6/10/2017		7			21'		2	Cu
6/12/2017		7			32'		1	Cu
6/14/2017		7			25'		1	Cu
6/15/2017		7			10'		1	Cu
6/16/2017		7			25'		1	Cu
6/24/2017		7			37'		2	Cu
6/26/2017		7			32'		3	Cu
6/29/2017		7			26'		1	Cu
6/30/2017		7			36'		1	Cu
7/1/2017		7			32'		2	Cu
7/3/2017		7			40'		2	Cu
7/5/2017		7			27'		1	Cu
7/7/2017		7			35'		1	Cu
7/8/2017		7			27'		2	Cu
7/10/2017		7			27'		1	Cu
7/11/2017		7			27'		3	Cu
7/15/2017		7			27'		1	Cu
7/16/2017		7			36'		5	Cu
7/22/2017		7					1	Cu
7/24/2017		7			27'		2	Cu
7/26/2017		7			27'		5	Cu
7/31/2017		7			27'		2	Cu
8/2/2017		7			22'		4	Cu
8/6/2017		7			22'		4	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/10/2017		7			26'		1	Cu
8/11/2017		7			27'		2	Cu
8/13/2017		7			27'		2	Cu
8/15/2017		7			36'		2	Cu
8/17/2017		7			36'		1	Cu
8/18/2017		7			39'		2	Cu
8/20/2017		7			36'		1	Cu
8/28/2017		7			27'		1	Cu
8/29/2017		7			41'		3	Cu
9/1/2017		7			30'		1	Cu
9/2/2017		7			32'		2	Cu
9/5/2017		7			30'		1	Cu
9/6/2017		7			33'		1	Cu
9/8/2017		7			33'		1	Cu
9/10/2017		7			38'		3	Cu
9/13/2017		7			38'		2	Cu
9/15/2017		7			38'		1	Cu
9/16/2017		7			38'		1	Cu
9/17/2017		7			33'		2	Cu
9/19/2017		7			38'		7	Cu
9/28/2017		7			25'		1	Cu
9/30/2017		7			18'		2	Cu
10/2/2017		7			41'		1	Cu
10/3/2017		7			32'		2	Cu
10/5/2017		7			32'		1	Cu
10/7/2017		7			27'		1	Cu
10/9/2017		7			41'		1	Cu
10/10/2017		7			35'		1	Cu
10/11/2017		7			35'		1	Cu
10/12/2017		7			35'		3	Cu
10/15/2017		7			35'		3	Cu
10/18/2017		7			35'		2	Cu
10/20/2017		7			32'		1	Cu
10/21/2017		7			32'		1	Cu
10/22/2017		7			32'		1	Cu
10/23/2017		7			32'		1	Cu
10/25/2017		7			44'		5	Cu
10/30/2017		7			18'		3	Cu
11/2/2017		7			28'		1	Cu
11/6/2017		7			32'		1	Cu
11/7/2017		7			36'		3	Cu
11/11/2017		7			33'		1	Cu
11/13/2017		7			42'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/15/2017		7			10'		1	Cu
11/19/2017		7			35'		11	Cu
12/2/2017		7			30'		3	Cu
12/5/2017		7			30'		1	Cu
12/8/2017		7			32'		2	Cu
12/10/2017		7			44'		2	Cu
12/17/2017		7			33'		3	Cu
12/20/2017		7			33'		1	Cu
12/26/2017		7			44'		3	Cu
2/21/2017		7			40'		2	Cu
5/15/2017		7			40'		3	Cu
6/19/2017		7			27'		5	Cu
9/7/2017		7			41'		1	Cu
9/29/2017		7			37'		1	Cu
10/24/2017		7			40'		1	Cu
11/3/2017		7			18'		3	Cu
11/16/2017		7			30'		1	Cu
8/24/2017		7			28'		1	Cu
9/9/2017		7			31'		1	Cu
			70.1%				256	
1/2/2017		8			28'		1	Cu
1/3/2017		8			28'		1	Cu
1/5/2017		8			28'		1	Cu
1/7/2017		8			28'		2	Cu
1/9/2017		8			28'		1	Cu
1/10/2017		8			28'		2	Cu
1/12/2017		8			28'		1	Cu
1/28/2017		8			27'		3	Cu
1/31/2017		8			27'		1	Cu
2/5/2017		8			33'		1	Cu
2/6/2017		8			25'		1	Cu
2/7/2017		8			27'		3	Cu
2/11/2017		8			27'		1	Cu
2/12/2017		8			27'		4	Cu
2/16/2017		8			38'		4	Cu
2/21/2017		8			30'		1	Cu
2/26/2017		8			40'		1	Cu
2/27/2017		8			40'		1	Cu
2/28/2017		8			40'		1	Cu
3/1/2017		8			27'		2	Cu
3/6/2017		8			30'		1	Cu
3/7/2017		8			30'		1	Cu
3/8/2017		8			30'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/10/2017		8			32'		1	Cu
3/11/2017		8			26'		1	Cu
3/13/2017		8			29'		1	Cu
3/14/2017		8			10'		1	Cu
3/16/2017		8			40'		4	Cu
3/21/2017		8			40'		1	Cu
3/22/2017		8			40'		1	Cu
3/23/2017		8			40'		1	Cu
3/29/2017		8			35'		1	Cu
4/1/2017		8			22'		2	Cu
4/3/2017		8			32'		3	Cu
4/7/2017		8			25'		3	Cu
4/10/2017		8			25'		1	Cu
4/14/2017		8			41'		2	Cu
4/22/2017		8			35'		1	Cu
5/1/2017		8			38'		11	Cu
6/1/2017		8			27'		2	Cu
6/3/2017		8			27'		1	Cu
6/8/2017		8			28'		8	Cu
6/16/2017		8			28'		4	Cu
6/25/2017		8			44'		7	Cu
7/2/2017		8			30'		1	Cu
7/3/2017		8			41'		2	Cu
7/5/2017		8			27'		2	Cu
7/7/2017		8			43'		3	Cu
7/12/2017		8			26'		1	Cu
7/13/2017		8			26'		1	Cu
7/14/2017		8			26'		3	Cu
7/17/2017		8			26'		2	Cu
7/19/2017		8			26'		2	Cu
7/21/2017		8			26'		7	Cu
7/28/2017		8			34'		3	Cu
7/31/2017		8			35'		4	Cu
8/4/2017		8			26'		2	Cu
8/6/2017		8			27'		5	Cu
8/11/2017		8			36'		2	Cu
8/13/2017		8			20'		1	Cu
8/14/2017		8			30'		1	Cu
8/15/2017		8			10'		1	Cu
8/17/2017		8			26'		1	Cu
8/18/2017		8			23'		3	Cu
8/25/2017		8			22'		3	Cu
8/28/2017		8			35'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/29/2017		8			30'		1	Cu
8/30/2017		8			30'		1	Cu
9/1/2017		8			24'		3	Cu
9/4/2017		8			41'		2	Cu
9/6/2017		8			30'		1	Cu
9/7/2017		8			30'		1	Cu
9/13/2017		8			27'		1	Cu
9/14/2017		8			32'		1	Cu
9/16/2017		8			41'		1	Cu
9/17/2017		8			38'		2	Cu
9/19/2017		8			30'		1	Cu
9/20/2017		8			24'		1	Cu
9/21/2017		8			33'		1	Cu
9/22/2017		8			38'		3	Cu
9/30/2017		8			19'		1	Cu
10/7/2017		8			23'		2	Cu
10/9/2017		8			35'		1	Cu
10/10/2017		8			28'		1	Cu
10/11/2017		8			30'		7	Cu
10/18/2017		8			30'		2	Cu
10/21/2017		8			40'		3	Cu
10/24/2017		8			40'		3	Cu
10/27/2017		8			35'		1	Cu
10/28/2017		8			42'		1	Cu
10/29/2017		8			36'		1	Cu
10/30/2017		8			30'		1	Cu
10/31/2017		8			34'		3	Cu
11/3/2017		8			30'		1	Cu
11/4/2017		8			30'		1	Cu
11/5/2017		8			35'		1	Cu
11/6/2017		8			30'		1	Cu
11/7/2017		8			28'		2	Cu
11/9/2017		8			28'		1	Cu
11/11/2017		8			42'		2	Cu
11/13/2017		8			30'		4	Cu
11/20/2017		8			30'		2	Cu
11/22/2017		8			30'		3	Cu
11/28/2017		8			32'		3	Cu
12/6/2017		8			28'		1	Cu
12/11/2017		8			32'		4	Cu
12/18/2017		8			34'		4	Cu
12/23/2017		8			25'		1	Cu
12/27/2017		8			25'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/24/2017		8			40'		3	Cu
2/25/2017		8			40'		1	Cu
4/24/2017		8			35'		1	Cu
9/11/2017		8			35'		1	Cu
9/12/2017		8			27'		1	Cu
9/25/2017		8			30'		2	Cu
10/2/2017		8			30'		3	Cu
10/5/2017		8			30'		1	Cu
12/25/2017		8			25'		1	Cu
12/26/2017		8			30'		1	Cu
8/24/2017		8			28'		1	Cu
			65.8%				240	
1/3/2017		9			25'		1	Cu
1/4/2017		9			25'		1	Cu
1/5/2017		9			25'		2	Cu
1/21/2017		9			32'		3	Cu
2/20/2017		9			38'		3	Cu
2/23/2017		9			38'		2	Cu
2/25/2017		9			38'		2	Cu
2/27/2017		9			41'		7	Cu
3/7/2017		9			29'		1	Cu
3/10/2017		9			41'		1	Cu
3/11/2017		9			28'		1	Cu
3/13/2017		9			30'		1	Cu
3/14/2017		9			30'		1	Cu
3/18/2017		9			25'		2	Cu
3/26/2017		9			26'		1	Cu
4/3/2017		9			26'		3	Cu
4/10/2017		9			30'		1	Cu
4/14/2017		9			32'		1	Cu
4/15/2017		9			22'		1	Cu
4/23/2017		9			22'		2	Cu
4/26/2017		9			28'		1	Cu
4/29/2017		9			35'		1	Cu
4/30/2017		9			35'		3	Cu
5/9/2017		9			27'		3	Cu
5/15/2017		9			39'		1	Cu
5/26/2017		9			32'		3	Cu
5/29/2017		9			32'		1	Cu
5/30/2017		9			41'		2	Cu
6/1/2017		9			36'		2	Cu
6/3/2017		9			36'		2	Cu
6/6/2017		9			22'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/10/2017		9			42'		2	Cu
6/13/2017		9			32'		1	Cu
6/14/2017		9			32'		2	Cu
6/19/2017		9			25'		1	Cu
6/21/2017		9			40'		3	Cu
6/26/2017		9			27'		1	Cu
6/27/2017		9			12'		8	Cu
7/5/2017		9			41'		7	Cu
7/14/2017		9			36'		2	Cu
7/17/2017		9			27'		1	Cu
7/18/2017		9			27'		1	Cu
7/20/2017		9			27'		1	Cu
7/23/2017		9			42'		7	Cu
7/31/2017		9			20'		3	Cu
8/3/2017		9			21'		2	Cu
8/5/2017		9			24'		2	Cu
8/7/2017		9			40'		1	Cu
8/15/2017		9			17'		2	Cu
8/19/2017		9			18'		1	Cu
8/21/2017		9			25'		1	Cu
8/24/2017		9			18'		13	Cu
9/11/2017		9			25'		1	Cu
9/12/2017		9			25'		2	Cu
9/17/2017		9			24'		1	Cu
9/18/2017		9			30'		1	Cu
9/19/2017		9			30'		3	Cu
9/22/2017		9			41'		1	Cu
9/23/2017		9			43'		2	Cu
9/25/2017		9			38'		1	Cu
9/26/2017		9			38'		1	Cu
9/27/2017		9			32'		2	Cu
9/30/2017		9			21'		5	Cu
10/5/2017		9			33'		1	Cu
10/6/2017		9			18'		2	Cu
10/9/2017		9			32'		1	Cu
10/10/2017		9			44'		3	Cu
10/13/2017		9			40'		1	Cu
10/14/2017		9			40'		1	Cu
10/16/2017		9			32'		1	Cu
10/17/2017		9			32'		2	Cu
10/19/2017		9			42'		2	Cu
10/21/2017		9			40'		3	Cu
10/24/2017		9			40'		6	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/30/2017		9			39'		3	Cu
11/2/2017		9			39'		1	Cu
11/3/2017		9			39'		1	Cu
11/4/2017		9			39'		1	Cu
11/6/2017		9			34'		3	Cu
11/9/2017		9			30'		1	Cu
11/11/2017		9			42'		1	Cu
11/13/2017		9			42'		1	Cu
11/14/2017		9			26'		1	Cu
11/15/2017		9			42'		1	Cu
11/20/2017		9			38'		1	Cu
11/21/2017		9			42'		7	Cu
11/28/2017		9			42'		1	Cu
11/29/2017		9			33'		2	Cu
12/1/2017		9			33'		2	Cu
12/6/2017		9			27'		1	Cu
12/13/2017		9			25'		1	Cu
12/14/2017		9			32'		1	Cu
12/18/2017		9			32'		4	Cu
12/24/2017		9			30'		2	Cu
12/28/2017		9			21'		3	Cu
1/28/2017		9			17'		1	Cu
2/4/2017		9			37'		4	Cu
6/12/2017		9			25'		1	Cu
7/12/2017		9			10'		1	Cu
8/8/2017		9			26'		5	Cu
8/13/2017		9			26'		1	Cu
9/6/2017		9			18'		5	Cu
9/14/2017		9			33'		1	Cu
12/11/2017		9			25'		2	Cu
12/26/2017		9			25'		1	Cu
8/17/2017		9			28'		1	Cu
9/6/2017		9			28'		2	Cu
			62.2%				227	
1/1/2017		10			30'		4	Cu
1/5/2017		10			30'		1	Cu
1/10/2017		10			27'		1	Cu
1/26/2017		10			30'		1	Cu
1/28/2017		10			23'		1	Cu
1/30/2017		10			33'		1	Cu
1/31/2017		10			26'		1	Cu
2/1/2017		10			26'		1	Cu
2/6/2017		10			32'		13	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/26/2017		10			32'		2	Cu
2/28/2017		10			32'		2	Cu
3/2/2017		10			32'		1	Cu
3/5/2017		10			29'		3	Cu
3/10/2017		10			36'		2	Cu
3/12/2017		10			36'		1	Cu
3/13/2017		10			36'		1	Cu
3/16/2017		10			25'		2	Cu
3/30/2017		10			25'		1	Cu
4/3/2017		10			27'		1	Cu
4/4/2017		10			29'		3	Cu
4/10/2017		10			38'		2	Cu
4/23/2017		10			25'		3	Cu
4/29/2017		10			43'		1	Cu
4/30/2017		10			38'		9	Cu
5/10/2017		10			30'		1	Cu
5/11/2017		10			30'		1	Cu
5/22/2017		10			30'		1	Cu
5/23/2017		10			30'		1	Cu
5/24/2017		10			30'		1	Cu
5/25/2017		10			30'		1	Cu
5/26/2017		10			36'		3	Cu
6/3/2017		10			36'		2	Cu
6/5/2017		10			27'		2	Cu
6/7/2017		10			27'		1	Cu
6/8/2017		10			27'		1	Cu
6/11/2017		10			39'		1	Cu
6/12/2017		10			18'		3	Cu
6/15/2017		10			25'		1	Cu
6/16/2017		10			22'		2	Cu
6/22/2017		10			22'		3	Cu
6/27/2017		10			12'		8	Cu
7/5/2017		10			32'		3	Cu
7/8/2017		10			32'		1	Cu
7/9/2017		10			32'		2	Cu
7/11/2017		10			20'		2	Cu
7/13/2017		10			20'		1	Cu
7/14/2017		10			19'		2	Cu
7/22/2017		10			26'		1	Cu
7/24/2017		10			44'		4	Cu
7/28/2017		10			26'		1	Cu
7/29/2017		10			22'		2	Cu
7/31/2017		10			44'		4	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/4/2017		10			44'		2	Cu
8/6/2017		10			44'		1	Cu
8/7/2017		10			35'		5	Cu
8/12/2017		10			27'		1	Cu
8/13/2017		10			27'		1	Cu
8/17/2017		10			27'		1	Cu
8/18/2017		10			27'		3	Cu
8/21/2017		10			27'		6	Cu
9/1/2017		10			22'		1	Cu
9/2/2017		10			28'		1	Cu
9/3/2017		10			36'		1	Cu
9/9/2017		10			19'		1	Cu
9/15/2017		10			40'		15	Cu
9/30/2017		10			25'		2	Cu
10/3/2017		10			28'		1	Cu
10/4/2017		10			21'		4	Cu
10/8/2017		10			21'		1	Cu
10/9/2017		10			44'		1	Cu
10/10/2017		10			32'		2	Cu
10/12/2017		10			40'		3	Cu
10/16/2017		10			40'		3	Cu
10/19/2017		10			22'		3	Cu
10/22/2017		10			42'		1	Cu
10/23/2017		10			40'		3	Cu
10/26/2017		10			40'		1	Cu
10/27/2017		10			26'		2	Cu
10/29/2017		10			40'		1	Cu
10/30/2017		10			32'		4	Cu
11/3/2017		10			44'		1	Cu
11/4/2017		10			38'		1	Cu
11/5/2017		10			38'		1	Cu
11/8/2017		10			30'		1	Cu
11/9/2017		10			38'		1	Cu
11/10/2017		10			38'		2	Cu
11/12/2017		10			38'		1	Cu
11/13/2017		10			38'		1	Cu
11/14/2017		10			38'		1	Cu
11/15/2017		10			38'		1	Cu
11/16/2017		10			38'		1	Cu
11/17/2017		10			38'		1	Cu
11/18/2017		10			38'		1	Cu
11/19/2017		10			38'		1	Cu
11/20/2017		10			42'		4	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/26/2017		10			37'		3	Cu
12/6/2017		10			37'		8	Cu
12/14/2017		10			37'		1	Cu
12/18/2017		10			25'		4	Cu
12/26/2017		10			26'		1	Cu
12/27/2017		10			26'		1	Cu
12/28/2017		10			26'		1	Cu
2/21/2017		10			32'		5	Cu
3/3/2017		10			32'		1	Cu
4/14/2017		10			23'		3	Cu
5/9/2017		10			30'		1	Cu
8/27/2017		10			27'		5	Cu
9/11/2017		10			28'		4	Cu
10/2/2017		10			28'		1	Cu
11/6/2017		10			34'		2	Cu
8/15/2017		10			28'		2	Cu
9/6/2017		10			28'		2	Cu
9/8/2017		10			28'		3	Cu
			69.0%				252	
1/1/2017		11			31'		1	Cu
1/2/2017		11			31'		1	Cu
1/3/2017		11			27'		1	Cu
1/4/2017		11			41'		1	Cu
1/5/2017		11			31'		2	Cu
1/7/2017		11			41'		4	Cu
1/11/2017		11			41'		1	Cu
1/12/2017		11			41'		1	Cu
1/26/2017		11			25'		4	Cu
1/30/2017		11			30'		1	Cu
2/2/2017		11			32'		1	Cu
2/6/2017		11			40'		2	Cu
2/8/2017		11			40'		1	Cu
2/11/2017		11			26'		1	Cu
2/13/2017		11			30'		1	Cu
2/27/2017		11			27'		15	Cu
3/14/2017		11			27'		1	Cu
3/15/2017		11			27'		1	Cu
3/16/2017		11			27'		1	Cu
3/24/2017		11			32'		1	Cu
4/4/2017		11			27'		1	Cu
4/13/2017		11			57'		1	Cu
4/14/2017		11			18'		2	Cu
4/17/2017		11			30'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/1/2017		11			35'		1	Cu
5/6/2017		11			41'		2	Cu
5/17/2017		11			41'		2	Cu
5/22/2017		11			32'		1	Cu
5/23/2017		11			32'		3	Cu
5/27/2017		11			29'		1	Cu
6/5/2017		11			30'		1	Cu
6/6/2017		11			30'		1	Cu
6/7/2017		11			30'		1	Cu
6/8/2017		11			30'		1	Cu
6/12/2017		11			30'		1	Cu
6/15/2017		11			17'		3	Cu
6/22/2017		11			30'		3	Cu
6/25/2017		11			30'		2	Cu
6/27/2017		11			27'		1	Cu
6/29/2017		11			43'		3	Cu
7/2/2017		11			43'		5	Cu
7/7/2017		11			25'		1	Cu
7/10/2017		11			27'		1	Cu
7/11/2017		11			27'		1	Cu
7/18/2017		11			30'		2	Cu
7/24/2017		11			27'		2	Cu
7/26/2017		11			44'		7	Cu
8/2/2017		11			44'		1	Cu
8/3/2017		11			20'		1	Cu
8/4/2017		11			27'		3	Cu
8/7/2017		11			44'		2	Cu
8/9/2017		11			27'		1	Cu
8/10/2017		11			18'		3	Cu
8/16/2017		11			16'		1	Cu
8/18/2017		11			40'		2	Cu
8/20/2017		11			13'		1	Cu
8/21/2017		11			17'		1	Cu
8/22/2017		11			17'		1	Cu
8/23/2017		11			17'		1	Cu
8/28/2017		11			44'		4	Cu
9/1/2017		11			24'		4	Cu
9/5/2017		11			44'		3	Cu
9/11/2017		11			38'		4	Cu
9/15/2017		11			27'		14	Cu
10/9/2017		11			30'		1	Cu
10/10/2017		11			30'		1	Cu
10/11/2017		11			30'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/12/2017		11			30'		1	Cu
10/17/2017		11			40'		3	Cu
10/20/2017		11			44'		10	Cu
10/30/2017		11			44'		2	Cu
11/2/2017		11			38'		1	Cu
11/3/2017		11			38'		1	Cu
11/6/2017		11			38'		1	Cu
11/7/2017		11			38'		1	Cu
11/8/2017		11			38'		1	Cu
11/10/2017		11			25'		1	Cu
11/13/2017		11			28'		4	Cu
11/18/2017		11			44'		5	Cu
11/24/2017		11			29'		1	Cu
11/28/2017		11			34'		3	Cu
12/11/2017		11			41'		2	Cu
12/16/2017		11			31'		3	Cu
10/1/2017		11			41'		1	Cu
2/18/2017		11			39'		5	Cu
5/8/2017		11			41'		9	Cu
7/13/2017		11			27'		4	Cu
10/2/2017		11			38'		4	Cu
12/6/2017		11			32'		2	Cu
5/2/2017		11			40'		2	Cu
7/22/2017		11			41'		1	Cu
7/23/2017		11			41'		1	Cu
8/13/2017		11			41'		3	Cu
9/8/2017		11			36'		1	Cu
9/9/2017		11			36'		1	Cu
9/30/2017		11			41'		1	Cu
10/16/2017		11			28'		1	Cu
12/26/2017		11			32'		3	Cu
			60.8%				222	
1/1/2017		12			40'		1	Cu
1/3/2017		12			40'		1	Cu
1/4/2017		12			40'		3	Cu
1/9/2017		12			40'		4	Cu
1/26/2017		12			32'		1	Cu
1/30/2017		12			32'		2	Cu
2/2/2017		12			27'		1	Cu
2/6/2017		12			32'		4	Cu
2/10/2017		12			39'		1	Cu
2/13/2017		12			32'		3	Cu
2/17/2017		12			34'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/27/2017		12			40'		1	Cu
2/28/2017		12			38'		2	Cu
3/2/2017		12			38'		2	Cu
3/5/2017		12			36'		2	Cu
3/7/2017		12			36'		1	Cu
3/10/2017		12			33'		3	Cu
3/13/2017		12			33'		1	Cu
3/18/2017		12			41'		1	Cu
3/19/2017		12			41'		1	Cu
3/28/2017		12			32'		1	Cu
4/4/2017		12			29'		1	Cu
4/6/2017		12			32'		1	Cu
4/9/2017		12			50'		2	Cu
4/14/2017		12			22'		3	Cu
4/17/2017		12			22'		1	Cu
4/22/2017		12			44'		1	Cu
4/29/2017		12			27'		2	Cu
5/1/2017		12			35'		2	Cu
5/5/2017		12			30'		3	Cu
5/8/2017		12			30'		2	Cu
5/10/2017		12			30'		1	Cu
5/11/2017		12			30'		1	Cu
5/20/2017		12			40'		1	Cu
5/24/2017		12			25'		1	Cu
5/25/2017		12			25'		1	Cu
5/27/2017		12			40'		3	Cu
5/30/2017		12			40'		4	Cu
6/3/2017		12			27'		1	Cu
6/4/2017		12			27'		1	Cu
6/12/2017		12			32'		1	Cu
6/15/2017		12			49'		1	Cu
6/16/2017		12			19'		2	Cu
6/18/2017		12			47'		4	Cu
6/24/2017		12			45'		1	Cu
6/26/2017		12			50'		2	Cu
6/28/2017		12			50'		2	Cu
6/30/2017		12			45'		1	Cu
7/1/2017		12			44'		7	Cu
7/8/2017		12			47'		2	Cu
7/10/2017		12			32'		4	Cu
7/14/2017		12			23'		1	Cu
7/22/2017		12			39'		1	Cu
7/23/2017		12			23'		3	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/26/2017		12			45'		2	Cu
7/28/2017		12			43'		3	Cu
7/31/2017		12			22'		1	Cu
8/1/2017		12			22'		5	Cu
8/7/2017		12			30'		1	Cu
8/8/2017		12			36'		1	Cu
8/9/2017		12			27'		2	Cu
8/11/2017		12			38'		1	Cu
8/12/2017		12			26'		2	Cu
8/14/2017		12			32'		1	Cu
8/24/2017		12			22'		11	Cu
9/7/2017		12			41'		2	Cu
9/17/2017		12			38'		6	Cu
9/23/2017		12			25'		1	Cu
9/24/2017		12			32'		1	Cu
9/25/2017		12			44'		4	Cu
9/30/2017		12			21'		2	Cu
10/2/2017		12			44'		4	Cu
10/8/2017		12			47'		1	Cu
10/12/2017		12			32'		1	Cu
10/24/2017		12			32'		1	Cu
10/25/2017		12			33'		2	Cu
10/27/2017		12			36'		2	Cu
10/29/2017		12			36'		1	Cu
10/30/2017		12			29'		1	Cu
11/1/2017		12			54'		3	Cu
11/4/2017		12			25'		1	Cu
11/5/2017		12			25'		2	Cu
11/7/2017		12			39'		1	Cu
11/8/2017		12			41'		3	Cu
11/11/2017		12			43'		1	Cu
11/12/2017		12			41'		1	Cu
11/13/2017		12			41'		1	Cu
11/14/2017		12			25'		1	Cu
11/15/2017		12			25'		1	Cu
11/16/2017		12			25'		1	Cu
11/17/2017		12			25'		1	Cu
11/18/2017		12			25'		1	Cu
11/19/2017		12			25'		1	Cu
11/20/2017		12			40'		1	Cu
11/21/2017		12			28'		2	Cu
11/23/2017		12			47'		1	Cu
11/24/2017		12			42'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
11/27/2017		12			49'		4	Cu
12/3/2017		12			30'		1	Cu
12/11/2017		12			28'		2	Cu
12/13/2017		12			28'		1	Cu
12/14/2017		12			25'		2	Cu
12/18/2017		12			28'		1	Cu
12/22/2017		12			32'		2	Cu
10/10/2017		12			28'		1	Cu
2/19/2017		12			43'		1	Cu
2/20/2017		12			32'		3	Cu
3/29/2017		12			32'		1	Cu
5/18/2017		12			32'		1	Cu
9/10/2017		12			38'		7	Cu
10/7/2017		12			47'		1	Cu
10/16/2017		12			38'		8	Cu
12/5/2017		12			30'		1	Cu
12/19/2017		12			37'		3	Cu
8/16/2017		12			41'		1	Cu
9/4/2017		12			41'		3	Cu
9/9/2017		12			41'		1	Cu
10/11/2017		12			28'		1	Cu
10/15/2017		12			41'		15	Cu
12/26/2017		12			36'		1	Cu
12/28/2017		12			36'		1	Cu
			67.9%				248	
1/25/2017		13			45'		5	Cu
1/30/2017		13			45'		1	Cu
1/31/2017		13			45'		1	Cu
2/1/2017		13			45'		1	Cu
2/2/2017		13			45'		6	Cu
2/8/2017		13			32'		5	Cu
2/16/2017		13			32'		3	Cu
2/26/2017		13			40'		2	Cu
2/28/2017		13			40'		6	Cu
3/7/2017		13			32'		1	Cu
3/8/2017		13			32'		1	Cu
3/9/2017		13			32'		1	Cu
4/2/2017		13			41'		1	Cu
4/15/2017		13			21'		1	Cu
5/1/2017		13			27'		4	Cu
5/5/2017		13			42'		10	Cu
5/18/2017		13			35'		1	Cu
5/20/2017		13			14'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/21/2017		13			14'		1	Cu
5/22/2017		13			35'		4	Cu
5/27/2017		13			38'		7	Cu
6/3/2017		13			39'		3	Cu
6/7/2017		13			50'		1	Cu
6/12/2017		13			32'		1	Cu
6/26/2017		13			32'		1	Cu
6/27/2017		13			32'		1	Cu
6/28/2017		13			32'		1	Cu
6/30/2017		13			32'		1	Cu
7/1/2017		13			43'		2	Cu
7/3/2017		13			20'		2	Cu
7/5/2017		13			32'		1	Cu
7/6/2017		13			32'		1	Cu
7/7/2017		13			32'		1	Cu
7/11/2017		13			32'		1	Cu
7/12/2017		13			32'		1	Cu
7/14/2017		13			25'		2	Cu
7/18/2017		13			30'		1	Cu
7/19/2017		13			30'		1	Cu
7/20/2017		13			31'		6	Cu
7/26/2017		13			26'		3	Cu
7/29/2017		13			26'		4	Cu
8/2/2017		13			26'		5	Cu
8/7/2017		13			26'		1	Cu
8/8/2017		13			26'		2	Cu
8/10/2017		13			26'		2	Cu
8/15/2017		13			27'		2	Cu
8/17/2017		13			26'		2	Cu
8/19/2017		13			25'		2	Cu
8/24/2017		13			40'		2	Cu
8/26/2017		13			30'		2	Cu
8/28/2017		13			38'		2	Cu
8/30/2017		13			20'		3	Cu
9/2/2017		13			38'		1	Cu
9/3/2017		13			22'		1	Cu
9/4/2017		13			22'		1	Cu
9/5/2017		13			22'		2	Cu
9/9/2017		13			35'		1	Cu
9/18/2017		13			30'		1	Cu
9/19/2017		13			33'		1	Cu
9/20/2017		13			35'		10	Cu
9/30/2017		13			35'		3	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/3/2017		13			35'		3	Cu
10/9/2017		13			30'		1	Cu
10/10/2017		13			30'		1	Cu
10/12/2017		13			26'		1	Cu
10/14/2017		13			47'		1	Cu
10/16/2017		13			50'		14	Cu
10/30/2017		13			26'		1	Cu
10/31/2017		13			38'		2	Cu
11/2/2017		13			35'		14	Cu
11/20/2017		13			25'		1	Cu
11/21/2017		13			25'		1	Cu
11/22/2017		13			25'		1	Cu
11/26/2017		13			39'		2	Cu
11/28/2017		13			39'		3	Cu
12/1/2017		13			39'		2	Cu
12/6/2017		13			30'		1	Cu
12/13/2017		13			47'		1	Cu
12/14/2017		13			28'		1	Cu
12/27/2017		13			25'		2	Cu
12/29/2017		13			46'		1	Cu
6/15/2017		13			35'		2	Cu
6/29/2017		13			32'		1	Cu
9/7/2017		13			24'		2	Cu
9/10/2017		13			40'		5	Cu
10/13/2017		13			47'		1	Cu
12/5/2017		13			27'		1	Cu
			57.5%				210	
1/3/2017		14			27'		3	Cu
1/9/2017		14			27'		1	Cu
1/10/2017		14			27'		1	Cu
1/11/2017		14			27'		1	Cu
1/12/2017		14			27'		1	Cu
1/16/2017		14			27'		1	Cu
1/17/2017		14			27'		2	Cu
1/19/2017		14			27'		1	Cu
1/20/2017		14			27'		2	Cu
1/22/2017		14			27'		2	Cu
1/24/2017		14			27'		2	Cu
1/26/2017		14			27'		2	Cu
1/28/2017		14			27'		2	Cu
1/30/2017		14			27'		1	Cu
1/31/2017		14			27'		1	Cu
2/1/2017		14			27'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/2/2017		14			27'		1	Cu
2/6/2017		14			27'		3	Cu
2/9/2017		14			27'		1	Cu
2/11/2017		14			32'		2	Cu
2/16/2017		14			42'		3	Cu
2/21/2017		14			29'		2	Cu
2/26/2017		14			26'		1	Cu
2/27/2017		14			26'		1	Cu
2/28/2017		14			26'		1	Cu
3/1/2017		14			37'		2	Cu
3/3/2017		14			45'		1	Cu
3/7/2017		14			40'		1	Cu
3/8/2017		14			40'		1	Cu
3/9/2017		14			40'		1	Cu
3/12/2017		14			45'		1	Cu
3/13/2017		14			45'		1	Cu
4/14/2017		14			39'		7	Cu
4/21/2017		14			39'		7	Cu
4/28/2017		14			39'		1	Cu
4/29/2017		14			39'		1	Cu
4/30/2017		14			39'		1	Cu
5/1/2017		14			30'		3	Cu
5/4/2017		14			30'		1	Cu
5/5/2017		14			38'		6	Cu
5/11/2017		14			43'		2	Cu
5/13/2017		14			43'		2	Cu
5/21/2017		14			44'		3	Cu
5/26/2017		14			39'		3	Cu
5/31/2017		14			41'		15	Cu
6/16/2017		14			19'		1	Cu
6/24/2017		14			27'		1	Cu
6/26/2017		14			30'		3	Cu
6/29/2017		14			35'		1	Cu
7/2/2017		14			47'		1	Cu
7/3/2017		14			38'		2	Cu
7/5/2017		14			38'		2	Cu
7/10/2017		14			18'		4	Cu
7/14/2017		14			18'		1	Cu
7/18/2017		14			45'		1	Cu
7/21/2017		14			37'		1	Cu
7/22/2017		14			23'		7	Cu
7/29/2017		14			21'		2	Cu
7/31/2017		14			18'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/2/2017		14			24'		4	Cu
8/6/2017		14			38'		4	Cu
8/10/2017		14			22'		1	Cu
8/11/2017		14			19'		9	Cu
8/21/2017		14			27'		4	Cu
8/25/2017		14			40'		1	Cu
8/26/2017		14			22'		3	Cu
8/29/2017		14			27'		3	Cu
9/2/2017		14			23'		2	Cu
9/6/2017		14			38'		2	Cu
9/9/2017		14			21'		3	Cu
9/12/2017		14			43'		1	Cu
9/13/2017		14			26'		4	Cu
9/17/2017		14			42'		7	Cu
9/25/2017		14			30'		7	Cu
10/2/2017		14			30'		1	Cu
10/3/2017		14			30'		2	Cu
10/5/2017		14			42'		2	Cu
10/10/2017		14			38'		1	Cu
10/11/2017		14			33'		1	Cu
10/12/2017		14			33'		1	Cu
10/16/2017		14			33'		1	Cu
10/17/2017		14			33'		1	Cu
10/20/2017		14			21'		3	Cu
10/27/2017		14			54'		1	Cu
10/30/2017		14			43'		2	Cu
11/6/2017		14			42'		1	Cu
11/15/2017		14			44'		2	Cu
11/18/2017		14			50'		2	Cu
11/20/2017		14			34'		3	Cu
11/24/2017		14			39'		2	Cu
12/4/2017		14			42'		1	Cu
12/5/2017		14			42'		2	Cu
12/7/2017		14			42'		1	Cu
12/8/2017		14			30'		1	Cu
12/20/2017		14			35'		3	Cu
12/25/2017		14			39'		1	Cu
12/26/2017		14			39'		1	Cu
12/29/2017		14			32'		3	Cu
3/14/2017		14			41'		4	Cu
6/30/2017		14			47'		2	Cu
10/9/2017		14			27'		1	Cu
10/19/2017		14			24'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/23/2017		14			30'		4	Cu
11/2/2017		14			43'		1	Cu
			64.1%				234	
1/1/2017		15			32'		1	Cu
1/3/2017		15			35'		1	Cu
1/4/2017		15			35'		1	Cu
1/9/2017		15			30'		1	Cu
1/12/2017		15			42'		1	Cu
1/21/2017		15			35'		3	Cu
1/24/2017		15			35'		1	Cu
1/27/2017		15			40'		3	Cu
2/3/2017		15			40'		5	Cu
2/8/2017		15			40'		3	Cu
2/16/2017		15			46'		1	Cu
2/19/2017		15			39'		2	Cu
2/25/2017		15			46'		5	Cu
3/2/2017		15			46'		2	Cu
3/4/2017		15			29'		1	Cu
3/5/2017		15			29'		1	Cu
3/6/2017		15			29'		1	Cu
3/8/2017		15			29'		1	Cu
3/15/2017		15			36'		2	Cu
3/17/2017		15			36'		1	Cu
3/18/2017		15			36'		1	Cu
4/15/2017		15			25'		2	Cu
4/28/2017		15			34'		14	Cu
5/15/2017		15			42'		2	Cu
5/24/2017		15			44'		2	Cu
5/26/2017		15			44'		5	Cu
5/31/2017		15			44'		5	Cu
6/9/2017		15			27'		1	Cu
6/15/2017		15			32'		1	Cu
6/16/2017		15			32'		2	Cu
6/18/2017		15			30'		2	Cu
6/21/2017		15			28'		1	Cu
6/22/2017		15			50'		1	Cu
6/23/2017		15			50'		1	Cu
6/26/2017		15			37'		2	Cu
6/28/2017		15			27'		1	Cu
6/29/2017		15			36'		1	Cu
6/30/2017		15			25'		10	Cu
7/11/2017		15			29'		3	Cu
7/14/2017		15			42'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/15/2017		15			42'		2	Cu
7/29/2017		15			31'		1	Cu
7/30/2017		15			31'		1	Cu
7/31/2017		15			22'		10	Cu
8/10/2017		15			30'		4	Cu
8/14/2017		15			30'		1	Cu
8/15/2017		15			25'		3	Cu
8/21/2017		15			32'		3	Cu
8/24/2017		15			26'		3	Cu
8/28/2017		15			38'		4	Cu
9/1/2017		15			27'		5	Cu
9/6/2017		15			27'		4	Cu
9/10/2017		15			27'		3	Cu
9/13/2017		15			27'		5	Cu
9/18/2017		15			28'		2	Cu
9/20/2017		15			38'		2	Cu
9/22/2017		15			45'		4	Cu
9/26/2017		15			32'		1	Cu
9/30/2017		15			26'		2	Cu
10/5/2017		15			17'		1	Cu
10/8/2017		15			38'		2	Cu
10/10/2017		15			47'		1	Cu
10/11/2017		15			33'		1	Cu
10/13/2017		15			50'		13	Cu
10/26/2017		15			32'		1	Cu
10/27/2017		15			38'		1	Cu
10/28/2017		15			35'		6	Cu
11/3/2017		15			30'		1	Cu
11/5/2017		15			40'		4	Cu
11/12/2017		15			45'		2	Cu
11/22/2017		15			28'		1	Cu
11/26/2017		15			42'		6	Cu
12/2/2017		15			34'		1	Cu
12/11/2017		15			32'		4	Cu
12/18/2017		15			32'		3	Cu
12/21/2017		15			32'		1	Cu
12/22/2017		15			39'		1	Cu
12/24/2017		15			39'		1	Cu
12/25/2017		15			38'		4	Cu
12/29/2017		15			38'		1	Cu
12/30/2017		15			38'		1	Cu
3/27/2017		15			40'		3	Cu
3/9/2017		15			29'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/10/2017		15			27'		2	Cu
10/2/2017		15			38'		3	Cu
10/12/2017		15			50'		1	Cu
11/20/2017		15			37'		2	Cu
			61.4%				224	
1/2/2017		16			27'		1	Cu
1/4/2017		16			27'		1	Cu
1/5/2017		16			27'		1	Cu
1/8/2017		16			37'		1	Cu
1/9/2017		16			37'		1	Cu
1/12/2017		16			37'		1	Cu
1/14/2017		16			26'		1	Cu
1/26/2017		16			27'		1	Cu
1/28/2017		16			39'		1	Cu
1/31/2017		16			39'		1	Cu
2/6/2017		16			26'		1	Cu
2/8/2017		16			44'		5	Cu
2/13/2017		16			44'		3	Cu
2/16/2017		16			44'		2	Cu
2/18/2017		16			39'		1	Cu
2/21/2017		16			20'		3	Cu
2/27/2017		16			27'		3	Cu
3/2/2017		16			27'		2	Cu
3/4/2017		16			49'		1	Cu
3/5/2017		16			49'		1	Cu
3/10/2017		16			22'		1	Cu
3/18/2017		16			50'		1	Cu
3/21/2017		16			39'		2	Cu
3/25/2017		16			26'		1	Cu
4/7/2017		16			39'		1	Cu
4/8/2017		16			39'		1	Cu
4/14/2017		16			40'		2	Cu
4/21/2017		16			40'		2	Cu
4/23/2017		16			44'		1	Cu
4/25/2017		16			22'		2	Cu
4/27/2017		16			43'		2	Cu
5/6/2017		16			44'		2	Cu
5/10/2017		16			34'		5	Cu
5/22/2017		16			46'		1	Cu
5/25/2017		16			40'		2	Cu
5/27/2017		16			20'		1	Cu
5/28/2017		16			45'		5	Cu
6/2/2017		16			45'		3	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/5/2017		16			27'		1	Cu
6/6/2017		16			27'		2	Cu
6/8/2017		16			27'		1	Cu
6/9/2017		16			40'		2	Cu
6/11/2017		16			18'		2	Cu
6/15/2017		16			38'		1	Cu
6/17/2017		16			21'		3	Cu
6/28/2017		16			41'		7	Cu
7/5/2017		16			32'		2	Cu
7/7/2017		16			27'		3	Cu
7/10/2017		16			23'		3	Cu
7/13/2017		16			41'		2	Cu
7/15/2017		16			18'		8	Cu
7/23/2017		16			39'		1	Cu
7/24/2017		16			32'		1	Cu
7/26/2017		16			31'		1	Cu
7/27/2017		16			31'		1	Cu
7/28/2017		16			44'		3	Cu
7/31/2017		16			50'		1	Cu
8/1/2017		16			18'		1	Cu
8/2/2017		16			27'		2	Cu
8/4/2017		16			32'		3	Cu
8/7/2017		16			25'		2	Cu
8/13/2017		16			38'		1	Cu
8/14/2017		16			38'		3	Cu
8/17/2017		16			38'		1	Cu
8/18/2017		16			38'		1	Cu
8/21/2017		16			44'		3	Cu
8/28/2017		16			37'		3	Cu
8/31/2017		16			40'		10	Cu
9/10/2017		16			22'		6	Cu
9/16/2017		16			22'		1	Cu
9/17/2017		16			41'		1	Cu
9/18/2017		16			27'		1	Cu
9/21/2017		16			28'		1	Cu
9/22/2017		16			38'		3	Cu
9/25/2017		16			38'		1	Cu
9/26/2017		16			38'		3	Cu
9/29/2017		16			39'		2	Cu
10/5/2017		16			32'		1	Cu
10/6/2017		16			30'		1	Cu
10/8/2017		16			39'		4	Cu
10/12/2017		16			26'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/13/2017		16			39'		1	Cu
10/14/2017		16					1	Cu
10/15/2017		16			40'		1	Cu
10/16/2017		16			27'		1	Cu
10/17/2017		16			42'		13	Cu
10/30/2017		16			22'		1	Cu
10/31/2017		16			41'		1	Cu
11/1/2017		16			43'		1	Cu
11/3/2017		16			42'		3	Cu
11/6/2017		16			43'		2	Cu
11/8/2017		16			43'		1	Cu
11/9/2017		16			50'		1	Cu
11/10/2017		16			36'		3	Cu
11/13/2017		16			36'		1	Cu
11/14/2017		16			36'		1	Cu
11/16/2017		16			34'		4	Cu
11/20/2017		16			34'		3	Cu
11/23/2017		16			34'		3	Cu
11/26/2017		16			35'		2	Cu
11/28/2017		16			35'		1	Cu
11/30/2017		16			32'		13	Cu
12/14/2017		16			38'		6	Cu
12/21/2017		16			32'		1	Cu
12/22/2017		16			38'		5	Cu
12/29/2017		16			22'		3	Cu
1/29/2017		16			39'		1	Cu
4/3/2017		16			26'		1	Cu
4/4/2017		16			28'		2	Cu
4/17/2017		16			43'		1	Cu
4/30/2017		16			50'		6	Cu
8/10/2017		16			27'		1	Cu
8/11/2017		16			27'		2	Cu
9/20/2017		16			28'		1	Cu
12/28/2017		16			32'		1	Cu
9/19/2017		16			41'		1	Cu
10/2/2017		16			28'		3	Cu
			71.5%				261	
9/18/2017		17			38'		1	Cu
			0.3%				1	
1/1/2017		18			46'		1	Cu
1/3/2017		18			45'		2	Cu
1/5/2017		18			45'		1	Cu
1/6/2017		18			45'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/7/2017		18			45'		1	Cu
1/8/2017		18			45'		1	Cu
1/9/2017		18			45'		1	Cu
1/10/2017		18			45'		1	Cu
1/12/2017		18			47'		4	Cu
1/16/2017		18			47'		4	Cu
1/20/2017		18			47'		3	Cu
1/23/2017		18			47'		3	Cu
1/26/2017		18			47'		3	Cu
1/29/2017		18			47'		2	Cu
2/1/2017		18			47'		2	Cu
2/3/2017		18			47'		3	Cu
2/6/2017		18			47'		4	Cu
2/11/2017		18			50'		1	Cu
2/12/2017		18			50'		1	Cu
2/17/2017		18			44'		3	Cu
2/25/2017		18			45'		1	Cu
2/27/2017		18			47'		5	Cu
3/4/2017		18			47'		7	Cu
3/11/2017		18			50'		2	Cu
3/13/2017		18			49'		1	Cu
3/18/2017		18			65'		2	Cu
3/22/2017		18			50'		1	Cu
3/23/2017		18			65'		1	Cu
3/24/2017		18			50'		1	Cu
3/29/2017		18			50'		1	Cu
3/30/2017		18			50'		1	Cu
4/1/2017		18			58'		2	Cu
4/5/2017		18			50'		7	Cu
4/14/2017		18			43'		3	Cu
4/22/2017		18			43'		2	Cu
4/27/2017		18			44'		9	Cu
5/8/2017		18			44'		4	Cu
5/15/2017		18			30'		1	Cu
5/18/2017		18			61'		1	Cu
5/24/2017		18			55'		2	Cu
5/28/2017		18			50'		1	Cu
5/30/2017		18			46'		1	Cu
5/31/2017		18			46'		1	Cu
6/3/2017		18			65'		15	Cu
6/23/2017		18			50'		1	Cu
6/24/2017		18			50'		1	Cu
6/28/2017		18			50'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
6/29/2017		18			48'		1	Cu
6/30/2017		18			40'		2	Cu
7/2/2017		18			45'		1	Cu
7/3/2017		18			45'		2	Cu
7/5/2017		18			40'		2	Cu
7/9/2017		18			57'		2	Cu
7/11/2017		18			57'		1	Cu
7/17/2017		18			61'		3	Cu
7/21/2017		18			65'		3	Cu
7/27/2017		18			40'		1	Cu
7/28/2017		18			65'		3	Cu
8/7/2017		18			32'		1	Cu
8/8/2017		18			27'		2	Cu
8/10/2017		18			27'		1	Cu
8/11/2017		18			45'		2	Cu
8/20/2017		18			32'		1	Cu
8/21/2017		18			32'		1	Cu
8/24/2017		18			46'		4	Cu
8/28/2017		18			30'		1	Cu
9/6/2017		18			35'		1	Cu
9/12/2017		18			32'		2	Cu
9/14/2017		18			32'		1	Cu
9/18/2017		18			32'		4	Cu
9/23/2017		18			51'		1	Cu
9/25/2017		18			34'		1	Cu
9/30/2017		18			45'		3	Cu
10/3/2017		18			45'		3	Cu
10/12/2017		18			30'		1	Cu
10/13/2017		18			57'		1	Cu
10/14/2017		18			58'		13	Cu
10/27/2017		18			30'		2	Cu
10/29/2017		18			41'		6	Cu
11/4/2017		18			54'		3	Cu
11/7/2017		18			55'		1	Cu
11/8/2017		18			55'		1	Cu
11/10/2017		18			55'		1	Cu
11/12/2017		18			48'		2	Cu
11/15/2017		18			52'		3	Cu
11/18/2017		18			51'		12	Cu
11/30/2017		18			51'		1	Cu
12/6/2017		18			52'		2	Cu
12/11/2017		18			57'		6	Cu
12/18/2017		18			54'		14	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/1/2017		18			40'		3	Cu
8/14/2017		18			24'		3	Cu
8/29/2017		18			30'		7	Cu
9/7/2017		18			35'		1	Cu
9/26/2017		18			45'		3	Cu
9/11/2017		18			32'		1	Cu
10/11/2017		18			28'		1	Cu
			69.9%				255	
1/2/2017		19			52'		4	Cu
1/6/2017		19			52'		3	Cu
1/9/2017		19			52'		1	Cu
1/16/2017		19			52'		2	Cu
1/18/2017		19			52'		1	Cu
1/24/2017		19			40'		1	Cu
1/26/2017		19			40'		1	Cu
1/27/2017		19			40'		1	Cu
1/28/2017		19			46'		1	Cu
1/31/2017		19			50'		1	Cu
2/4/2017		19			47'		1	Cu
2/6/2017		19			52'		1	Cu
2/7/2017		19			52'		1	Cu
2/8/2017		19			52'		1	Cu
2/9/2017		19			52'		1	Cu
2/10/2017		19			52'		1	Cu
2/16/2017		19			43'		1	Cu
2/17/2017		19			43'		1	Cu
2/18/2017		19			43'		1	Cu
2/22/2017		19			40'		1	Cu
2/23/2017		19			40'		18	Cu
3/20/2017		19			60'		1	Cu
3/29/2017		19			53'		1	Cu
3/30/2017		19			41'		1	Cu
4/2/2017		19			46'		1	Cu
4/3/2017		19			46'		1	Cu
4/8/2017		19			46'		3	Cu
4/11/2017		19			45'		1	Cu
4/15/2017		19			45'		1	Cu
4/17/2017		19			50'		2	Cu
4/23/2017		19			50'		1	Cu
4/27/2017		19			30'		2	Cu
5/1/2017		19			30'		2	Cu
5/3/2017		19			30'		2	Cu
5/8/2017		19			30'		4	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/16/2017		19			30'		1	Cu
5/17/2017		19			30'		2	Cu
5/26/2017		19			47'		3	Cu
6/1/2017		19			38'		1	Cu
6/2/2017		19			38'		1	Cu
6/7/2017		19			53'		1	Cu
6/21/2017		19			46'		2	Cu
6/27/2017		19			55'		1	Cu
7/2/2017		19			22'		4	Cu
7/6/2017		19			30'		1	Cu
7/7/2017		19			55'		2	Cu
7/10/2017		19			50'		2	Cu
7/14/2017		19			55'		3	Cu
7/18/2017		19			50'		1	Cu
7/21/2017		19			50'		1	Cu
7/27/2017		19			49'		1	Cu
8/2/2017		19			25'		10	Cu
8/12/2017		19			60'		2	Cu
8/24/2017		19			38'		8	Cu
9/1/2017		19			58'		7	Cu
9/11/2017		19			34'		4	Cu
9/18/2017		19			34'		4	Cu
9/25/2017		19			32'		1	Cu
9/29/2017		19			49'		7	Cu
10/12/2017		19			33'		1	Cu
10/14/2017		19			57'		1	Cu
10/16/2017		19			38'		4	Cu
10/21/2017		19			60'		11	Cu
11/1/2017		19			42'		2	Cu
11/4/2017		19			65'		3	Cu
11/20/2017		19			27'		2	Cu
11/22/2017		19			27'		1	Cu
11/26/2017		19			50'		2	Cu
11/30/2017		19			50'		2	Cu
12/2/2017		19			60'		16	Cu
12/18/2017		19			60'		1	Cu
12/24/2017		19			48'		4	Cu
12/28/2017		19			48'		2	Cu
12/31/2017		19			57'		1	Cu
5/22/2017		19			30'		1	Cu
6/15/2017		19			25'		4	Cu
7/20/2017		19			50'		1	Cu
7/29/2017		19			60'		3	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/15/2017		19			35'		2	Cu
8/18/2017		19			26'		2	Cu
8/23/2017		19			60'		1	Cu
9/8/2017		19			16'		3	Cu
9/26/2017		19			34'		3	Cu
12/19/2017		19			48'		5	Cu
			58.9%				215	
10/9/2017		19			28'		1	Cu
1/3/2017		20			49'		1	Cu
1/9/2017		20			30'		3	Cu
1/17/2017		20			52'		1	Cu
2/7/2017		20			30'		2	Cu
2/9/2017		20			30'		1	Cu
2/16/2017		20			50'		3	Cu
3/1/2017		20			47'		3	Cu
3/4/2017		20			47'		4	Cu
3/8/2017		20			47'		3	Cu
3/11/2017		20			47'		3	Cu
3/18/2017		20			50'		1	Cu
3/30/2017		20			51'		15	Cu
4/15/2017		20			50'		6	Cu
4/27/2017		20			45'		2	Cu
4/29/2017		20			50'		1	Cu
4/30/2017		20			50'		5	Cu
5/5/2017		20			50'		3	Cu
5/8/2017		20			50'		4	Cu
5/12/2017		20			46'		1	Cu
5/19/2017		20			40'		1	Cu
5/20/2017		20			40'		1	Cu
5/29/2017		20			47'		5	Cu
6/3/2017		20			47'		4	Cu
6/21/2017		20			50'		3	Cu
6/24/2017		20			50'		2	Cu
6/29/2017		20			40'		1	Cu
6/30/2017		20			45'		5	Cu
7/5/2017		20			45'		3	Cu
7/8/2017		20			45'		4	Cu
7/17/2017		20			50'		1	Cu
8/3/2017		20			44'		1	Cu
8/7/2017		20			27'		1	Cu
8/8/2017		20			35'		1	Cu
8/28/2017		20			30'		1	Cu
8/29/2017		20			44'		5	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/3/2017		20			44'		2	Cu
9/5/2017		20			30'		1	Cu
9/6/2017		20			30'		1	Cu
9/7/2017		20			30'		1	Cu
9/11/2017		20			33'		1	Cu
9/14/2017		20			65'		7	Cu
9/25/2017		20			28'		4	Cu
10/2/2017		20			28'		3	Cu
10/5/2017		20			47'		3	Cu
10/8/2017		20			47'		1	Cu
10/17/2017		20			33'		2	Cu
10/19/2017		20			40'		6	Cu
11/16/2017		20			27'		2	Cu
11/27/2017		20			46'		1	Cu
11/28/2017		20			46'		1	Cu
12/6/2017		20			65'		3	Cu
12/9/2017		20			65'		12	Cu
12/21/2017		20			65'		2	Cu
12/26/2017		20			46'		2	Cu
12/28/2017		20			46'		2	Cu
12/30/2017		20			46'		1	Cu
12/31/2017		20			46'		1	Cu
1/30/2017		20			30'		1	Cu
2/1/2017		20			30'		2	Cu
2/4/2017		20			50'		1	Cu
4/22/2017		20			50'		3	Cu
7/18/2017		20			36'		14	Cu
8/9/2017		20			25'		1	Cu
8/10/2017		20			26'		2	Cu
8/12/2017		20			26'		1	Cu
9/13/2017		20			33'		1	Cu
10/9/2017		20			38'		7	Cu
10/16/2017		20			33'		1	Cu
10/25/2017		20			53'		10	Cu
11/20/2017		20			32'		3	Cu
			57.0%				208	
1/4/2017		21			44'		2	Cu
1/6/2017		21			44'		1	Cu
1/12/2017		21			46'		1	Cu
1/17/2017		21			33'		4	Cu
1/22/2017		21			33'		1	Cu
1/24/2017		21			33'		2	Cu
1/28/2017		21			50'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/30/2017		21			40'		9	Cu
2/11/2017		21			45'		2	Cu
2/13/2017		21			45'		1	Cu
2/24/2017		21			65'		1	Cu
2/25/2017		21			47'		4	Cu
3/1/2017		21			51'		1	Cu
3/2/2017		21			51'		3	Cu
3/5/2017		21			51'		3	Cu
3/8/2017		21			51'		7	Cu
3/20/2017		21			54'		1	Cu
3/21/2017		21			60'		1	Cu
3/22/2017		21			60'		1	Cu
3/23/2017		21			60'		1	Cu
4/10/2017		21			40'		3	Cu
4/22/2017		21			54'		1	Cu
4/23/2017		21			46'		2	Cu
4/25/2017		21			46'		1	Cu
4/26/2017		21			46'		1	Cu
4/27/2017		21			38'		1	Cu
4/30/2017		21			46'		2	Cu
5/11/2017		21			47'		1	Cu
5/12/2017		21			47'		1	Cu
5/15/2017		21			46'		1	Cu
5/21/2017		21			45'		7	Cu
5/28/2017		21			47'		3	Cu
5/31/2017		21			47'		7	Cu
6/9/2017		21			49'		5	Cu
6/15/2017		21			30'		1	Cu
6/19/2017		21			30'		1	Cu
6/29/2017		21			32'		1	Cu
7/1/2017		21			46'		1	Cu
7/2/2017		21			48'		3	Cu
7/5/2017		21			46'		2	Cu
7/12/2017		21			51'		2	Cu
7/14/2017		21			51'		1	Cu
7/16/2017		21			50'		1	Cu
7/18/2017		21			0'		2	Cu
7/20/2017		21			49'		1	Cu
7/28/2017		21			57'		5	Cu
8/3/2017		21			30'		1	Cu
8/13/2017		21			45'		1	Cu
8/26/2017		21			44'		1	Cu
8/27/2017		21			44'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/29/2017		21			65'		3	Cu
9/6/2017		21			27'		1	Cu
9/7/2017		21			33'		1	Cu
9/10/2017		21			55'		1	Cu
9/13/2017		21			65'		1	Cu
9/18/2017		21			30'		2	Cu
9/20/2017		21			30'		2	Cu
9/25/2017		21			35'		1	Cu
9/28/2017		21			63'		1	Cu
10/2/2017		21			25'		3	Cu
10/5/2017		21			25'		4	Cu
10/9/2017		21			25'		2	Cu
10/11/2017		21			25'		2	Cu
10/17/2017		21			40'		2	Cu
10/20/2017		21			33'		3	Cu
10/23/2017		21			50'		2	Cu
10/25/2017		21			53'		10	Cu
11/6/2017		21			30'		1	Cu
11/13/2017		21			34'		4	Cu
11/20/2017		21			30'		3	Cu
11/27/2017		21			47'		2	Cu
12/1/2017		21			40'		2	Cu
12/10/2017		21			51'		3	Cu
12/13/2017		21			60'		1	Cu
12/14/2017		21			60'		1	Cu
12/15/2017		21			60'		1	Cu
12/16/2017		21			60'		1	Cu
12/17/2017		21			60'		1	Cu
12/18/2017		21			60'		1	Cu
12/19/2017		21			60'		1	Cu
12/20/2017		21			60'		1	Cu
12/21/2017		21			60'		1	Cu
12/22/2017		21			60'		1	Cu
12/23/2017		21			60'		1	Cu
12/24/2017		21			60'		1	Cu
12/25/2017		21			60'		1	Cu
12/26/2017		21			60'		1	Cu
12/28/2017		21			50'		1	Cu
12/29/2017		21			58'		1	Cu
12/31/2017		21			58'		1	Cu
2/15/2017		21			39'		8	Cu
5/2/2017		21			27'		4	Cu
5/9/2017		21			49'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/7/2017		21			35'		3	Cu
8/24/2017		21			44'		2	Cu
10/16/2017		21			40'		1	Cu
10/19/2017		21			50'		1	Cu
12/27/2017		21			60'		1	Cu
9/11/2017		21			28'		1	Cu
9/12/2017		21			28'		1	Cu
9/14/2017		21			28'		1	Cu
			56.7%				207	
1/10/2017		22			47'		1	Cu
1/21/2017		22			50'		3	Cu
1/31/2017		22			33'		1	Cu
2/6/2017		22			53'		2	Cu
2/8/2017		22			53'		1	Cu
2/12/2017		22			30'		1	Cu
2/13/2017		22			30'		1	Cu
2/14/2017		22			30'		2	Cu
2/16/2017		22			30'		1	Cu
2/22/2017		22			40'		4	Cu
2/27/2017		22			44'		1	Cu
2/28/2017		22			44'		1	Cu
3/1/2017		22			44'		1	Cu
3/2/2017		22			44'		1	Cu
3/3/2017		22			44'		1	Cu
3/6/2017		22			44'		1	Cu
3/7/2017		22			44'		1	Cu
3/9/2017		22			46'		6	Cu
3/15/2017		22			46'		1	Cu
3/24/2017		22			60'		3	Cu
4/6/2017		22			58'		2	Cu
4/11/2017		22			46'		3	Cu
4/14/2017		22			46'		2	Cu
4/16/2017		22			46'		1	Cu
4/17/2017		22			46'		1	Cu
4/28/2017		22			46'		1	Cu
5/2/2017		22			46'		1	Cu
5/11/2017		22			33'		1	Cu
5/27/2017		22			45'		2	Cu
6/4/2017		22			49'		1	Cu
6/5/2017		22			55'		3	Cu
6/17/2017		22			51'		7	Cu
6/29/2017		22			30'		1	Cu
7/1/2017		22			53'		5	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/6/2017		22			47'		3	Cu
7/11/2017		22			45'		2	Cu
7/31/2017		22			40'		4	Cu
8/7/2017		22			38'		4	Cu
8/20/2017		22			63'		1	Cu
9/1/2017		22			47'		1	Cu
9/6/2017		22			42'		5	Cu
9/14/2017		22			35'		5	Cu
9/20/2017		22			33'		1	Cu
9/21/2017		22			40'		1	Cu
10/2/2017		22			63'		3	Cu
10/5/2017		22			50'		4	Cu
10/9/2017		22			38'		1	Cu
10/12/2017		22			57'		1	Cu
10/16/2017		22			42'		3	Cu
10/28/2017		22			50'		2	Cu
10/30/2017		22			54'		1	Cu
10/31/2017		22			42'		1	Cu
11/1/2017		22			45'		1	Cu
11/2/2017		22			45'		1	Cu
11/4/2017		22			53'		3	Cu
12/13/2017		22			52'		1	Cu
12/16/2017		22			51'		6	Cu
12/29/2017		22			51'		3	Cu
1/26/2017		22			52'		1	Cu
4/3/2017		22			58'		2	Cu
5/1/2017		22			38'		1	Cu
7/28/2017		22			49'		3	Cu
8/12/2017		22			53'		1	Cu
8/28/2017		22			28'		4	Cu
9/11/2017		22			35'		3	Cu
9/25/2017		22			50'		1	Cu
9/29/2017		22			63'		1	Cu
9/30/2017		22			63'		1	Cu
10/19/2017		22			34'		9	Cu
11/16/2017		22			42'		5	Cu
11/21/2017		22			41'		3	Cu
12/6/2017		22			30'		1	Cu
			43.6%				159	
1/9/2017		23			47'		1	Cu
9/18/2017		23			30'		1	Cu
10/23/2017		23			47'		7	Cu
9/13/2017		23			28'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
			2.7%				10	
1/7/2017		24			50'		2	Cu
1/14/2017		24			50'		1	Cu
			0.8%				3	
9/23/2017		25			34'		3	Cu
10/5/2017		25			33'		1	Cu
			1.1%				4	
1/4/2017		26			37'		1	Cu
1/5/2017		26			37'		2	Cu
1/7/2017		26			37'		4	Cu
1/11/2017		26			37'		1	Cu
1/12/2017		26			37'		1	Cu
1/20/2017		26			35'		7	Cu
1/28/2017		26			33'		3	Cu
2/6/2017		26			46'		1	Cu
2/8/2017		26			35'		1	Cu
2/9/2017		26			35'		1	Cu
2/10/2017		26			37'		1	Cu
2/11/2017		26			35'		1	Cu
2/23/2017		26			39'		3	Cu
2/26/2017		26			30'		1	Cu
2/27/2017		26			30'		2	Cu
3/5/2017		26			52'		1	Cu
3/6/2017		26			38'		2	Cu
3/17/2017		26			40'		1	Cu
3/18/2017		26			40'		1	Cu
4/2/2017		26			33'		2	Cu
4/7/2017		26			39'		1	Cu
4/12/2017		26			45'		2	Cu
4/17/2017		26			50'		2	Cu
4/20/2017		26			36'		1	Cu
4/24/2017		26			38'		6	Cu
5/1/2017		26			38'		5	Cu
5/7/2017		26			30'		3	Cu
5/12/2017		26			50'		15	Cu
6/7/2017		26			54'		1	Cu
6/20/2017		26			38'		1	Cu
6/24/2017		26			40'		3	Cu
6/29/2017		26			32'		6	Cu
7/5/2017		26			38'		2	Cu
7/7/2017		26			40'		1	Cu
7/8/2017		26			40'		1	Cu
7/9/2017		26			30'		5	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/14/2017		26			30'		1	Cu
7/17/2017		26			35'		1	Cu
7/18/2017		26			35'		1	Cu
7/19/2017		26			35'		1	Cu
7/20/2017		26			35'		1	Cu
7/21/2017		26			35'		1	Cu
7/22/2017		26			38'		3	Cu
7/25/2017		26			35'		3	Cu
7/28/2017		26			31'		1	Cu
7/29/2017		26			40'		2	Cu
7/31/2017		26			27'		2	Cu
8/2/2017		26			21'		5	Cu
8/7/2017		26			35'		1	Cu
8/8/2017		26			40'		1	Cu
8/9/2017		26			35'		2	Cu
8/11/2017		26			35'		3	Cu
8/18/2017		26			42'		1	Cu
8/20/2017		26			46'		1	Cu
8/21/2017		26			38'		2	Cu
8/23/2017		26			38'		1	Cu
8/24/2017		26			38'		1	Cu
8/25/2017		26			38'		2	Cu
8/28/2017		26			30'		1	Cu
8/29/2017		26			30'		1	Cu
8/31/2017		26			33'		2	Cu
9/2/2017		26			33'		2	Cu
9/5/2017		26			33'		1	Cu
9/10/2017		26			34'		6	Cu
9/18/2017		26			34'		5	Cu
9/23/2017		26			39'		2	Cu
9/26/2017		26			30'		1	Cu
9/27/2017		26			30'		1	Cu
9/28/2017		26			30'		1	Cu
9/29/2017		26			30'		1	Cu
9/30/2017		26			46'		1	Cu
10/2/2017		26			33'		1	Cu
10/3/2017		26			30'		1	Cu
10/4/2017		26			30'		2	Cu
10/6/2017		26			33'		1	Cu
10/7/2017		26			33'		1	Cu
10/8/2017		26			33'		1	Cu
10/9/2017		26			33'		1	Cu
10/10/2017		26			33'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/11/2017		26			40'		2	Cu
10/14/2017		26			38'		2	Cu
10/16/2017		26			32'		4	Cu
10/21/2017		26			38'		2	Cu
10/23/2017		26			40'		2	Cu
10/25/2017		26			40'		5	Cu
11/2/2017		26			35'		1	Cu
11/3/2017		26			35'		2	Cu
11/5/2017		26			30'		1	Cu
11/7/2017		26			30'		1	Cu
11/9/2017		26			22'		1	Cu
11/13/2017		26			35'		2	Cu
11/15/2017		26			35'		1	Cu
11/16/2017		26			40'		3	Cu
11/19/2017		26			40'		5	Cu
11/24/2017		26			46'		2	Cu
11/26/2017		26			46'		1	Cu
11/27/2017		26			30'		1	Cu
11/28/2017		26			34'		3	Cu
12/4/2017		26			34'		3	Cu
12/15/2017		26			33'		1	Cu
12/18/2017		26			35'		2	Cu
12/28/2017		26			46'		3	Cu
1/18/2017		26			46'		1	Cu
2/4/2017		26			40'		1	Cu
2/12/2017		26			46'		2	Cu
2/16/2017		26			40'		3	Cu
3/1/2017		26			52'		3	Cu
3/10/2017		26			45'		2	Cu
8/17/2017		26			42'		1	Cu
9/6/2017		26			34'		4	Cu
9/25/2017		26			30'		1	Cu
10/20/2017		26			38'		1	Cu
11/6/2017		26			50'		1	Cu
12/20/2017		26			35'		1	Cu
			64.1%				234	
1/17/2017		27			28'		1	Cu
1/22/2017		27			37'		3	Cu
1/26/2017		27			27'		1	Cu
1/30/2017		27			35'		1	Cu
2/6/2017		27			35'		1	Cu
2/11/2017		27			40'		5	Cu
2/19/2017		27			40'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/21/2017		27			40'		1	Cu
2/26/2017		27			36'		3	Cu
3/1/2017		27			36'		1	Cu
3/3/2017		27			32'		1	Cu
3/4/2017		27			32'		2	Cu
3/6/2017		27			32'		2	Cu
3/10/2017		27			32'		1	Cu
3/11/2017		27			32'		2	Cu
3/13/2017		27			32'		1	Cu
3/14/2017		27			32'		1	Cu
3/15/2017		27			32'		2	Cu
4/3/2017		27			49'		1	Cu
4/7/2017		27			39'		1	Cu
4/22/2017		27			30'		1	Cu
5/1/2017		27			49'		1	Cu
5/10/2017		27			31'		3	Cu
5/21/2017		27			30'		1	Cu
5/29/2017		27			39'		2	Cu
6/14/2017		27			40'		1	Cu
6/25/2017		27			28'		15	Cu
7/13/2017		27			37'		3	Cu
7/17/2017		27			36'		1	Cu
7/22/2017		27			30'		1	Cu
7/23/2017		27			30'		1	Cu
7/24/2017		27			32'		1	Cu
7/25/2017		27			30'		1	Cu
7/26/2017		27			30'		1	Cu
7/27/2017		27			30'		1	Cu
7/28/2017		27			35'		1	Cu
7/29/2017		27			35'		2	Cu
7/31/2017		27			40'		4	Cu
8/4/2017		27			31'		2	Cu
8/7/2017		27			32'		2	Cu
8/9/2017		27			32'		1	Cu
8/28/2017		27					23	Cu
9/20/2017		27			30'		5	Cu
9/25/2017		27			35'		1	Cu
9/26/2017		27			30'		1	Cu
9/27/2017		27			30'		2	Cu
9/30/2017		27			30'		1	Cu
10/1/2017		27			30'		1	Cu
10/6/2017		27			32'		10	Cu
10/16/2017		27			38'		4	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/20/2017		27			30'		3	Cu
10/23/2017		27			37'		1	Cu
10/24/2017		27			32'		1	Cu
10/26/2017		27			18'		1	Cu
10/27/2017		27			33'		3	Cu
10/30/2017		27			28'		3	Cu
11/2/2017		27			27'		1	Cu
11/5/2017		27			32'		3	Cu
11/8/2017		27			32'		1	Cu
11/14/2017		27			37'		1	Cu
11/16/2017		27			35'		1	Cu
11/19/2017		27			39'		1	Cu
11/20/2017		27			39'		1	Cu
11/21/2017		27			35'		2	Cu
11/27/2017		27			40'		1	Cu
11/28/2017		27			40'		1	Cu
12/4/2017		27			35'		1	Cu
12/11/2017		27			30'		2	Cu
12/13/2017		27			30'		2	Cu
12/19/2017		27			35'		1	Cu
12/22/2017		27			30'		1	Cu
2/8/2017		27			40'		3	Cu
2/16/2017		27			40'		3	Cu
3/2/2017		27			32'		1	Cu
3/8/2017		27			32'		2	Cu
8/10/2017		27			19'		8	Cu
10/2/2017		27			30'		1	Cu
10/5/2017		27			28'		1	Cu
10/25/2017		27			35'		1	Cu
12/20/2017		27			40'		1	Cu
12/21/2017		27			40'		1	Cu
5/2/2017		27			40'		2	Cu
			50.1%				183	
1/10/2017		28			38'		2	Cu
1/18/2017		28			34'		2	Cu
1/23/2017		28			38'		2	Cu
1/25/2017		28			38'		5	Cu
1/30/2017		28			38'		1	Cu
2/6/2017		28			28'		2	Cu
2/8/2017		28			36'		5	Cu
2/13/2017		28			38'		5	Cu
2/18/2017		28			38'		2	Cu
2/21/2017		28			38'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/22/2017		28			38'		2	Cu
2/28/2017		28			34'		12	Cu
3/20/2017		28			38'		1	Cu
3/21/2017		28			38'		4	Cu
4/5/2017		28			38'		3	Cu
4/15/2017		28			38'		6	Cu
4/22/2017		28			40'		2	Cu
4/29/2017		28			30'		2	Cu
5/1/2017		28			32'		2	Cu
5/3/2017		28			32'		2	Cu
5/5/2017		28			30'		1	Cu
5/6/2017		28			38'		3	Cu
5/20/2017		28			30'		1	Cu
6/5/2017		28			30'		1	Cu
6/6/2017		28			30'		1	Cu
6/7/2017		28			30'		1	Cu
6/23/2017		28			44'		3	Cu
6/26/2017		28			44'		2	Cu
6/29/2017		28			13'		1	Cu
6/30/2017		28			40'		1	Cu
7/1/2017		28			32'		2	Cu
7/3/2017		28			30'		2	Cu
7/6/2017		28			40'		1	Cu
7/7/2017		28			30'		3	Cu
7/10/2017		28			30'		1	Cu
7/11/2017		28			30'		2	Cu
7/13/2017		28			30'		1	Cu
7/19/2017		28			64'		5	Cu
7/25/2017		28			40'		3	Cu
7/28/2017		28			32'		10	Cu
8/7/2017		28			20'		3	Cu
8/10/2017		28			32'		1	Cu
8/11/2017		28			40'		2	Cu
8/13/2017		28			38'		1	Cu
8/14/2017		28			38'		1	Cu
8/15/2017		28			38'		1	Cu
8/16/2017		28			38'		2	Cu
8/22/2017		28			30'		2	Cu
8/26/2017		28			37'		1	Cu
8/28/2017		28			38'		1	Cu
8/29/2017		28			27'		1	Cu
8/30/2017		28			27'		2	Cu
9/1/2017		28			36'		2	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/3/2017		28			39'		3	Cu
9/6/2017		28			38'		5	Cu
9/11/2017		28			33'		8	Cu
9/19/2017		28			33'		2	Cu
9/22/2017		28					1	Cu
9/23/2017		28			35'		1	Cu
9/24/2017		28			30'		1	Cu
9/26/2017		28			28'		1	Cu
9/28/2017		28			33'		5	Cu
10/3/2017		28			33'		1	Cu
10/7/2017		28			30'		1	Cu
10/8/2017		28			30'		1	Cu
10/9/2017		28			33'		1	Cu
10/10/2017		28			27'		2	Cu
10/12/2017		28			27'		1	Cu
10/13/2017		28			27'		1	Cu
10/14/2017		28			38'		16	Cu
10/31/2017		28			38'		1	Cu
11/1/2017		28			38'		3	Cu
11/4/2017		28			38'		1	Cu
11/6/2017		28			35'		1	Cu
11/9/2017		28			36'		1	Cu
11/10/2017		28			38'		1	Cu
11/14/2017		28			30'		2	Cu
11/16/2017		28			30'		1	Cu
11/19/2017		28			38'		1	Cu
11/22/2017		28			30'		1	Cu
11/24/2017		28			30'		1	Cu
11/25/2017		28			30'		1	Cu
11/26/2017		28			30'		1	Cu
11/28/2017		28			27'		1	Cu
12/4/2017		28			38'		3	Cu
12/7/2017		28			38'		2	Cu
12/9/2017		28			38'		2	Cu
12/11/2017		28			34'		1	Cu
12/12/2017		28			34'		1	Cu
12/19/2017		28			31'		3	Cu
12/26/2017		28			30'		3	Cu
5/21/2017		28			40'		3	Cu
6/19/2017		28			20'		3	Cu
7/5/2017		28			30'		1	Cu
10/4/2017		28			20'		3	Cu
11/8/2017		28			30'		1	Cu

Transient Dock 2017

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/25/2017		28			28'		1	Cu
			61.1%				223	

VESSEL TRACKING

SIYB MARINA AND YACHT CLUBS

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6001	100	Sail	46	14	Copper	Proline 1088-6	A10886	ter Island Boat	Jun	2014	60	60061-94-ZB
SDYC	6002	100	Power	39.5	13.8	Copper	erlux Micron Ex	5693	Il and Sausalito	Aug	2015	35	
SDYC	6003	100	Power	48	15.1	Copper	Proline 1088-6	A1088G	ter Island Boat	Jan	2015	60	60061-94-ZB
SDYC	6004	100	Sail	43	13	Low Copper	m Pro Gold mo	A411187706	ter island Boat	Feb	2016	65	
SDYC	6005	84		52	15.4	Copper	Pettit Ultima	1038	Driscolls	Apr	2016	60	
SDYC	6006	100	Power			Copper	Super Proguard	NAU770	elsen Beaumon	Jun	2016	55	23566-20-ZR
SDYC	6007	97	Sail	34.5	11	Copper	om Pro w/ Gra	411127906	Driscoll	Apr	2015	40	60061-117-ZE
SDYC	6008	87	Power	39	12	Low Copper	ttit Copper Gua	1048	ter Island Boat	Feb	2016	33.26	
SDYC	6009	95	Sail	40	13	Non Copper	Intersleek -8	FXA979/A	ter Island Boat	Mar	2013	0	
SDYC	6010	98	Sail	39.6	12.3	Low Copper	Pettit B-94	B-94	Driscoll	Jun	2015	65	
SDYC	6011	70	Power	35	12.3	Copper	erlux Bottomk	10397	Driscoll	Dec	2012	42.75	
SDYC	6012	95		62	35.7	Copper	C Offshore Bla	V118	Boat Works, P	July	2016	41.19	
SDYC	6013	100	Sail	39	13	Copper	rlux Ultrakote	2669N	Balboa	Jul	2016	66.5	
SDYC	6014	92	Sail	44.5	13.3	Non Copper	Interlux Ultra	Y3779F	Driscoll	Mar	2017	55	2693-212-AA
SDYC	6015	100	Sail	32	9	Copper	Pettit Z-Spar	411187706	Driscoll	Jul	2012	65	60061-94-ZE
SDYC	6016	99	Sail	39	12	Low Copper	Interlux Ultra	Y3779F	Marine Group	Nov	2015	55	2693-212-AA
SDYC	6017	99		37	14	Copper	erlux Bottomk	10397	Driscoll	Oct	2010	42.75	
SDYC	6018	97	Power	42	13.6	Copper	oline 1088-6 Bl	A1088G	ter Island Boat	Aug	2017	60	60061-94-ZB
SDYC	6019	0		23.3	7.11	Non Copper	Purchased 2016		Purchase		2016	67	
SDYC	6020	100	Power	17	6.8	Copper	ical Super Prog	NAU773	ielsen Beaumo	Jun	2015	55	23566-20-ZT
SDYC	6021	96	Sail	52	10	Copper	Interlux Ultra	Y3779F	Driscolls	Aug	2014	55	2693-212-AA
SDYC	6022	0	Sail	25.5	8	Non Copper	rchased Aug 2017		Purchase	Aug	2017	67	
SDYC	6023	94	S	28.2	8.2	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2014	55	2693-212-AA
SDYC	6024	96	Sail	29.3	9.3	Copper	Pettit Z-Spar	411187706	Driscoll	Aug	2012	65	60061-94-ZE
SDYC	6025	95	Power	21.3	8.4	Copper	Bottomshield	411186606	Cogswell Marin	Aug	2015	28.86	60061-129-AA
SDYC	6026	99	Sail	37'		Copper	r Interlux Prote	B-94	Driscoll	Aor	2015	65	
SDYC	6027	96	Sail	35	9	Low Copper	erlux Bottomk	79	ter Island Boat	Jun	2012	22	
SDYC	6028	98	Sail	29.11	10.1	Low Copper	Interlux Ultra	Y3779F	ter Island boat	Jul	2015	55	2693-212-AA
SDYC	6030	91		39.2	10.8	Copper	Interlux Ultra	Y3779F	Koehler	Jun	2013	55	2693-212-AA
SDYC	6031	98	Sail	30	10.8	Copper	ottom Pro Gol	A411187706	Driscoll	Oct	2017	65	
SDYC	6032	97	Sail	43.8		Copper	Widow by Petti	1862	ter Island Boat	Aug	2016	25	
SDYC	6033	99	Sail	29.11	10.1	Copper	tit Z-Spar Prote	411187706	Driscoll	Jun	2010	65	60061-94-ZE
SDYC	6034	0	Sail	29.9	11.3	Non Copper	tit Z-Spar Prote	411187706	Driscoll	Jun	2016	65	60061-94-ZE
SDYC	6035	97		25		Copper	nterlux Ultrakot	2779N	ter Island Boat	Mar	2017	66.5	
SDYC	6036	92	Sail	34		Copper	tit Z-Spar Pro G	A411187706	Shipyard / Ne	Sept	2017	65	
SDYC	6037	100	Sail	35	11.9	Copper	Proline 1088-6	A1088G	ter Island Boat	Feb	2016	60	60061-94-ZB
SDYC	6038	95	Sail	J-120		Copper	Prline 1088-6	A1088G	ter Island Boat	Oct	2016	60	60061-94-ZB
SDYC	6039	100	Sail	33.3	10	Low Copper	Ceram-kote	99M	ter Island Boat	Oct	2014	0	
SDYC	6040	99		47.2	14.3	Low Copper	rchased Feb 2017		Purchase	Feb	2017	67	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6041	100	Power	31	10	Non Copper	Epoxy Bottom	V127/A	ter Island Boat	Sept	2014	0	
SDYC	6042	96	Sail	68	14	Copper	awk Smart Sol	4705	ward Shipyard-	Mar	2015	0	
SDYC	6043	95	Sail	34.9	11.11	Copper	Pettit Vivid-3	1361	ter Island Boat	Jun	2016	25	60061-116-AA
SDYC	6044	100	Power	45.7	14.5	Copper	it Z-Spar Prote	411187706	Driscoll	Aug	2016	65	60061-94-ZE
SDYC	6046	99	Sail	18		Copper	it Z-Spar Prote	411187706	Driscoll	Mar	2012	65	60061-94-ZE
SDYC	6047	99	Power	33	11.3	Copper	Proline 1088-6	A1088G	Driscoll	Dec	2013	60	60061-94-ZB
SDYC	6048	99	Sail			Copper	it Z-Spar Prote	411187706	Driscoll	Apr	2012	65	60061-94-ZE
SDYC	6049	74				Copper	rchased Mar 20	A1088G	Purchase	Mar	2017	60	60061-94-ZB
SDYC	6050	100		40	13	Copper	x Calif Bottom	YBA143	Driscoll	Jul	2012	35	2693-18-ZA
SDYC	6051	99	Power	38	12	Copper	it Z-Spar Prote	411187706	Driscoll	Jul	2016	65	60061-94-ZE
SDYC	6052	0	Power	37	13	Non Copper	Ultrakote-6	Y3669U	Koehler	Jun	2017	57	
SDYC	6053	98	Power			Copper	x Ultra - "Ultra	2779N	Koehler	Jun	2017	66.5	
SDYC	6054	100	Power			Low Copper	ettit Vivid Whit	11161	Lido Newport	Aug	2016	25	60061-116-AA
SDYC	6055	0	Power	23	8	Non Copper	Proline 1088-6	A1088G	ter Island Boat	Oct	2015	60	60061-94-ZB
SDYC	6056	99	Power	36.4	10	Copper	Pettit-Pro	16471732	Driscoll	May	2015	65	
SDYC	6057	0		32	11	Non Copper	rchased Oct 2013		Purchase		2013	67	
SDYC	6059	97	Power	35.5	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2013	55	2693-212-AA
SDYC	6060	90	Sail	36	12.5	Non Copper	Ceram-kote	99M	ter Island Boat	May	2011	0	
SDYC	6062	98	Sail	35.3	11.5	Copper	Micron 66-2	YBA473	ielsen Beaumo	Jul	2014	35	2693-187-ZG
SDYC	6063	81	Sail	40.9	12.9	Non Copper	it Z-Spar Prote	411187706	Driscoll	Mar	2015	65	60061-94-ZE
SDYC	6064	95	Sail	36	6	Non Copper	d VOC Blue or	1378	Koehler	May	2013	65	
SDYC	6065	0	Electric	30	8.5	Non Copper	it Z-spar Prote	411187706	SD Boatyard	Jan	2009	65	60061-94-ZE
SDYC	6066	100	Power	25.5	7	Non Copper	o Bottom Paint		none			0	
SDYC	6067	92	Power	58		Low Copper	ux Ultra Cote 3	Y3779U	ter Island Boat	Aug	2017	57	
SDYC	6068	98	Sail	39.1	12.3	Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2017	55	2693-212-AA
SDYC	6069	94	Sail	48	14.3	Copper	Interlux Ultra	Y3779F	Koehler	Dec	2012	55	2693-212-AA
SDYC	6070	92		50	12	Copper	r Bottom Pro	A411187706	Driscoll	Feb	2016	65	
SDYC	6071		vacant	Jr Racing								0	
SDYC	6072	98		27		Copper	erlux VC Offsh	V118	ter Island Boat	Jun	2015	41.19	
SDYC	6073	93		39.3	12.1	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Aug	2014	55	2693-212-AA
SDYC	6075	75	Sail	22	8	Low Copper	ydrolift - No bottom paint		self-applied			0	
SDYC	6076	98		32.5	11.75	Copper	Purchased Apr 2017		Purchase	Apr	2017	0	
SDYC	6077	96		55	16	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2015	55	2693-212-AA
SDYC	6078	98	Power	35	11	Copper	erlux Bottomk	10397	Koehler	Nov	2016	42.75	
SDYC	6079	9	Sail	33	10.4	Copper	erlux VC Offsh	V118	Driscoll	Oct	2013	41.19	
SDYC	6080	72	Power	34		Copper	Pettit Horizons	1850	Driscoll	Jul	2016	40.5	60061-101-AA
SDYC	6081	99	Sail	28	9.6	Low Copper	ettit Vivid Whit	1361	ter Island Boat	Jan	2015	25	60061-116-AA
SDYC	6082	86	Sail	39.8	12.3	Copper	Interlux Ultra	Y3779F	iscoll Mission B	Jun	2014	55	2693-212-AA
SDYC	6083	100	Sail	44	13.7	Copper	terlux Ultra Blu	3669	ter Island Boat	Dec	2010	55	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6084	98		47.1	15.6	Copper	Sharkskin-7	6145	SD Boatyard	May	2012	45	44891-11-AA
SDYC	6085	100	Power	32	10.1	Copper	Pettit Vivid -3	1361	de San Diego C	Jan	2015	25	60061-116-AA
SDYC	6086	100	Power	33	10.2	Copper	terlux Interspe	BZA646	Driscoll	Aug	2015	0	
SDYC	6087	99	Power	17		Copper	Monterey	5445	Self Applied	Sept	2016	58	
SDYC	6088	100	Sail	45.6	14.1	Non Copper	Interlux Ultra	Y3779F	Driscoll	Jun	2015	55	2693-212-AA
SDYC	6089	100		36	13	Copper	nterlux Ultrakot	2779N	ter Island Boat	Oct	2017	66.5	
SDYC	6090	84	Sail	36	11.9	Copper	line 1088 01 B	Y1088C-01	ter Island Boat	Jan	2014	67	
SDYC	6091	71	Sail	41	11	Non Copper	Ceramkote	99M	ter Island Boat	May	2014	0	
SDYC	6092	100		80	23.5	Copper	Interspeed 640	BRA642		Jan	2017	38	2693-142-ZM
SDYC	6093	99	Sail	28	7	Low Copper	Interlux Ultra	Y3779F	Purchased	Jun	2015	55	2693-212-AA
SDYC	6094	100	Power	31.9	11.5	Low Copper	ux Ultra Blue 3	Y3669F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6095	92	Power	38.2	13.4	Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2015	55	2693-212-AA
SDYC	6096	99	Power	42	24	Copper	Proline 1088-6	A1088G	Driscoll	Apr	2016	60	60061-94-ZB
SDYC	6097	89		32	6.7	Copper	terlux Interspe	BZA646	Driscoll	Jun	2015	0	
SDYC	6098	100	Sail	36.4	12.5	Copper	it Z-Spar Prote	411187706	ter Island Boat	Mar	2017	65	60061-94-ZE
SDYC	6099	99	Sail	34		Copper	Purchased 2015		Purchase		2015	67	
SDYC	6100	84		17	6	Copper	B-94 Protector	B-94	iscoll Boat Wor	Oct	2015	65	
SDYC	6101	78	Sail	40	12.8	Non Copper	Pacifica Plus	YBB263	ter Island Boat	Mar	2013	0	
SDYC	6102	100	Power	34.7	13	Copper	erglass Bottom	YBA579	ter Island Boat	Nov	2016	46	
SDYC	6103	95	Power	40	14	Copper	it Z-Spar Prote	411187706	Driscoll	Jul	2016	65	60061-94-ZE
SDYC	6104	99	Sail	36.1	10.1	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2015	55	2693-212-AA
SDYC	6105	98	Power			Copper	Interlux Aqua	YBA549	Driscoll	May	2014	46	
SDYC	6106	100		31.1	6.8	Copper	Performance Ep	V127/A				0	
SDYC	6107	100	Sail	28.5	9.2	Copper	terlux Ultra Ko	2779N	ter Island Boat	Aug	2017	66.5	
SDYC	6108	100	Power	46.4	11.6	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2017	55	2693-212-AA
SDYC	6109	49	Power	54.6	16.2	Copper	Intersleek 900	FXA979/A	Driscoll	Mar	2013	0	
SDYC	6110	93		64.3	18	Copper	Interlux Micron	5693	ter Island Boat	Oct	2011	35	
SDYC	6112	98	Sail	35	11.7	Copper	Trinidad-6	A1088G	Driscoll	Jun	2017	60	60061-94-ZB
SDYC	6113	76	Sail	35	11	Copper	Proline 1088-6	Y3779F	ter Island Boat	Jul	2017	55	2693-212-AA
SDYC	6114	94		33.2	10	Low Copper	Purchased in 2016		Purchase		2016	67	
SDYC	6115	100	Sail	46.6	14.7	Low Copper	cal Proguard Ab	NAU993	ielsen Beaumo	Feb	2015	41.97	
SDYC	6116	88	Sail	52	14.8	Copper	Proline 1088-6	A1088G	ter Island Boat	Jul	2005	60	60061-94-ZB
SDYC	6117	95	Power	24	9	Copper	erlux Bottomk	10397	Driscoll	Oct	2016	42.75	
SDYC	6119	98	Sail	35	11	Copper	Performance Ep	V127/A	ter Island Boat	Feb	2010	0	
SDYC	6120	69	Sail	59	18	Copper	Interlux Ultra	Y3779F	Koehler	Oct	2014	55	2693-212-AA
SDYC	6121	97	Power	25	8	Copper	nterlux Ultra Re	YBA472	Self Applied	Jan	2017	35	2693-187-ZE
SDYC	6123	100	Power	49	14.2	Copper	Proline 1088-6	A1088G	ter Island Boat	Apr	2015	60	60061-94-ZB
SDYC	6124	96		20.6	8.3	Non Copper	ewater Copper	8101	iscoll Mission B	Jun	2011	67	
SDYC	6125	90	Power	36.7	12.6	Low Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2011	60	60061-94-ZB

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6126	79	Power	44	13.7	Non Copper	water Shelter I	8202	ter Island Boat	Apr	2011	0	
SDYC	6127	86		39	13	Low Copper	rchased Feb 2017		Purchase	Feb	2017	67	
SDYC	6128	100	Power	38		Copper	Proline 1088-6	A1088G	ter Island Boat	Jun	2017	60	60061-94-ZB
SDYC	6131	100	Sail	34	11	Non Copper	water Shelter I	8202	ter Island boat	Apr	2015	0	
SDYC	6133	100	Power	52	16	Copper	Interlux Ultra	Y3449U	ter Island Boat	Feb	2015	57	
SDYC	6134		vacant									0	
SDYC	6135	98	Power	23	8.5	Copper	ux Calif Bottom	YBA143	Driscoll	Dec	2015	35	2693-18-ZA
SDYC	6136	90	Sail	45	13.1	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2014	55	2693-212-AA
SDYC	6137	92	Sail	48	13.2	Copper	Offshore Interl	V117	Driscoll	Feb	2013	41.19	
SDYC	6138	0				Non Copper	No Bottom Paint		none			0	
SDYC	6139	0	Electric	23	7.2	Non Copper	Interlux Ultra	Y3779F	Driscoll	Apr	2017	55	2693-212-AA
SDYC	6140	95	Power	42	13.9	Non Copper	terlux Interspe	BZA646	ter Island Boat	Aug	2014	0	
SDYC	6141	98		46.4	9.9	Copper	terlux Ultra-Co	2779N	ter Island Boat	Apr	2017	66.5	
SDYC	6142	93	Sail	48.4	14.8	Copper	cal Proguard Ab	NAU993	ielsen Beaumo	Feb	2015	41.97	
SDYC	6143	96		44.2	14.5	Copper	terlux Ultra Bla	Y3779F	Svendsens	Apr	2015	67	2693-212-AA
SDYC	6144	98	Sail	32	6.7	Non Copper	erlux Bottomk	10397	Other	May	2011	42.75	
SDYC	6145	94		35	11	Copper						67	
SDYC	6146	99		26	9	Copper	inidad VOC Bla	1878	Driscoll	Jan	2013	75.8	
SDYC	6147	100	Sail			Copper	rchased May 2015		Purchase	May	2015	67	
SDYC	6148	81	Sail	34.5	11	Copper	erlux VC Offsh	V118	Driscoll	Aug	2015	41.19	
SDYC	6149	100				Copper	rchased Dec 2015		Purchase		2015	67	
SDYC	6150	100	Power	47.6	14.4	Copper	ux Ultra Black	Y3779F	ter Island Boat	Sep	2015	55	2693-212-AA
SDYC	6151	98	Power	47.3	15.6	Non Copper	Pacifica Plus	YBB263	ne Group/Sout	Apr	2016	0	
SDYC	6152	98	Sail			Copper	Interlux Ultra	Y3779F	Driscoll	Jun	2017	55	2693-212-AA
SDYC	6153	0	Power	22	8	Non Copper	Interlux K91	K91	Driscoll	Mar	2007	70.2	
SDYC	6154	100	Power	36.3	16.5	Non Copper	Intersleek 900	FXA979/A	ter Island Boat	Jun	2013	0	
SDYC	6155	100	Power	33.6	10.3	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6156	0	Power	50	16.8	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	May	2015	55	2693-212-AA
SDYC	6157	70	Power	63	15.8	Copper	terlux Ultra Bla	Y3779F	ielsen Beaumo	Jun	2015	55	2693-212-AA
SDYC	6158	98	Sail	59	10.6	Copper	lux Bottomkot	79	Koehler	Aug	2015	22	
SDYC	6159	98	Power	37	13.5	Low Copper	Proline	A1088G	iscoll Mission B	Dec	2014		60061-94-ZB
SDYC	6160	99	Power	38	13	Copper	ABC 3-2	ABC3-92	ter Island Boat	Oct	2015	47.99	
SDYC	6161	98	Sail	40	12.5	Copper	Pettit Vivid-3	1361	Driscoll	Jun	2016	25	60061-116-AA
SDYC	6162	98		33	11	Copper	lux Bottomkot	79	Driscoll	Sept	2017	22	
SDYC	6163	93	Power	20.5		Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	2693-212-AA
SDYC	6164	100	Power	38	13.5	Copper	rchased June 2014		Purchase	Jun	2014	67	
SDYC	6165	0	Sail	43.8	12.8	Non Copper	roline 1088 Bla	A1088G	ter Island Boat	Jun	2015	60	60061-94-ZB
SDYC	6166	98	Sail	41	10.3	Non Copper	Ultrakote - 6	Y3669U	Koehler Kraft	Mar	2017	57	
SDYC	6167		vacant	Jr Racing								0	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low Copper, or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6168	100	Power	73.3	21	Low Copper	tom Pro Gold A	A411187706	Driscoll	Mar	2017	65	
SDYC	6169	100	Sail	79	16.4	Copper	Proline 1088-6	A1088G	ura Harbor Boa	Nov	2014	60	60061-94-ZB
SDYC	6170	0	Sail	35	11	Non Copper	Interlux Ultra	Y3779F	Koehler	Oct	2016	55	2693-212-AA
SDYC	6171	90	Power	42	13.5	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2017	55	2693-212-AA
SDYC	6172	0	Sail	20	7	Non Copper	Interlux Ultra	Y3779F	Driscoll	Jul	2016	55	2693-212-AA
SDYC	6173	97	Sail	43.2	12.9	Copper	Defense CA 43	4801	ielsen Beaumo	Aug	2016	47.5	60061-101-ZA
SDYC	6174	97	Power	44.8	14.4	Copper	Intersleek 900	FXA979/A	ter Island Boat	Jun	2015	0	
SDYC	6176	89		63.5		Low Copper	Interlux Ultra	Y3779F	Driscoll	Mar	2017	55	2693-212-AA
SDYC	6177	100	Sail	34	11.5	Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2017	55	2693-212-AA
SDYC	6178	99		25	8.6	Copper						67	
SDYC	6179	92	Power	65		Copper	Seaguard-2	P30BQ12	Driscoll	Jul	2015	48	
SDYC	6180	67	Power	32.4	12.3	Copper	Ceramcoat	99M	ter Island Boat	Jun	2008	0	
SDYC	6181	99	Sail	49.2	15.11	Copper	Interlux Ultra	Y3779F	ter Island Boat	Dec	2016	55	2693-212-AA
SDYC	6182	98		30.1	11	Copper	terlux Ultra Blu	3669	ter Island Boatyard		2015	55	
SDYC	6183	97	Sail	49.5	14.8	Copper	erlux Bottomk	10397	ter Island Boat	Apr	2016	42.75	
SDYC	6184	0	Sail	42	13	Non Copper	Proline 1088-6	A1088G	ter Island Boat	Dec	2013	60	60061-94-ZB
SDYC	6185	100	Power	30.5	10.6	Low Copper	lux Bottomkot	79	ter Island Boat	Aug	2014	22	
SDYC	6186	98	Power	36	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Oct	2015	55	2693-212-AA
SDYC	6187	99	Sail			Copper	Trinidad Pro-7	A1877G	ter Island Boat	Feb	2017	60	60061-94-ZD
SDYC	6188	91				Non Copper	rchased Sep 2017		Purchase	Sep	2017	67	
SDYC	6189	96	Power	42	15	Copper	/ Bottom Pro G	A411187706	ington Harbor	Oct	2015	65	
SDYC	6190		vacant	jr racing								0	
SDYC	6191	0	Power	47.9	15.5	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2017	55	2693-212-AA
SDYC	6192	99		42	13.5	Copper	lux Ultra Blue	Y3669F	ter Island Boat	Jul	2017	55	2693-212-AA
SDYC	6193	100	Sail	36.3	11.8	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6194	93		29.2	6.4	Copper						67	
SDYC	6195	98	Power			Copper	terlux Interspe	BQA659/5GL	ter Island Boat	Oct	2014	38	2693-176-ZB
SDYC	6196	100	Sail	28		Low Copper	Proline	A10886	iscoll Mission B	Oct	2010	60	60061-94-ZB
SDYC	6197	99	Sail	40	11.9	Low Copper	Interlux Ultra	Y3779F	Koehler	Nov	2013	55	2693-212-AA
SDYC	6199	100	Electric	31	11.3	Copper	Pettit Z-Spar	411187706	Driscoll	Dec	2011	65	60061-94-ZE
SDYC	6201	100	Power	32		Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	
SDYC	6202	91	Sail	47	14.8	Low Copper	ar Bottom Pro	A411187706	Driscoll	May	2017	65	
SDYC	6203	97	Sail	28	9.3	Non Copper	Coppercoat	85396-1-AA	Driscoll	Apr	2013	0	
SDYC	6204	98	Power	40	13.5	Copper			Shelter Island Boat	May	2016	67	
SDYC	6205		Power										
SDYC	6206	96		30	10	Copper	Interlux Ultra	Y3779F	ter Island Boat	Oct	2013	55	2693-212-AA
SDYC	6207	98	Power	34	10.6	Copper	erlux Bottomk	10397	ter Island Boat	May	2012	42.75	
SDYC	6209	0	Sail	47	14.8	Non Copper	Proline 1088-6	A1088G	ter Island Boat	Jul	2015	60	60061-94-ZB
SDYC	6210		vacant			Copper						67	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6211	96	Power	71.5	19.6	Copper	Interlux Ultra	Y3779F	Driscoll	Nov	2014	55	2693-212-AA
SDYC	6213	99	Power	35	11.5	Copper	Pettit Z-Spar	411187706	Driscoll	Jul	2017	65	60061-94-ZE
SDYC	6214	98	Sail	32	6.7	Copper	Interlux Ultra	3779	Koehler	Oct	2016	55	
SDYC	6215	99	Sail	36	11	Non Copper	o Bottom Paint		none			0	
SDYC	6216	91	Sail	43	13.1	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2012	55	2693-212-AA
SDYC	6217	98		24	8.5	Copper	terlux Ultra Bla	Y3779F	scolls Mission	Jan	2016	55	2693-212-AA
SDYC	6218	100	Sail	37	12.3	Non Copper	ttit Copper-Gu	1048	ielsen Beaumo	Jun	2015	33.26	
SDYC	6219	100		30	21.2	Copper	ettit Vivid Free	1361	Marine Group	Jul	2014	25	60061-116-AA
SDYC	6220	100	Sail	28	9.5	Low Copper	Ceram-kote	99M	Self-Applied	Jun	2010	0	
SDYC	6221	100	Sail	39	12.6	Non Copper	Proline 1088-6	A1088G	ter Island Boat	Oct	2017	60	60061-94-ZB
SDYC	6222	98		42	13.6	Copper	ar Bottom Pro	A411187706	Driscoll	Jun	2014	65	
SDYC	6223	100	Sail	38	11.7	Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2015	60	60061-94-ZB
SDYC	6224	0	Power	36.7	13.7	Non Copper	Pettit Ultima	1038	Driscoll	Aug	2010	60	
SDYC	6225	97	Power	40	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Mar	2016	55	2693-212-AA
SDYC	6226	100		30	8.5	Low Copper	Ceramcote	99M	ter Island Boat	Jun	2002	0	
SDYC	6228	92	Power	48	15.5	Copper	Proline 1088-6	A10886	Driscoll	Jun	2015	60	60061-94-ZB
SDYC	6229		vacant	jr racing								0	
SDYC	6230	92	Power	40	13.8	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	2693-212-AA
SDYC	6231	90	Power	46	15	Low Copper	erlux Interprot	B-94	ter Island Boat	Jun	2015	65	
SDYC	6232	100	Sail	36	12	Copper	Trinidad SR	A1877G	Driscoll	Feb	2016	60	60061-94-ZD
SDYC	6233	81	Sail	37.5	13	Copper	Hydrocoat	1840	ielsen Beaumo	Jul	2015	40.43	60061-87-ZI
SDYC	6234	88		57	16	Low Copper	Proline 1088-6	A1088G	ter Island Boat	Jul	2009	60	60061-94-ZB
SDYC	6235	100	Power	40	12.1	Low Copper	awk Smart Sol	4705	Driscoll	Jun	2005	0	
SDYC	6236	95	Power	36.5	11.4	Copper	erlux Bottomk	10397	aples Boat Yar	Jun	2012	42.75	
SDYC	6237	94		45.9	12	Copper	terlux Ultra Ko	Y3449U	ter Island Boat	Mar	2016	57	
SDYC	6238	0	vacant									0	
SDYC	6239	100	Sail			Copper	Interlux Ultra	Y3779F	ter Island Boat	Aug	2014	55	2693-212-AA
SDYC	6240	98	Power	30	9.6	Copper	erglass Botton	YBA579	Driscoll	Jan	2015	46	
SDYC	6241		vacant									0	
SDYC	6242	99	Power	36	12.5	Low Copper	Pettit Z-Spar	B-94	ter Island Boat	Mar	2015	65	
SDYC	6243	90	Power	70	19	Low Copper	SeaHawk AF33	3345	e Group / Sout	Feb	2017	33	44891-12-AA
SDYC	6244	97	Sail	38	20	Copper	tit z-Spar Prote	411187706	Driscoll	Mar	2017	65	60061-94-ZE
SDYC	6245	100		39.3	13	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2014	55	2693-212-AA
SDYC	6246	100	Sail	47	14.2	Copper	Trinidad Pro-7	A1088G	ward BoatYard	May	2016	60	60061-94-ZB
SDYC	6247	0	Power	52	15	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6248	100	Power	33		Non Copper	Interlux Ultra	Y3779F	ielsen Beaumo	Jun	2013	55	2693-212-AA
SDYC	6249	97	Power	36.8	12.7	Non Copper	Pacifica Plus	YBB263	de San Diego C	Nov	2015	0	
SDYC	6250	100		27		Copper	ettit Vivid Whit	11161	ielsen Beaumo	Aug	2017	25	60061-116-AA
SDYC	6251	100	Electric	18	6	Copper	lux Bottomkot	79	ter Island Boat	Jun	2017	22	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6252	83	Sail	29	9.3	Copper	Sharksin-7	6145	ter Island Boat	Jul	2014	45	44891-11-AA
SDYC	6253	99	Sail	44	9.1	Copper	3 40% copper a	NAU993	ielsen Beaumo	Jun	2016	41.97	
SDYC	6254	99	Power	40	13.5	Low Copper	ad VOC Red or	1678	fic Marine Boat	Nov	2015	75.8	
SDYC	6255	95	Sail	38	12	Copper	Trinidad-6	A1088G	ter Island Boat	Jun	2015	60	60061-94-ZB
SDYC	6257	99	Sail			Copper	SeaHawk AF3	3345	Driscoll	Sept	2008	33	44891-12-AA
SDYC	6258	98	Sail			Copper	Interlux Ultra	Y3779F	Koehler	Mar	2015	55	2693-212-AA
SDYC	6259	100	Sail	49	11.5	Copper	Interlux Ultra	Y3779F	Iarbor Marine (	Jun	2004	55	2693-212-AA
SDYC	6260	100	Electric	18	6.7	Copper	erlux Bottomk	10397	Driscoll	Jun	2014	42.75	
SDYC	6261	97	Sail	32.8	6.5	Low Copper	Interlux Aqua	YBA549	Koehler	Jun	2015	46	
SDYC	6262	98		32.5	12.3	Copper	Interlux Ultra	Y3779F	Koehler	Feb	2011	55	2693-212-AA
SDYC	6263	95	Sail	30	10.5	Copper	Proline 1088-6	A10886	ter Island Boat	May	2011	60	60061-94-ZB
SDYC	6264	100	Power	36	12.5	Non Copper	:al Proguard Ab	NAU993	ielsen Beaumo	Nov	2016	41.97	
SDYC	6265	100	Sail			Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2014	60	60061-94-ZB
SDYC	6266	95	Power	42	11	Copper	berglass Botton	YBA579	Driscoll	Jan	2015	46	
SDYC	6267	100	Power	20	7	Copper	Proline 1088-6	A1088G	Unknown	Jun	2010	60	60061-94-ZB
SDYC	6268	100		25	8	Copper	Purchased 2016		Purchase		2016	67	
SDYC	6269	96	Sail	31.8		Copper	Pettit Vivid-3	1361	ter Island Boat	Jul	2017	25	60061-116-AA
SDYC	6270		vacant									0	
SDYC	6271	80	Sail	35	11.3	Copper	Proline 1088-6	A10886	Koehler	Apr	2016	60	60061-94-ZB
SDYC	6272		vacant	jr racing								0	
SDYC	6273	96	Power	41	13.4	Low Copper	ux Ultra Black 3	Y3779F	ter Island Boat	Oct	2017	55	2693-212-AA
SDYC	6275	59	Power	47.3	14.9	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2015	55	2693-212-AA
SDYC	6276	99	Sail	29.9	10.3	Non Copper	Proline 1088-6	A1088G	SD Boatworks	Apr	2012	60	60061-94-ZB
SDYC	6277	96	Power	32.2	10.2	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	May	2015	55	2693-212-AA
SDYC	6278	94	Sail	39.6	12	Copper	Ultrakote-6	Y3669U	ter Island Boat	Jan	2014	57	
SDYC	6279	99	Power	33	11	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2016	55	2693-212-AA
SDYC	6280	95		33	10	Copper	it Z-Spar Prote	411187706	Driscoll	Jun	2011	65	60061-94-ZE
SDYC	6281	99	Sail	36.7	10	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	2693-212-AA
SDYC	6282	98	Power	40.6	12.2	Copper	Interlux Ultra	Y3779F	ter Island Boat	Aug	2012	55	2693-212-AA
SDYC	6283	99	Sail	32	7	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2011	55	2693-212-AA
SDYC	6284	99		23.5	8.5	Non Copper	ed Apr 2013 - no paint since		Hipp Marine Servi	Apr	2013	0	
SDYC	6285	98	Power	38	13.3	Copper	al Pro Guard A	NAU993	ıe Group / Sout	May	2017	41.97	
SDYC	6286	87	Sail	41	10.6	Low Copper	Pettit Vivid-3	1361	ward Shipyard-	Apr	2012	25	60061-116-AA
SDYC	6287	0	Sail	72	15	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2016	55	2693-212-AA
SDYC	6288	99	Power	38	13	Copper	berglass Botton	YBA579	ielsen Beaumo	Apr	2016	46	
SDYC	6289	95	Power	26.7	9.5	Copper	erlux Bottomk	10397	Knight &Carver	Jun	2009	42.75	
SDYC	6290	98	Power			Copper	Proline 1088-6	A1088G	ter Island Boat	Jul	2016	60	60061-94-ZB
SDYC	6291	100	Power	48.7	15.9	Copper	Proline 1088 01	1088C-01	ter Island Boat	Nov	2015	66.9	
SDYC	6292	99	Power	48	14.8	Copper	Trinidad-6	A1088G	Driscoll	Oct	2017	60	60061-94-ZB

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6293	96		25	8.6	Copper	rchased Apr 2017		Purchase	Apr	2017	67	
SDYC	6294	94	Power	31	11.3	Copper	erlux Bottomkc	10397	ter Island Boat	Oct	2013	42.75	
SDYC	6296	83		78	19	Copper						67	
SDYC	6297	97		51	13.9	Copper	Pettit Z-Spar	411187706	Marine Group	Jun	2012	65	60061-94-ZE
SDYC	6298	99	Power	47.3	14.9	Copper	Coppercoat	85396-1-AA	ielsen Beaumo	Jun	2015	0	
SDYC	6299	98	Sail	32	6.7	Copper	Pettit Vivid - 3	1361	Driscoll	Jun	2012	25	60061-116-AA
SDYC	6300	96	Power	33.5	11.6	Copper	Interlux Ultra	Y3779F	Driscoll	Nov	2015	55	2693-212-AA
SDYC	6302	94		49	13.9	Copper	ean Speed Ultra	7972	nacapa Boatyai	May	2012	0	
SDYC	6303	100	Sail	32	6.7	Copper	tom paint applied ever		Purchase			0	
SDYC	6304	96	Power	30.3	10.3	Copper	lux Ultra Kote I	2779N	ter Island Boat	Mar	2017	66.5	
SDYC	6305	100	Power	39	12.5	Non Copper	Interlux Ultra	Y3779F	larine Industrie	Jun	2015	55	2693-212-AA
SDYC	6306	100	Power	42	12.8	Copper	rchased April 2017		Purchase	Apr	2017	67	
SDYC	6307	86		40.9	12.4	Non Copper	Hydro Hoist		none			0	
SDYC	6308	100				Low Copper	Interlux Ultra	Y3779F	Driscoll	Apr	2012	55	2693-212-AA
SDYC	6309	95	Power	68	18	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2016	55	2693-212-AA
SDYC	6310	99	Sail	31.1	7.6	Low Copper	Pettit Vivid-3	1361	iscoll Mission B	May	2016	25	60061-116-AA
SDYC	6311	97		35.3	11.6	Low Copper	rchased July 2017		Purchase	Jul	2017	67	
SDYC	6312	84	Sail	20	4	Non Copper	No bottom paint		none			0	
SDYC	6313	100		33.9	11.3	Copper	Pettit-Z Spar	411187706	Marine Group		2013	65	60061-94-ZE
SDYC	6314	94	Power	42	15	Low Copper	ux Calif Bottom	YBA143	ter Island Boat	Jan	2012	35	2693-18-ZA
SDYC	6315	94	Sail			Low Copper	rchased Mar 2017		Purchase	Mar	2017	67	
SDYC	6316		vacant	jr racing								0	
SDYC	6317	100				Copper	rchased Aug 2017		Purchase	Aug	2017	67	
SDYC	6318	94		42	14	Copper	y Defense MOI	4901	eilsen Beaumo	Nov	2016	40	60061-117-ZA
SDYC	6319	100	Sail	41.8	13.8	Non Copper	Interlux Ultra	Y3779F	ter island Boat	Jul	2016	55	2693-212-AA
SDYC	6320	98	Sail	36	12.5	Copper	bergalss Bottom	YBA579	ter Island Boat	Oct	2016	46	
SDYC	6321	0	Sail	15	5	Non Copper	Proline 1088	1088C-02	iscoll Mission B	6	2010	55.7	
SDYC	6322	90	Sail	40	9	Non Copper	tit Z-Spar Prote	411187706	Driscoll	Mar	2015	65	60061-94-ZE
SDYC	6323	99	Power	35	12	Copper	Proline 1088-6	A1088G	ter Island Boat	Jun	2012	60	60061-94-ZB
SDYC	6324	0	Sail	33	10	Non Copper	lux Bottomkot	79	ter Island Boat	Jun	2012	22	
SDYC	6325	99	Power	32.9	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Sept	2013	55	2693-212-AA
SDYC	6326	98	Power	28		Copper	lux Bottomkot	79	Driscoll	Mar	2015	22	
SDYC	6327	78		50	16.5	Low Copper	Proline 1088-6	A1088G	e Group Boat V	Nov	2007	60	60061-94-ZB
SDYC	6329	100	Sail	32.6	10.1	Copper	Interlux Ultra	Y3779F	ter Island Boat	May	2012	55	2693-212-AA
SDYC	6330	90		38	13.5	Low Copper	Interlux Ultra	Y3779F	Koehler Kraft	Feb	2016	55	2693-212-AA
SDYC	6331	98	Power	44	13.5	Copper	Interlux Aqua	YBA549	ielsen Beaumo	Apr	2015	46	
SDYC	6332	90	Sail	35		Copper	Trilux 33-3	YBA063	Driscoll	Nov	2009	16.95	2693-203-ZB
SDYC	6333	100	Sail	25	8.3	Low Copper	erlux Bottomkc	10397	Driscoll	Jun	2015	42.75	
SDYC	6334	94	Power	36.3	11.9	Copper	nterlux Ultrakot	2779N	ter Island Boat	Apr	2016	66.5	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6335	97	Power	73	16.4	Low Copper	Trilux33-3	YBA063	ielsen Beaumo	Aug	2016	16.95	2693-203-ZB
SDYC	6336	0	Sail	51		Non Copper	ivid White w/ g	11161	Driscoll	Oct	2014	25	60061-116-AA
SDYC	6337	96	Sail	44.2		Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2013	60	60061-94-ZB
SDYC	6338	98	Sail	40.2	12	Non Copper	tit Z-Spar Prote	411187706	Driscoll	May	2013	65	60061-94-ZE
SDYC	6339	100		32	6.7	Copper	nterlux Ultrakot	2779N	Driscoll		2012	66.5	
SDYC	6341	100	Sail	36.4	11.9	Non Copper	nterlux Ultrakot	2779N	ter Island Boat	Jan	2017	66.5	
SDYC	6342	88	Sail	26	8.5	Copper	rinidad VOC Re	1678	de San Diego C	Jan	2013	75.8	
SDYC	6343	95	Power	33	10.8	Copper	terlux Interspe	BQA659/5GL	Koehler	Feb	2017	38	2693-176-ZB
SDYC	6344	97	Power	52.8	15	Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2014	55	2693-212-AA
SDYC	6345	98		40	11.11	Low Copper	Proline 1088-6	A1088G	ndurance Marir	Apr	1991	60	60061-94-ZB
SDYC	6346	93	Sail	41.7	13	Copper	ttit Hydrocoat E	1847G	ielsen Beaumo	Jun	2017	25.25	
SDYC	6347		vacant	jr racing								0	
SDYC	6349	95	Sail	40	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6350	100		35	12	Non Copper	Intersleek 900	FXA979/A	Driscoll	Aug	2011	0	
SDYC	6351	99	Sail	36	11.9	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Dec	2015	55	2693-212-AA
SDYC	6352	87	Sail	32	6.7	Copper	nterlux Ultrakot	2779N	ter Island Boat	Oct	2016	66.5	
SDYC	6353	0	Power	38	14	Non Copper	berglass Botton	YBA579	Driscoll	May	2013	46	
SDYC	6354	99	Sail	43.1	13.1	Copper	Proline 1088	A1088G	ter Island Boat	Feb	2013	60	60061-94-ZB
SDYC	6355	95	Sail	35	11	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6356	99		48	15.1	Copper	terlux Ultra Bla	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6357	96	Power	24	8.3	Copper	ar Bottom Pro (	A411187706	Driscoll	Mar	2015	65	
SDYC	6358	98	Sail			Low Copper	Interlux Ultra	Y3779F	Koehler	Jun	2015	55	2693-212-AA
SDYC	6359	84	Power	45	13.7	Copper	erlux Bottomk	10397	ielsen Beaumo	May	2015	42.75	
SDYC	6360	100		33	11.6	Low Copper	tit Z-Spar Prote	411187706	Driscoll	Feb	2014	65	60061-94-ZE
SDYC	6361	98	Power	40	12.6	Low Copper	tit Z-Spar Prote	411187706	alerno Marine -	Jul	2017	65	60061-94-ZE
SDYC	6362	99				Copper	rchased Jun 2017		Purchase	jun	2017	67	
SDYC	6363	92	Sail	36	12.5	Copper	Ceram-kote	99M	ter Island Boat	May	2011	0	
SDYC	6364	97		38.4	13.8	Copper	rlux Ultrakote E	2779N	ter Island Boatyard		2015	66.5	
SDYC	6365	100	Power	42	13.5	Copper	Trinidad Pro-7	A1877G	Driscoll	Aug	2014	60	60061-94-ZD
SDYC	6366	92		50	10.5	Copper						67	
SDYC	6367	88	Sail	50	13.1	Copper	Pettit Vivid - 3	1361	ter Island Boat	Jul	2016	25	60061-116-AA
SDYC	6368	100	Sail			Copper	nterlux Ultrakot	2779N	ter Island Boat	Mar	2016	66.5	
SDYC	6369	81	Power	22	8	Low Copper	ABC3-2	ABC3-92	SD Boatyard	Oct	2006	47.99	
SDYC	6370	99	Electric	39.7	11.8	Low Copper	ettit Vivid Whit	11161	ter Island Boat	Jan	2011	25	60061-116-AA
SDYC	6371	93	Sail	48	11.6	Non Copper	tit Z-Spar Prote	411187706	Driscoll	Mar	2016	65	60061-94-ZE
SDYC	6372	98	Sail	26.4	5.11	Copper	Interlux Ultra	Y3779F	Koehler	Nov	2016	55	2693-212-AA
SDYC	6373	99	Sail	34	11.6	Low Copper	Pettit Z-Spar	411187706	Driscoll	Dec	2011	65	60061-94-ZE
SDYC	6374	100		37	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Sept	2011	55	2693-212-AA
SDYC	6375	0	Power	47.5	13	Non Copper	Pettit Horizons	B-94	ter island Boat	May	2013	65	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6376	0	Sail	30		Non Copper	Proline 1088	Y3779F	coll Mission	Jun	2017	67	2693-212-AA
SDYC	6377	99	Power	59.5	16.5	Copper	erlux Ultra B 36	3669	ter Island Boat	May	2012	55	
SDYC	6378	100				Non Copper	it Z-Spar Prote	411187706	ter Island Boat	Apr	2016	65	60061-94-ZE
SDYC	6379	63		42	15	Copper	Proline 1088-6	A1088G	Driscoll	Mar	2014	60	60061-94-ZB
SDYC	6380	95	Power	36	13.6	Copper						67	
SDYC	6381	96		53	15.4	Copper	Proline 1088-6	A1088G	ter Island Boat	Jun	2012	60	60061-94-ZB
SDYC	6382	100	Sail			Copper	Ultrakote-6	Y3669U	ter Island Boat	Feb	2016	57	
SDYC	6383	90	Power	35.5	13.3	Low Copper	ettit Ultima Ec	1808	Driscoll	Jun	2016	0	
SDYC	6384	96	Sail	34.5	11	Low Copper	erformance Ep	V127/A	Driscoll			0	
SDYC	6385	95	Sail	35.7		Non Copper	Intersleek 900	FXA979/A	ter Island Boat	Nov	2013	0	
SDYC	6386	100		38.6	12.3	Non Copper	erlux Ultra Gre	Y3559F	ter Island Boat	Nov	2017	55	2693-212-AA
SDYC	6387	100	Sail	46	18.6	Copper	Spar Bottom p	A411187706	Driscoll	Aug	2017	65	
SDYC	6388	100	Sail	32.8	7.5	Non Copper	Coppercoat	85396-1-AA	At Home	Feb	2015	0	
SDYC	6389	83	Sail	34.5	11	Copper	line 1088-6 Ep	A1088G	Driscoll	Aug	2015	60	0
SDYC	6390	84	Power	17	6.1	Copper	ux Calif Bottom	YBA143	Driscoll	Aug	2016	35	2693-18-ZA
SDYC	6391	92		43.9	14.6	Copper	ux Micron Ultra	YBA472	scoll Shelter Isl	May	2017	35	2693-187-ZE
SDYC	6392	0	Sail	35	11	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2014	55	2693-212-AA
SDYC	6393	97	Sail	40.1	12	Copper	erlux VC Offsh	V118	ter Island Boat	Jun	2017	41.19	
SDYC	6394	100	Power	53	16	Copper	Interlux Ultra	Y3779F	e Group Boat	Nov	2014	55	2693-212-AA
SDYC	6395	99	Power	34	11.5	Low Copper	er Proguard, M	NK52	ielsen Beaumo	Oct	2016	33.4	2693-70-ZA
SDYC	6396	94	Power	47.5	15.2	Copper	lux Ultra Blue 3	Y3669F	ter Island Boat	Jun	2014	55	2693-212-AA
SDYC	6398	97	Power	43	14	Low Copper	it Z-Spar Prote	411187706	ter Island Boat	Aug	2015	65	60061-94-ZE
SDYC	6399	99	Power	21	8	Non Copper	ttit Copper-Gua	1048	ter Island Boat	Nov	2015	33.26	
SDYC	6400	100	Power	31	8.8	Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2015	60	60061-94-ZB
SDYC	6401	100		33	12	Copper						67	
SDYC	6402	97	Sail	37	12	Copper	Interlux Ultra	Y3779F	ter Island Boat	Oct	2017	55	
SDYC	6403	98	Power	50	15.8	Copper	Proline 1088-6	A1088G	ter Island Boat	Aug	2017	60	60061-94-ZB
SDYC	6404	100	Sail	32	6.7	Low Copper	-Spar Protecto	B-94		Feb	2015	65	
SDYC	6405	97	Power	35	10.6	Copper	it Z-Spar Prote	411187706	Driscoll	Jan	2015	65	60061-94-ZE
SDYC	6406	0	Sail	34.1	10	Non Copper	Pettit-Vivid-3	1361	Koehler	May	2015	25	60061-116-AA
SDYC	6407	99	Sail	53	14	Low Copper	erlux VC Offsh	V118	ter Island Boat	Nov	2016	41.19	
SDYC	6408	100	Sail	28.5	10	Copper	Proline 1088	A1088G	ter Island Boat	Aug	2016	60	60061-94-ZB
SDYC	6409	99	Power	18.5	7	Low Copper	SeaHawk AF33	3345	ter Island Boat	Apr	2006	33	44891-12-AA
SDYC	6410	97	Power	23		Copper	erlux Bottomk	10397	ter Island Boat	Jan	2017	42.75	
SDYC	6411	93	Sail	48	14.75	Copper	Interlux Ultra	Y3779F	Driscoll	Jun	2017	55	2693-212-AA
SDYC	6412	100	Sail	35	10	Copper	Interlux Ultra	Y3779F	Koehler	Aug	2017	55	2693-212-AA
SDYC	6413	99	Power	57	15	Copper	ux Ultra Blue 3	Y3779F	ter Island Boat	May	2013	55	2693-212-AA
SDYC	6414		vacant						Cruising			0	
SDYC	6415	95		21		Copper	it Z-Spar Prote	411187706	Driscoll	Jul	2017	65	60061-94-ZE

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6416	97		30.5	11.2	Copper	Interlux Ultra	Y3779F	ter Island Boat	Mar	2011	55	2693-212-AA
SDYC	6417	99		29	11	Low Copper	:it Z-Spar Prote	411187706	Driscoll	Apr	2011	65	60061-94-ZE
SDYC	6418	72	Sail	30	10.1	Copper	Proline 1088-6	A1088G	ter Island Boat	Jan	2012	60	60061-94-ZB
SDYC	6419	95	Sail	41.3	13.5	Low Copper	terlux Interspe	BRA642	ter Island Boat	Aug	2013	38	2693-142-ZM
SDYC	6420	0	Power	23.6	7	Non Copper	Interlux Ultra	Y3779F	Koehler	Jul	2016	55	2693-212-AA
SDYC	6421	95		25	6.5	Copper	ical Super Prog	NAU770	ielsen Beaumo	7	2017	55	23566-20-ZR
SDYC	6422	100	Sail	33.1	9.7	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Mar	2013	55	2693-212-AA
SDYC	6423	97		49.9	11.9	copper	Interlux Ultra	Y3779F	Koehler	Oct	2014	55	2693-212-AA
SDYC	6424	100	Power	33	12.8	Copper	:it Z-Spar Prote	411187706	Sunset Auatic	Mar	2017	65	60061-94-ZE
SDYC	6425	100	Sail	39.5	12.6	Copper	Ultrakote-6	Y3669U	ter Island Boat	Oct	2015	57	
SDYC	6426	100	Sail	46.9	11.1	Copper	Proline 1088-6	A1088G	ter Island Boat	Apr	2016	60	60061-94-ZB
SDYC	6427	79	Sail	67.6	19.2	Low Copper	:it Z-spar Prote	411187706	Driscoll	Oct	2015	65	60061-94-ZE
SDYC	6428	99	Power	36	11.8	Copper	erlux Bottomk	10397	Koehler	Apr	2010	42.75	
SDYC	6429	83		42	13.3	Copper	terlux Ultra Blu	Y3669F	ter Island Boat	Mar	2016	55	2693-212-AA
SDYC	6430	98	Sail	45.9	14	Copper	ux Ultra Black 3	Y3779F	ter Island Boat	Apr	2015	55	2693-212-AA
SDYC	6431	100	S			Low Copper	nterlux Epoxyco	NK52	ielsen Beaumo	May	2015	33.4	2693-70-ZA
SDYC	6432	95	Power	42	14.5	Copper	Interlux Ultra	Y3779F	ter Island Boat	Mar	2016	55	2693-212-AA
SDYC	6433	99		30	10	Copper	erlux Bottomk	10397	Driscoll	Jan	2012	42.75	
SDYC	6434	80	Sail	30	10	Copper	Intersleek 900	FXA979/A	iscoll Mission B	Apr	2017	0	
SDYC	6435	97	Sail	52	13.6	Low Copper	Trinidad SR	A1877G	ter Island Boat	Jun	2015	60	60061-94-ZD
SDYC	6436	92	Sail	41.8	12.5	Low Copper	Pettit-Vivid 3	1361	Driscoll	Mar	2014	25	60061-116-AA
SDYC	6437	98	Power	32	11.5	Copper	erlux Bottomk	79	Koehler	Jan	2017	22	
SDYC	6438	96	Power	40	14	Non Copper	erlux Bottomk	10397	Driscoll	Jun	2016	42.75	
SDYC	6440	98	Power	45.1	13.8	Copper	Interlux Ultra	Y3779F	ter Island Boat	Oct	2017	55	
SDYC	6441	100	Sail	38		Copper	erlux Bottomk	10397	ielsen Beaumo	Jun	2014	42.75	
SDYC	6442	97	Sail	42	12.9	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2015	55	2693-212-AA
SDYC	6443	83	Sail	37	22.4	Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2016	55	2693-212-AA
SDYC	6444	99	Sail	38.3	11.6	Copper	Proline 1088-6	A1088G	ter Island Boat	May	2012	60	60061-94-ZB
SDYC	6445	97	Sail	32	5.1	Low Copper	rlux Ultrakote E	2669N	Koehler Kraft	Jul	2016	66.5	
SDYC	6446	95	Power	23		Copper	:it Z-Spar Prote	411187706	Driscoll	Jul	2017	65	60061-94-ZE
SDYC	6447	100		40	13.5	Non Copper	N/A		N/A			67	
SDYC	6448	100	Electric	18	6	Copper	SeaHawk AF33	3345	Driscoll	Jun	2015	33	44891-12-AA
SDYC	6449	100	Power	25	8	Low Copper	Pettit Vivid-3	1361	Driscoll -MB	Apr	2016	25	60061-116-AA
SDYC	6450	100		32	6.7	Copper	Proline 1088-6	A1088G	ter Island Boat	Apr	2011	60	60061-94-ZB
SDYC	6451	99	Sail	32	5	Non Copper	Coppercoat	85396-1-AA	Driscoll	Jun	2012	0	
SDYC	6452	100		39.1	11.9	Copper	rchased may 2017		Purchase	May	2017	67	
SDYC	6453	98		19		Copper	Trinidad SR	A1877G	ter Island Boat	Jun	2011	60	60061-94-ZD
SDYC	6454	95	Power	47.3	14.3	Copper	hased January 2015		Purchase	Jan	2015	67	
SDYC	6455	100				Copper	Purchased 2014		Purchase		2014	67	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6456		Power										
SDYC	6457	99	power	36	13	Low Copper	ewater Copper	8101	ter Island Boat	oct	2015	67	
SDYC	6458	82	Sail	41.8	13.8	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2015	55	2693-212-AA
SDYC	6459	99	Power	61	16	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6460	98		25.3	9.5	Copper	Pettit Vivid-3	1361	Driscoll	Jan	2014	25	60061-116-AA
SDYC	6461	0				Non Copper	ux White Epoxy	V127/A	Driscoll	Apr	2017	0	
SDYC	6462	92	Sail	32	10	Copper	tit Z-spar Prote	411187706	ter Island Boat	May	2012	65	60061-94-ZE
SDYC	6463	100	Sail	31	7.3	Low Copper	erformance Ep	V127/A	ner - Manufactu	Jun	2015	0	
SDYC	6464	100				Copper						67	
SDYC	6465	99	Sail	33	9	Low Copper	Pettit Vivid	1361	Driscoll	Jun	2015	25	60061-116-AA
SDYC	6466	93	Electric	18	10	Copper	tit Z-spar Prote	411187706	ter Island Boat	Jun	2014	65	
SDYC	6467	93		32.8	9.25	Copper	terlux Ultrakot	Y3669U	ter Island Boat	May	2016	57	
SDYC	6468	91	Sail	34.4	11.9	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2015	55	2693-212-AA
SDYC	6469	98	Sail	57.3	15.3	Low Copper	Trilux33-3	YBA060	Driscoll	Jul	2017	17	2693-203-AA
SDYC	6470	98	Power			Copper	lux Bottomkot	79	Driscoll	Jan	2016	22	
SDYC	6471	98	Power	47	14.8	Copper	rchased Mar 2016		Purchase	Mar	2016	67	
SDYC	6472	100	Sail	34	10.8	Copper			Shelter Island Boat	Jun	2015	67	
SDYC	6473	96	Power	28.2	9.5	Copper	ettit Vivid Whit	11161	ter Island Boat	Nov	2017	25	60061-116-AA
SDYC	6474	94	Sail	50	13.8	Copper	SeaHawk AF33	3345	ter Island Boat	Apr	2006	33	44891-12-AA
SDYC	6475	100	Power	27.1	9.2	Low Copper	Pettit Ultima	1038	ielsen Beaumo	Jul	2017	60	
SDYC	6476	97	Sail	47	14	Non Copper	SeaHawk AF33	3345	ter Island Boat	Aug	2015	33	44891-12-AA
SDYC	6477	96	Power	78	20	Copper	rlux Micron CS	YBC582	ter Island Boat	Mar	2017	33.4	2693-225-AA
SDYC	6478	84	Sail	50	12.2	Low Copper	Seaguard-2	P30BQ12	Driscoll	Mar	2017	48	
SDYC	6479	100	Power	38.6	12.7	Low Copper	tit Z-Spar Prote	411187706	Driscoll	Jan	2011	65	60061-94-ZE
SDYC	6480	100	Power	30	10.3	Copper	Interlux Ultra	Y3449F	Knight Carver	May	2010	55	2693-212-AA
SDYC	6481	86	Sail	32.7	9.15	Copper	Interlux Ultra	Y3779F	Driscoll	Sept	2013	55	2693-212-AA
SDYC	6482	100	Sail	39.2	10.8	Copper	Interlux Ultra	Y3779F	Driscoll	Jun	2017	55	2693-212-AA
SDYC	6483	97		37	11.8	Copper	lux Ultra-Kote	Y3779U	iscoll Mission B	Feb	2017	57	
SDYC	6484	0	Power	25	8.5	Non Copper	erlux Bottomk	10397	Driscoll	Jun	2016	42.75	
SDYC	6485	95	Power	17		Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	2693-212-AA
SDYC	6486	100	Sail	33	11	Copper	Proguard Abla	NAU990	ielsen Beaumo	Jul	2017	41.97	
SDYC	6487	100	Power	33.1	10.8	Copper	tit Z-Spar Prote	411187706	Driscoll	Oct	2015	65	60061-94-ZE
SDYC	6488	78	Power	48	14	Copper	lux Bottomkot	79	ielsen Beaumo	Aug	2016	22	
SDYC	6489	95	Power	41	12.5	Non Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2015	55	2693-212-AA
SDYC	6490	78	Power	47	15	Copper	lux Bottomkot	79	ielsen Beaumo	Jun	2016	22	
SDYC	6491	95	Sail	46.3	13.8	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Mar	2017	55	2693-212-AA
SDYC	6492	98	Power	48.6	16	Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2017	55	2693-212-AA
SDYC	6493	95	Power	62	16.8	Copper	Interlux Aqua	YBA549	Driscoll	Mar	2016	46	
SDYC	6494	100		26	7	Copper	Super KL-6	K93	Driscoll	May	2010	70.2	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6495	100	Power	34	12	Copper	it Z-Spar Prote	B-91	Driscoll	May	2016	65	
SDYC	6496	100	Power			Copper	Interlux Ultra	Y3779F	Driscoll	July	2017	55	2693-212-AA
SDYC	6497	98	Power	35.6	12	Copper	Hydrocoat	1840	ielsen Beaumo	Jul	2015	40.43	60061-87-ZI
SDYC	6498	97		33.5	9.2	Low Copper						67	
SDYC	6499	95	Power			Copper	lux Ultrakote 3	Y3779U	ter Island Boat	Jul	2017	57	
SDYC	6500	98	Sail	40	12.3	Copper	Interlux Ultra	Y3779F	ter Island Boat	May	2016	55	2693-212-AA
SDYC	6501	99	Power	35	12	Copper	ux Calif Bottom	YBA143	Koehler	May	2015	35	2693-18-ZA
SDYC	6502	93		30.4	11.5	Copper	rlux UltraKote	Y3669U	ter Island Boat	Feb	2016	57	
SDYC	6503	100	Power	63.1	17.3	Copper	Interlux Ultra	Y3779F	alboa Boat Yar	Jun	2015	55	2693-212-AA
SDYC	6504	96	Sail	42.5	14	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2016	55	2693-212-AA
SDYC	6505	0		43	13.6	Non Copper	roline 1088 Re	A10886	ter Island Boatyard		2015	60	60061-94-ZB
SDYC	6506	98	Sail	31.1	9.8	Copper	erlux Bottomk	10397	ter Island Boat	Jun	2014	42.75	
SDYC	6507	86	Power	35	9.5	Copper	erlux VC Offsh	V118	Driscoll	May	2016	41.19	
SDYC	6508	99	Sail	44.9	13	Copper	lux Bottomkot	79	ielsen Beaumo	Feb	2017	22	
SDYC	6509	100	Power	35	10	Copper	nterlux Ultrakot	2779N	ter Island Boat	Jun	2016	66.5	
SDYC	6510	99				Copper	rchased Aug 2017		Purchase	Aug	2017	67	
SDYC	6511	100	Sail	32	6.7	Copper	it Z-Spar Prote	411187706	Driscoll	Aug	2015	65	60061-94-ZE
SDYC	6512		vacant	Jr Racing								0	
SDYC	6514	100	Power	33	13	Copper	Micron Optima	YBA993	Koehler	Dec	2016	28.45	
SDYC	6515	92	Sail	33.6	11.8	Copper	Interlux Ultra	Y3779F	ter Island Boat	Apr	2014	55	2693-212-AA
SDYC	6516	96	Sail	30	19	Copper	Pettit Vivid-3	1361	ter Island Boat	Aug	2015	25	60061-116-AA
SDYC	6517	96	Power	47	14	Copper	erlux Bottomk	10397	Driscoll	Apr	2015	42.75	
SDYC	6518	100	Sail			Low Copper	Primer - No A	V127/A	Driscoll	Oct	2016	0	
SDYC	6519	100		47	15	Copper	ewater Copper	8101	ter Island Boat	Feb	2010	67	
SDYC	6520	98	Sail	34.5	11	Copper	Performance E	V127/A	iscoll Mission B	Apr	2011	0	
SDYC	6521	100	Sail	34.5	11	Copper	y non toxic bo	V127/A	Driscoll	Nov	2013	0	
SDYC	6522	99	Sail	32	6.7	Copper	Coppercaot	85396-1-AA	Other	Jan	2013	0	
SDYC	6523	98		31.7	11.4	Low Copper	lsey Defense B	4901	Beaumont Bo	Jul	2017	40	60061-117-ZA
SDYC	6524	86	Sail	29.11	11	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Feb	2014	55	2693-212-AA
SDYC	6525		vacant	jr racing								0	
SDYC	6526	0		47	14.3	Non Copper	ased December 2017		Purchase	Dec	2017	67	
SDYC	6527	70	Power	40	12.5	Copper	it Z-Spar Prote	411187706	Driscoll	Oct	2016	65	60061-94-ZE
SDYC	6528	92				Copper	Interlux Ultra	Y3779F	e Group Boat	Oct	2016	55	2693-212-AA
SDYC	6529	98	Power	35.7	12.6	Low Copper	Proline 1088-6	A1088G	ter Island Boat	Apr	2017	60	60061-94-ZB
SDYC	6530	97	Sail	50		Copper	Proline 1088-6	A1088G	ter Island Boat	Oct	2016	60	60061-94-ZB
SDYC	6531		vacant									0	
SDYC	6532	100	Sail	32	6	Copper	Proline 1088-6	A1088G	ter Island Boat	Mar	2015	60	60061-94-ZB
SDYC	6533	92	Sail	32	11	Copper	it Z-Spar Prote	411187706	ter Island Boat	May	2016	65	60061-94-ZE
SDYC	6534	80	Sail	31		Copper	Intersleek-8	FXA979/A	Driscoll	Jun	2012	0	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low Copper, or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SDYC	6535	100	Power	57	14.5	Low Copper	erlux Bottomk	10397	ter Island Boatyard		2010	42.75	
SDYC	6536	99	Sail	47	14.1	Low Copper	rchased Jan 2016		Bay Marine Boatw	Jan	2016	67	
SDYC	6537	100	Sail	32	11	Copper	Proline 1088-6	A1088G	ter Island Boat	Jun	2010	60	60061-94-ZB
SDYC	6538	96	Power	27.5	9.5	Copper	Interlux Ultra	Y3779F	ter Island Boat	Dec	2011	55	2693-212-AA
SDYC	6539	100	Sail	32	6.7	Copper	x Calif Bottomk	YBA143	Koehler	Jul	2016	35	2693-18-ZA
SDYC	6540	100		42	14	Copper	ttit Hydrocoat	1640	Driscoll	Feb	2017	40.43	60061-87-ZL
SDYC	6541	100		34.5	11	Copper	Proline 1088-G	A1088G	ter Island Boat	Aug	2017	60	60061-94-ZB
SDYC	6542	98	Sail	40	12	Copper	oolsey Defense	4901	ielsen Beaumo	Nov	2017	40	60061-117-ZA
SDYC	6544	100	Power	52	14	Copper	x Calif Bottomk	YBA143	Driscoll	Jul	2017	35	2693-18-ZA
SDYC	6545	100	Sail	29	9.6	Copper	Interlux Ultra	Y3779F	Driscoll -MB	Dec	2016	55	2693-212-AA
SDYC	6546	100	Sail	35	11	Non Copper	nterlux Epoxyc	V127/A	ed by manufacturer		2001	0	
SDYC	6547	97	Power	48	15.2	Copper	erlux Bottomk	10397	Driscoll	Jul	2016	42.75	
SDYC	6548	100	Power	50	15	Copper	Proline 1088-6	A1088G	ter Island Boat	Nov	2014	60	
SDYC	6549	100	Power	28	9.6	Copper	Interlux Aqua	YBA549	Driscoll	Apr	2015	46	
SDYC	6550	99	Sail	33	11.4	Copper	Trinidad SR	A1877G	d Kettenberg Y	Jun	2006	60	60061-94-ZD
SDYC	6551	86	Sail	30	11	Copper	Proline 1088-6	A10886	ter Island Boat	Aug	2015	60	60061-94-ZB
SDYC	6552	99		41	10.5	Copper	Trinidad SR	A1877G	Driscoll	Jun	2010	60	60061-94-ZD
SDYC	6553	98	Power	63.5	18	Copper	tit Z-spar Prote	411187706	he Group/Sout	Dec	2014	65	60061-94-ZE
SDYC	6554	96	Power	26.5	8.5	Low Copper	Pettit-Vivid 3	1361	Driscoll	Jul	2016	25	60061-116-AA
SDYC	6555	100	Power	36	10	Copper	Proline 1088-6	A1088G	Driscoll	Feb	2017	60	60061-94-ZB
SDYC	6556	96				Copper	rchased Jun 2016		Purchase	Jun	2016	67	
SDYC	6557	65	Power	41	13.8	Copper	tit Z-Spar Prote	411187706	Driscoll	Jul	2016	65	60061-94-ZE
SDYC	6558	75	Power	47	14.6	Copper	nterlux Ultra Bl	Y3669F	ter Island Boat	Mar	2015	55	2693-212-AA
SDYC	6559	99	Power	31	10.3	Copper	Interlux Ultra	Y3779F	SD Boatyard	May	2016	55	2693-212-AA
SDYC	6560	100	Sail	31	10	Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2015	55	2693-212-AA
SDYC	6561	91	Sail	36.6	13.1	Non Copper	Interluc Ultra	Y3779F	ter Island Boat	May	2017	55	2693-212-AA
SDYC	6562	97	Power			Copper	Interlux Ultra	Y3779F	iscoll Mission B	Nov	2016	55	2693-212-AA
SDYC	6563	99	Sail	36.3	11.9	Copper	tit Z-Spar Prote	411187706	Driscoll	Jul	2017	65	60061-94-ZE
SDYC	6564	95	Sail	40	12	Copper	Proline 1088-6	A1088G	ter Island Boat	Jul	2017	60	60061-94-ZB
SDYC	6565	99	Sail	38	13.2	Non Copper	lawk Smart Sol	4002	Driscoll	Mar	2016	0	
SDYC	6566	96	Power	39	15	Copper	Interlux Ultra	Y3779F	ielsen Beaumo	Jun	2015	55	2693-212-AA
SDYC	6567	100		32.2	12	Copper	lux Ultra-Kote	2779N		Feb	2017	66.5	
SDYC	6568	76	Sail	43.8	12	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Nov	2017	55	2693-212-AA
SDYC	6569	100	Sail	31.1	6	Low Copper	erlux Bottomk	10397	Driscoll	Jan	2015	42.75	
SDYC	6570	95	Sail	40	12	Copper	Proline 1088-6	A1088G	Driscoll	May	2016	60	60061-94-ZB
SDYC	6571	89	Sail	33	9.4	Copper	Proline 1088-6	A10886	ter Island Boat	Jun	2013	60	60061-94-ZB
SDYC	6572	89	Power	32	11.5	Copper	Interlux	Y3779F	Koehler	Nov	2014	55	2693-212-AA
SDYC	6573	100		30	10.1	Copper	terlux Ultra Pai	Y3779F	ter Island Boat	Jun	2013	55	2693-212-AA
SDYC	6574	98		35	10.25	Non Copper	Proline 1088-6	A1088G	ter Island Boat	Aug	2013	60	60061-94-ZB

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SDYC	6575	100	Sail	40.2	13.5	Copper	Proline 1088-6	A10886	Driscoll	Jul	2011	60	60061-94-ZB
SDYC	6576	0				Non Copper	terlux Interspe	BQA659/5GL	ter Island Boat	Mar	2015	38	2693-176-ZB
SDYC	6577	99	Power	46	15.5	Copper			Shelter Island Boat	Apr	2015	67	
SDYC	6578	99	Power			Copper	Interlux Ultra	Y3779F	ter Island Boat	Jun	2014	55	2693-212-AA
SDYC	6579	75	Power			Copper	Proline - Rust	A10886	Driscoll	Apr	2017	60	60061-94-ZB
SDYC	6580	99	Sail	35.6	10.4	Copper	Interlux Ultra	Y3779F	Driscoll	Jan	2007	55	2693-212-AA
SDYC	6581	86		21	8	Low Copper	Sharkskin-7	6145	ter island Boat	Jun	2013	45	44891-11-AA
SDYC	6582	91		43	11	Copper	ıx Calif Bottom	YBA143	Koehler	Apr	2015	35	2693-18-ZA
SDYC	6583	99				Non Copper	ainted since before 2007		none			0	
SDYC	6584	97	Power	45.3	14.3	Low Copper	rlux UltraKote E	2779N	ter Island Boat	Mar	2017	66.5	
SDYC	6586		vacant									0	
SDYC	6587	92	Sail	30	7	Copper	Interlux Ultra	Y3779F	Koehler	Aug	2011	55	2693-212-AA
SDYC	6588	100	Sail	33.8	11.5	Non Copper	Hydrolift		none			0	
SDYC	6589	94	Power	21	8.5	Copper	terlux Ultra Bla	Y3779F	ter Island Boat	Sept	2015	55	2693-212-AA
SDYC	6590	100	Sail	31.6	9.3	Copper	roline 1088 Re	A10886	ter Island Boat	Mar	2016	60	60061-94-ZB
SDYC	6591	96	Electric	24.2	9.3	Low Copper	Interlux Ultra	Y3779F	ter Island Boat	Jul	2015	55	2693-212-AA
SDYC	6592	97		30	20.5	Non Copper	ased November 2016		Purchase		2016	67	
SDYC	6593	97	Power	42	13.6	Copper	Interlux Ultra	Y3449U	Koehler	Aug	2011	57	
SDYC	6594	94	Sail	37	11.4	Copper	Pettit Vivid-3	1361	ward Shipyard-	Jul	2012	25	60061-116-AA
SDYC	6595	99	Sail	53	15	Low Copper	rlux Ultrakote	Y3449U	ter Island Boat	Mar	2017	57	
SDYC	6596	100	Sail	55	16	Copper	ydracoat Produ	1840	ielsen Beaumo	Feb	2016	40.43	60061-87-ZI
SDYC	6597	98	Sail	27	9	Copper	Proline 1088-6	A1088G	ter Island Boat	Jan	2015	60	60061-94-ZB
SDYC	6598	100				Copper	Super Proguard	NAU770	ielsen Beaumo	Sept	2016	55	23566-20-ZR
SDYC	6599	92	Sail	47	13.2	Copper	Micron Extra VO	5793	Driscoll	Nov	2013	38.6	2693-190-ZJ
SDYC	6600	73	Power	22	8	Copper	Interlux Ultra	Y3779F	ter Island Boat	May	2016	55	2693-212-AA
SDYC	12256	97	Electric	25	8	Copper	Trinidad-6	1878	Driscoll	Nov	2006	75.8	
SWYC	4001	100	S	40	12	Cu	Ultima SR-60	A1103206	La Cruz	2	2016	60	
SWYC	4005	100	P	48	14	Non	Interstellar 9(	FXA970/A	SI	4	2013	0	
SWYC	4006	50	S	30	10	Cu			purch	6	2017		
SWYC	4007	100	S	37	12	Cu	Pettit Protec	B-94	Dr	5	2017		
SWYC	4009	98	S	28	9	Low	Zspar Protect	B-91	SI	2	2017	65	
SWYC	4011	96	S	36	11	Low	Interlux Ultra	2669N	KK	11	2007		
SWYC	4012	100	P	48	15	Low	Interlux Ultra	Y3779F	SI	12	2014	55	2693-212-AA
SWYC	4013	100	P	40	13	Low	Interlux Ultra	Y3669F	SI	11	2013	55	2693-212-AA
SWYC	4014	98	P	39	14	Low	Interlux Ultra	Y3669F	KK	5	2014	55	2693-212-AA
SWYC	4015	100	P	47	14	Low	Interlux Micr(	YBA473	SI	12	2013	35	2693-187-ZG
SWYC	4016	100	P	19	7	low	Pettit Vivid	11161	Dr	8	2017	0.25	
SWYC	4017	100	P	38	14	Low	Interlux Ultra	Y3779F	Dr MB	3	2014	55	2693-212-AA
SWYC	4018	98	S	36	11	Non	Intersleek 90(	FXA970/A	SI	8	2013	0	

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SWYC	4022	96	P	29	11	Low	Z-spar Protec	B-94	Dr	7	2014	65	
SWYC	4024	92	S	39	13	Cu	Interlux Ultra	Y3669F	KK	5	2016	57	2693-212-AA
SWYC	4025	0	Vacant			Non						0	
SWYC	4026	96	S	32	11	Non	Pettit Ultima	1608	Ventura Harb	7	2012	0	
SWYC	4027	100	S	38	13	Low	Interlux Ultra	Y3779U	SI	9	2013	57	
SWYC	4028		Vacant									0	
SWYC	4032	100	P	21	8	Low	Interlux Ultra	Y3779F	SI	10	2014	55	2693-212-AA
SWYC	4040	100	S	46	14	Low	Interlux Ultra	Y3669F	SI	10	2014	55	2693-212-AA
SWYC	4041	100	(	52	17	Low	Proline 1088	Y1088C-01	SI	4	2013		
SWYC	4042	100	P	30	11	Cu	Interlux Ultra	Y3669U	SI	3	2015	57	
SWYC	4043	100	P	31	9	Cu	Ulttakote	3779	SI	11	2015	67	
SWYC	4044	94	P	42	13	Low	Interlux Ultra	Y3449F	DrMB	9	2012	55	2693-212-AA
SWYC	4045	90	P	20	9		Interlux Ultra	Y3779F	SI	4	2016	55	2693-212-AA
SWYC	4046	75	S	41	13	Cu	Z-Spar Protec	B-94	DrSI	3	2017	65	
SWYC	4047	100											
SWYC	4049	100	P	40	12	Cu	Interlux Ultra	Y3779F	SI	2	2016	55	2693-212-AA
SWYC	4050	100	S	30	10	Low	Interlux Ultra	Y3779F	SI	6	2012	55	2693-212-AA
SWYC	4051	82	P	39	14	Low	Z-Spar Bottor	411127906	Dr SI	9	2014	45	
SWYC	4052	100	S	26	6	Cu	Interlux Ultra	Y3559F	KK	8	2017	55	2693-212-AA
SWYC	4053	100	P	36	12	Non	Aquacote	non toxic test	Dr SI	8	2015	0	
SWYC	4054	80	S	37	12	Low	Micron 66	YBA473	SI	9	2015	35	2693-187-ZG
SWYC	4055	100	P	26	10	Low	Proline 1088	Y1088C-01	SI	6	2010	67	
SWYC	4056	92	S	27	10	Low	Interlux Ultra	Y3669F	SI	11	2012	55	2693-212-AA
SWYC	4058	100	S	25	8	Cu	Z-spar botton	41127706	Dr SI	6	2015	45	60061-94-ZE
SWYC	4060	98	P	38	12	Cu	Nautical Supe	NAU770	NB	4	2016	55	23566-20-ZR
SWYC	4061	100	S	31	11	Cu	Interlux Ultra	2779N	SI	3	2016	57	
SWYC	4064	100	P	49	15	Low	Proline 1088	Y1088C-01	SI	4	2004	67	
SWYC	4065	100	S	32	8	Low	Interlux Ultra	Y3669F	SI	10	2013	55	2693-212-AA
SWYC	4067	100	P	58	16	Low			purch	10	2014		
SWYC	4068	0	Vacant			Non						0	
SWYC	4069	100	S	34	10	Low	Z-spar Bottor	41127706	DrSI	11	2014	45	60061-94-ZE
SWYC	4071	100	P	12	5		Omni	1840	SI Inflatables	11	2015		60061-87-ZI
SWYC	4074	88	S	42	13	Cu	Interlux Ultra	Y3669F	SI	4	2015	55	2693-212-AA
SWYC	4075	100	S	44	13	Cu	Interlux Ultra	Y3779F	SI	11	2016	55	2693-212-AA
SWYC	4076	96	S	30	10	Low	Interlux Ultra	Y3669F	SI	6	2014	55	2693-212-AA
SWYC	4077	100	P	24		Cu	Ultra-Kote	3779	SI	12	2016	67	
SWYC	4079	98	P	67	16	Low	Z-Spar Protec	B-94	SI	12	2014	65	
SWYC	4080	100	S	34	12	Low	Z-Spar Bottor	411167706	Dr	10	2014	45	60061-94-ZE
SWYC	4082	33	P						purch	10	2017		

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SWYC	4083	98	P	45	10	Low	Trinidad SR	A1877G	self	9	2012	70	60061-94-ZD
SWYC	4084	100	S	30	11	Low	Interlux Ultra	Y3669F	SI	7	2014	55	2693-212-AA
SWYC	4085	100	P	37	13	Cu	Z-Spar Protec	B-94	Larson's Ship	9	2016	65	
SWYC	4086	100	S	34	11	Non	Intersleek 90	FXA972/A	SI	7	2013	0	
SWYC	4087	96	P	43	13	Cu	Interlux Ultra	Y3779F	SI	5	2015	55	2693-212-AA
SWYC	4089	96	S	22	8	Low	Interlux Ultra	Y3669F	Self	4	2014	55	2693-212-AA
SWYC	4090	100	S	34	11	Low	Interlux Ultra	Y3669F	SI	12	2013	55	2693-212-AA
SWYC	4091	98	P	29	9	Cu			purch	2	2016		
SWYC	4093	100	P	35	11	Low	Z-Spar Protec	B-91	Dr SI	5	2012	65	
SWYC	4094	100	P	22	9				purch	8	2016		
SWYC	4095	96	S	51		Cu	Interlux Ultra	Y3779F	SI	3	2015	55	2693-212-AA
SWYC	4096	92	S	36	12	Low	Interlux Ultra	Y3669F	SI	5	2014	55	2693-212-AA
SWYC	4097	100	S	30	10	Low	Proline 1088	Y1088C-01	KK	3	2014	68	
SWYC	4098	100	S	24	8	Low	Micron 66	YBA470	self	3	2014	35	2693-187-ZD
SWYC	4102	100	P	45	14	Cu			purch	3	2015		
SWYC	4103	100	S	42	13	Low	Interlux Ultra	Y3669F	SI	9	2013	55	2693-212-AA
SWYC	4104	100	S	40	12	Low	Interlux Ultra	Y3669U	SI	8	2010	57	
SWYC	4105	100	P	41	11	Cu	Interlux Ultra	Y3669F	SI	2	2015	55	2693-212-AA
SWYC	4108	100	P	36	13	Cu	Ultra-Kote	Y3779U	SI	5	2016	67	
SWYC	4109	100	S	30	10	Low	Pettit Trinida	1275	Dr	5	2008	70	
SWYC	4111	96	P	34	13	Low	Interlux Ultra	Y3779F	SI	2	2014	55	2693-212-AA
SWYC	4112	96	P	37	12	Low	Interlux Ultra	Y3669F	SI	6	2011	55	2693-212-AA
SWYC	4113	94	P	28	8	Cu	Ultra-Kote	3779	SI	5	2016	67	
SWYC	4115	100	P	36	13	Low	Interlux Ultra	Y3779F	SI	11	2014	55	2693-212-AA
SWYC	4116	85	S	36	11	Cu	Interlux Ultra	2669N	SI	4	2017	55	
SWYC	4117	100	S	40	12	Non	Vivid free	1162	KC	8	2017	0	
SWYC	4118	100	S	37	12	Cu	Woolsey Defe	4501	KK	11	2015	45	
SWYC	4119	100	P	46	15	Low	Interlux Ultra	Y3669F	DR SI	3	2013	55	2693-212-AA
SWYC	4121	100	S	27	9	Cu	Interlux Ultra	Y3669F	SI	6	2016	57	2693-212-AA
SWYC	4123	100	P	43	13		Interlux Ultra	Y3779U	SI	5	2017	55	
SWYC	4124	100	S	45	14	Low	Interlux Ultra	Y3669F	SI	6	2012	55	2693-212-AA
SWYC	4126	98	S	41	13	Low			purch	2	2014		
SWYC	4127	100	P	26	9	Low	Micron 66	YBA470	MG	12	2016	35	2693-187-ZD
SWYC	4128	100	P	44	15	Low	Proline 1088	Y1088C-01	SI	4	2013	67	
SWYC	4130	100	S	37	12	Low	Micron Extra-	5794	KK	6	2011	35	2693-190-ZK
SWYC	4134	94	S	35	12	Low	Interlux Ultra	Y3779F	KK	5	2014	55	2693-212-AA
SWYC	4135	100	P	44	14	Non	Z-spar The Pr	B-94	SI	11	2013	53	
SWYC	4136	96	S	39	12	Low	Interlux Ultra	Y3669F	KK	5	2014	55	2693-212-AA
SWYC	4137	92	P	27	8				purch	2	2017		

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SWYC	4138	92	S	31	11	Cu	Z-Spar Bottor	411127906	Dr SI	7	2015	45	
SWYC	4140	98	S	39	12	Low	Pettit Trinida	A10882	SI	2	2012	70	60061-94-ZB
SWYC	4141	100	S	21	7	Low	Interlux Ultra	Y3669F	self	2	2011	55	2693-212-AA
SWYC	4142	98	S	35	10	Low	Super KL K90	K90	DR SI	4	2006	70	
SWYC	4145	96	S	43	15	Low	Interlux Ultra	Y3669F	SI	7	2013	55	2693-212-AA
SWYC	4146	100	S	49	14	Cu	Proline 1088	Y1088C-01	SI	10	2015	67	
SWYC	4147	94	P	25	8	Cu	Interlux Ultra	Y3669F	SI	6	2017	55	2693-212-AA
SWYC	4148	100	S	39	12	Low	Interlux Ultra	Y3779F	KK	4	2013	30	2693-212-AA
SWYC	4149	100	P	35	13	Low	Interlux Ultra	Y3779F	SI	4	2014	55	2693-212-AA
SWYC	4153	100	P	21	8	Low	Interspeed 64	BQA679/5GL	self	9	2015	38	2693-132-ZY
SWYC	4154	96	P	29	9	Low	Trilux 33	YBA063	Kulick Rpair	5	2016	33	2693-203-ZB
SWYC	4155	100	S	29	10	Low	Interlux Ultra	Y3669F	SI	5	2010	55	2693-212-AA
SWYC	4157	94	P	30	10	Low	Interlux Ultra	Y3779F	SI	3	2011	55	2693-212-AA
SWYC	4158	100	P	24	9	Low	Interlux Ultra	Y3779F	SI	2	2014	55	2693-212-AA
SWYC	4160					Non	no paint					0	
SWYC	4161	88	S	30	9	Low	Interlux Ultra	Y3779F	SI	1	2014	55	2693-212-AA
SWYC	4163	98	S	36	12	Cu	Interlux Ultra	Y3669F	SI	4	2016	57	2693-212-AA
SWYC	4166	0	Vacant									0	
SWYC	4169	100	S	47	13	Cu	Z-Spar Bottor	411167706	Dr	3	2015	45	60061-94-ZE
SWYC	4171	88	S	61	13	Low	Interlux Ultra	Y3669F	KK	12	2013	55	2693-212-AA
SWYC	4172	0	Vacant			Non						0	
SWYC	4173	100	P	26	9	Cu	Ultrakote	2669N	SI	7	2017	69	
SWYC	4174	94	S	41	14	Low	Proline 1088	Y1088C-01	SI	10	2010	67	
SWYC	4175	0	Vacant									0	
SWYC	4176	100	S	39	13	Cu	Interlux Ultra	Y3779F	SI	4	2015	55	2693-212-AA
SWYC	4177	100	S	41	13	Low	Interlux Ultra	Y3779F	SI	4	2012	55	2693-212-AA
SWYC	4178	92	S	44	13	Cu	Interlux Ultra	Y3669F	SI	7	2015	55	2693-212-AA
SWYC	4186	84	S	41	14	Cu	Trinidad Pro	A1088G	purch	3	2016	60	60061-94-ZB
SWYC	4187	94	S	32		Low	Pettit Trinida	A1277Q	Dr	10	2013	60	60061-94-ZD
SWYC	4188	100				Non	no paint					0	
SWYC	4189	100	S	34	11	Cu	Z-Spar Bottor	411127906	KK	11	2015	45	
SWYC	4191	96	P	36	12	Low	Interlux Ultra	Y3779F	SI	6	2013	55	2693-212-AA
SWYC	4194	94	S	34	11	Low	Interlux Ultra	Y3779F	SI	3	2011	55	2693-212-AA
SWYC	4199	100	S	36	13	Cu	Interlux Ultra	Y3669U	SI	5	2016	57	
SWYC	4200	100	S	34	11	Low			SI	1	2008	67	
SWYC	4205	100	S	31	9	Low	Z-Spar Protec	B-91	Marina del Re	8	2014	65	
SWYC	4206	100	S	36	12	Low	Interlux Ultra	Y3669F	SI	9	2006	55	2693-212-AA
SWYC	4208	100	P	13	6	Low	Z-spar Protec	B-94	self	5	2013	65	
SWYC	4210	100	S	39	14	Cu	Z-Spar Protec	B-94	Dr SI	7	2015	65	

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SWYC	4211	100	P	40	14		Z-Spar Protec	B-91	MG	1	2015	65	
SWYC	4213	96	S	33	8	Low	Interlux Ultra	Y3669F	SI	7	2014	55	2693-212-AA
SWYC	4214	100	P	36	13	Low	Pettit Z-spar I	B-94	Marina del Re	3	2010	60	
SWYC	4215	100	P	40	14	Cu	Proline 1088	Y1088C-01	MG	12	2015		
SWYC	4216	100	P	32	10	Cu	Interlux Ultra	Y3669F	SI	11	2015	55	2693-212-AA
SWYC	4218	90	P	42	15	Low	Interlux Ultra	Y3779F	SI	11	2012	55	2693-212-AA
SWYC	4219	100	P	44	14	Cu	Proline 1088	Y1088C-01	SI	5	2015		
SWYC	4220	100	P	52	16	Low	Proline 1088	Y1088C-02	SI	4	2014	56	
SWYC	4221	100	S	36	13	Cu	Interlux Ultra	Y3669F	SI	1	2015	55	2693-212-AA
SWYC	4222	100	S	39	12	Low	Z-Spar Protec	B-94	Dr	3	2014	65	
SWYC	4223	98	P	34	10	Cu	Woolsey Defe	4501	NB	7	2017	45	
SWYC	4224	100	S	39	12	Cu	Interlux Ultra	Y3779F	SI	9	2015	55	2693-212-AA
SWYC	4225	100	P	39	14	Cu	Trinidat Antif	1875	DrSI	3	2017	70	
SWYC	4226	100	S	34	11	Cu	Interlux Ultra	Y3669F	SI	6	2015	55	2693-212-AA
SWYC	4228	100		12		non	mo paint					0	
SWYC	4229	100	S	41	12	Low	Proline 1088	Y1088C-01	SI	8	2013	67	
SWYC	4231	100	P	31		Low			purch	9	2014		
SWYC	4232	100	P	26	9	Cu	Ultra-Kote	3779	SI	3	2016	67	
SWYC	4233	100				Cu	Interlux Ultra	Y3669F	SI	10	2016	55	2693-212-AA
SWYC	4234	100	S	28	10	Low			SI	6	2012		
SWYC	4235	100	S	45	12	Cu	Proline 1088	Y1088C-01	KK	8	2015	67	
SWYC	4236	100	P	25	8	Cu	Interlux Ultra	Y3669U	SI	11	2015	57	
SWYC	4237	88	P	24	8	Cu	Proline 1088	Y1088C-02	SI	7	2016	56	
SWYC	4238	0	Vacant									0	
SWYC	4239	100	S	33	10	Low	Proline 1088	Y1088C-01	SI	11	2014	68	
SWYC	4240	100	S	34	12	Non	CeRam-Kote	99M	Dr	10	2011	0	
SWYC	4241	100	S	37	13	Low	Interspeed 62	BQA659/5GL	SI	7	2017	38	2693-176-ZB
SWYC	4243	94	P	55	14	Cu	Pettit Trinida	1878	KK	4	2015	70	
SWYC	4246	100	S	39	11	Cu	Interlux Ultra	Y3779F	SI	6	2016	55	2693-212-AA
SWYC	4247	90	P	28	9	Low	California Bot	YBA143	Inland boat C	3	2017	35	2693-18-ZA
SWYC	4248	100	P	40	13	Low	Interlux CA B	YBA140	SI	8	2011	35	2693-18-ZA
SWYC	4251	100	P	22		Cu							
SWYC	4252	96	P	39	12	Cu	Z-Spar Prote	B-94	MG	4	2015	45	
SWYC	4254	100	S	34	11	Low	Pettit Trinida	A10882	SI	3	2013	70	60061-94-ZB
SWYC	4255	100	S	29	10	Low	Interlux Ultra	Y3669F	SI	6	2013	55	2693-212-AA
SWYC	4257	92	P	40	14	Cu			piurch	9	2017	55	
SWYC	4259	96	S	31	11	Cu	Interlux Ultra	2669N	SI	1	2016	57	
SWYC	4260	98	S	27	10	Low	Proline 1088	Y1088C-02	SI	7	2012	67	
SWYC	4261	100	P	24	8	Cu	Ultrakote	2669N	MG	9	2016	69	

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SWYC	4262	80	S	47	11	Low	Proline 1088	Y1088C-01	self	10	2012	67	
SWYC	4263	100	P	40	13	Cu	Interlux Ultra	Y3779F	SI	12	2017	55	2693-212-AA
SWYC	4265	88	P	41	13	Low	Interlux Ultra	Y3669F	SI	6	2014	55	2693-212-AA
SWYC	4266	100	P	35	11	Low	Interlux Ultra	Y3669F	SI	4	2011	55	2693-212-AA
SWYC	4267	100	P	63	15	Low	Seahawk AF3	3345	Dr	6	2013	33	44891-12-AA
SWYC	4269	0	Vacant			Non						0	
SWYC	4270	96	P	47	15	Cu	ABC3 PPG	ABC3-92	SI	9	2016	70	
SWYC	4274	67	S	35	11	Cu	Z-Spar Protec	B-91	DrSI	4	2016	65	
SWYC	4275	100	P	25	8	Non	Bluewater M	8204	SI	5	2012	0	
SWYC	4276	100	P	32	11		PLM Marine RC		NB	11	2016		
SWYC	4278	100	S	32	11	Cu	Proline 1088	Y1088C-01	Dr MB	10	2015	67	
SWYC	4279	100	P	49	15	Low	Proline 1088	Y1088C-01	SI	1	2013	67	
SWYC	4281	100	S	35	12	Low	Interlux Ultra	Y3779F	SI	7	2013	55	2693-212-AA
SWYC	4282	100	P	22	8	Low			SI	11	2012		
SWYC	4284	100	P	60	18	Cu	Interlux Ultra	Y3669F	SI	6	2015	55	2693-212-AA
SWYC	4285	98	S	40	24	Cu	Proline 1088	Y1088C-02	MG	4	2017	56	
SWYC	4286	100	P	42	15	Low			SI	4	2012		
SWYC	4287	100	S	48	14	Cu	Interlux Ultra	Y3669U	SI	12	2015	57	
SWYC	4288	100	P	53	14	Low	Proline 1088	Y1088C-02	Lido Shipyard	2	2014		
SWYC	4289	100	S	53	16	Cu	Interlux Ultra	2449H	SI	2	2017	57	
SWYC	4292	98	S	34	12	Low	Z-Spar Botto	411187706	SI	4	2012	45	60061-94-ZE
SWYC	4294	96	S	31	10	Low	Interlux Ultra	Y3669F	SI	1	2014	55	2693-212-AA
SWYC	4295	96	S	32	10	Low	Interlux Ultra	Y3669F	SI	9	2012	55	2693-212-AA
SWYC	4296	100	P	23	8	Cu	Proline 1088	Y1088C-02	SI	8	2015	56	
SWYC	4297	96	P	22	9	Low	Micron 66	YBA470	Hance&Smyt	9	2014	35	2693-187-ZD
SWYC	4298	100	P	32	11	Low	Pettit Vivid	1861	Embree Mari	12	2014	25	60061-116-AA
SWYC	4299	98	S	37	12	Low			Dr	2	2011		
SWYC	4303	100	S	21	7	Low	Interlux Ultra	Y3669F	self	2	2011	55	2693-212-AA
SWYC	4305	100	S	30	11	Low			purch	5	2014		
SWYC	4306	96	S	34	12	Low	Z-Spar Protec	B-91	NB	10	2013	65	
SWYC	4307	100	S	33	10	Low			Dr MB	3	2012		
SWYC	4309	100	S	4	12					5	2015		
SWYC	4310	100	P	40	14		Proline 1088	1088C-01	KK	5	2017	56	
SWYC	4313	90	P	40	13	Cu	Interlux Ultra	Y3779F	SI	8	2015	55	2693-212-AA
SWYC	4314	96	S	35	12	Cu	Interlux Ultra	Y3779F	NB	1	2015	55	2693-212-AA
SWYC	4315	90	S	34	11	Low	Pettit Trinida	A1877G	SI	7	2014	60	60061-94-ZD
SWYC	4317	98	P	34	12	Low	Z-Spar Protec	B-91	SI	2	2013	65	
SWYC	4318	100	S	32	12	Cu	Z-Spar Protec	B-91	Dr	9	2016	65	
SWYC	4320	100		12		non	mo paint					0	

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SWYC	4321	100	S	34	12	Cu	Pettit Protect	B-91	DrSI	9	2016	60	
SWYC	4322	100	P	42	14	Low	Interlux Ultra	Y3669F	SI	12	2014	55	2693-212-AA
SWYC	4325	100	S	25	8	Cu	Z-Spar Bottor	41127706	SI	11	2015	45	60061-94-ZE
SWYC	4327	100	S	38	12	Low			purch	10	2014		
SWYC	4328	100	P	54	16	Cu	Interlux Ultra	Y3779F	SI	2	2015	55	2693-212-AA
SWYC	4329	94	S	32	11	Cu	Z-Spar Protec	B90VOC	Dr SI	12	2015	65	
SWYC	4330	100	S	34	11	Low	International		SI	1	2011		
SWYC	4331	98	P	30	11	low	West Marine	411128006	SI	5	2017	24	60061-71-ZD
SWYC	4332	98	S	37	13	Cu	Proline 1088	1088C-02	SI	7	2017	56	
SWYC	4333	98	P	32	12	Low			Newport	5	2010	67	
SWYC	4334	100	S	30	11	Cu	Proline 1088	Y1088C-01	SI	1	2015	67	
SWYC	4338	100	P	48	13	Cu	Interlux Ultra	Y3669U	KK	1	2016	57	
SWYC	4340	98	P	25	9	Cu	Interlux Ultra	Y3779F	KK	10	2015	55	2693-212-AA
SWYC	4342	100											
SWYC	4343	98	S	21	7	Low	Interlux Ultra	Y3669F	self	2	2011	55	2693-212-AA
SWYC	4347	100	S	32	11	Low			Dr	7	2011	67	
SWYC	4348	98	S	40	12	Cu	Interlux Ultra	Y3779F	SI	1	2015	55	2693-212-AA
SWYC	4349	94	S	49	16	Low	California Bot	YBA143	SI	10	2016	35	2693-18-ZA
SWYC	4350	100	S	28	10	Cu	Interlux Ultra	Y3669F	SI	6	2015	55	2693-212-AA
SWYC	4351	100	S	38	13				purch	2	2017		
SWYC	4352	100	S	33	11				purch	8	2016		
SWYC	4353	100	P	70	18	Non	No paint					0	
SWYC	4356	100	P	58	12	Low	Proline 1088	Y1088C-01	KC	2	2012	67	
SWYC	4358	92	P	21	8	Cu	Pettit Vivid	11161	Miramar BY	5	2017		60061-116-AA
SWYC	4359	100	S	40	12	Low	Z-Spar Protec	B-91	KK	7	2010	65	
SWYC	4360	90	S	40	12	Cu	Interlux Ultra	Y3779F	SI	2	2016	55	2693-212-AA
SWYC	4361	100	S	33	11	Cu	Interlux Ultra	Y3669F	SI	11	2017	55	2693-212-AA
SWYC	4362	100	P	34	10	Cu	Interlux Ultra	Y3779U	KK	1	2016	57	
SWYC	4363	98	S	37	12	Non	Intersleek 90	FXA972/A	SI	3	2013	0	
SWYC	4364	94	S	30	10	Low	Z-Spar Protec	B-91	Dr	2	2014	65	
SWYC	4365	100	P	41	13	Low	Interlux Ultra	Y3779F	SI	6	2014	55	2693-212-AA
SWYC	4367	96	S	36	12	Cu	Interlux Ultra	Y3669U	SI	8	2016	57	
SWYC	4372	100	P	44	14		interlux Ultra	Y3779F	SI	11	2016	55	2693-212-AA
SWYC	4373	100	P	25	9	Cu	Interlux Ultra	2779N	pirch	7	2016	57	
SWYC	4375	94	S	43	13	Low	Interlux Ultra	Y3779F	SI	4	2013	55	2693-212-AA
SWYC	4377	100	S	41	12	Non	Intersleek 90	FXA979/A	SI	4	2015	0	
SWYC	4378	100	P	44	15	Low			Dr SI	8	2011		
SWYC	4379	100	P	37	13	Low	ABC 3 PPG	ABC3-41	Basin Marine	12	2014	70	
SWYC	4380	100	P			Cu							

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SWYC	4382	94	P	25	8	Cu	Interlux Ultra	2779N	SI	1	2017	57	
SWYC	4383	92	S	38	12	Cu	Ultra-Kote	Y3779U	KK	2	2017	67	
SWYC	4384	100	S	47	13	Cu	Interlux Ultra	Y3669F	KK	4	2015	55	2693-212-AA
SWYC	4385	100	S	23	8	Low	Z-Spar Protec	B90VOC	Dr	10	2013	65	
SWYC	4388	100	P	29	10	Low	Interlux Ultra	Y3669F	MG	9	2014	55	2693-212-AA
SWYC	4389	85	S	40	12	Cu	Interlux Ultra	Y3669F	SI	4	2015	55	2693-212-AA
SWYC	4391	100	S	34	11	Low	Proline 1088	Y1088C-01	KC	9	2010	67	
SWYC	4392	96	P	27	10	Cu	Proline 1088	1088C-01	SI	5	2017	67	
SWYC	4393	100	P	45	14	Cu	Proline 1088	Y1088C-01	SI	6	2015	67	
SWYC	4394	88	S	25	5	Low			KK	1	2011		
SWYC	4396	100	S	36	12	Low	UltraKote	2669N	SI	6	2016	69	
SWYC	4397	80	S	36	12	Low	Interlux Ultra	Y3669U	SI	1	2014	55	
SWYC	4399	98	P	36	13	Non	no paint					0	
SWYC	4400	98	S	35	11	Low	Z-Spar Protec	B-94	Dr	3	2014	65	
SWYC	4401	94	S	43	14	Low	Interlux Ultra	Y3669F	KK	11	2014	55	2693-212-AA
SWYC	4402	98	S	33	12	Cu	Interlux Ultra	Y3669F	SI	6	2015	55	2693-212-AA
SWYC	4404	100	S	30	11	Cu			purch	2	2015		
SWYC	4406	100	P	33	10	Non	No paint					0	
SWYC	4407	100	P	34	11	low	Micron 66	YBA470	Charlotte Har	5	2016	35	2693-187-ZD
SWYC	4409	100	S	50	14	Cu	Proline 1088	Y1088C-01	SI	1	2011	68	
SWYC	4410	100	S	30	10	Low	West Marine	10175156	Oxnard Boat	12	2011	28	60061-129-AA
SWYC	4411	92				Non	no paint					0	
SWYC	4412	98	S	22	8	Cu	Interlux Ultra	Y3669F	KK	11	2016		2693-212-AA
SWYC	4413	94	S	39	11	Low	Interlux Ultra	Y3669F	SI	5	2013	55	2693-212-AA
SWYC	4414	84	P	26	8	Low	Proline 1088	Y1088C-02	self	4	2013	56	
SWYC	4415	100	S	38	11	Low	Comex ABC 3	ABC3-41	Total Yacht W	5	2013		
SWYC	4416	92	P	60	17	Cu	Interlux Ultra	Y3779U	SI	10	2015	57	
SWYC	4417	100	S	34	11	Low	Pettit		Dr	11	2014		
SWYC	4418	92	P	36	12	Cu	Interlux Ultra	Y3669F	SI	8	2017	57	2693-212-AA
SWYC	4419	98	S	25	8	Cu	Interlux Ultra	Y3669F	SI	7	2016	55	2693-212-AA
SWYC	4421	0	Vacant			Non						0	
SWYC	4422	91	P	39	13	Low	Interlux Ultra	Y3669F	SI	6	2012	55	2693-212-AA
SWYC	4424	100	P	14	6	Cu	Pettit Protect	B-91	Dr SI	5	2015	60	
SWYC	4426	100	P	34	12	Cu	Proline 1088	Y1088C-01	MG	7	2016	67	
SWYC	4427	100	P	39	15	Cu	Z-Spar Protec	B-91	Dr SI	7	2015	65	
SWYC	4428	98	S	45	12	Low	Interlux Ultra	Y3669F	SI	2	2014	55	2693-212-AA
SWYC	4430	75	S	34	9	Low			Dr SI	4	2007		
SWYC	4432	96	S	33	6	Non	VC-Offshore	V116	Self	11	2017	67	
SWYC	4433	60	P	17	7	Non	VC-17	YBA406	self	1	2016	0	

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SWYC	4435	94	S	35	9	Cu	Z-spar Bottor	411167706	MG	2	2015	45	60061-94-ZE
SWYC	4436	100	S	27	8	Low			purch	5	2014		
SWYC	4437	100											
SWYC	4439	88	S	50	12	Low	Interlux Micr	YBA470	SI	11	2013	35	2693-187-ZD
SWYC	4441	96	P	40	10	Low	Proline 1088	Y1088C-02	SI	12	2013	56	
SWYC	4442	100	P	26	8	Low	California bot	YBA143	Dr	2	2013	35	2693-18-ZA
SWYC	4443	100	P	34	12	Low			purch	2	2014		
SWYC	4446	100	S	27	9	Non	No paint					0	
SWYC	4447	94	S	38	12	Low	Interlux Ultra	Y3669F	SI	9	2013	55	2693-212-AA
SWYC	4450	100	P	40	15	Cu	Interlux Ultra	2669N	SI	5	2017	57	
SWYC	4451	100	S	46	13	Cu	Proline 1088	Y1088C-02	SI	4	2015	56	
SWYC	4454	92	P	39	14	Cu	Proline 1088	Y1088C-01	SI	4	2016	67	
SWYC	4458	0	Vacant			Non						0	
SWYC	4461	100	S	32	11		Interlus Ultra	2669N	SI	8	2016	67	
SWYC	4462	100	S	30	11	Low	Interlux Ultra	Y3669F	SI	5	2013	55	2693-212-AA
SWYC	4463	100	S	30	11	Cu	Interlux Ultra	Y3669F	Oceanside M	3	2015	55	2693-212-AA
SWYC	4464	92	S	54	11	Low	Trinidad SR	A1277Q	KC	2	2013	70	
SWYC	4465	100	S	35	12	Low	Pettit Trinida	A10886	Colonial Yach	12	2014	70	60061-94-ZB
SWYC	4466	100	S	30	10	Cu	Interlux Ultra	2669N	SI	3	2017	57	
SWYC	4468	100	S	40	12	Cu	Ultra-Kote	Y3449U	SI	7	2016	67	
SWYC	4470	100	S	39	11	Cu	Z-spar botton	411167706	SI	5	2017	45	60061-94-ZE
SWYC	4472	92	S	38	12	Low			purch	9	2014		
SWYC	4474	100	S	33	11	Low	Interlux ACT	7790B	Dr	3	2007	30	
SWYC	4476	100	S	45	10	Low	Proline 1088	Y1088C-02	Dr SI	4	2014	56	
SWYC	4477	98	S	29	10	Low	Z-Spar Protec	B-91	Dr	8	2014	65	
SWYC	4479	100	P	53	15	Cu	Woolsey Defe	4601	NB	6	2017	45	
SWYC	4480	100	P	18	9	Cu	Interlux Ultra	Y3779F	SI	5	2016	55	2693-212-AA
SWYC	4486	100	P	18					purch	4	2016		
SWYC	4489	100	S	37	10	Low	Proline 1088	Y1088C-01	SI	6	2012	67	
SWYC	4492	100	P	39	12	Low	Interlux Ultra	Y3669F	SI	12	2013	55	2693-212-AA
SWYC	4493	100	S	34	11	Cu	Ultra-Kote	3779	SI	7	2016	67	
SWYC	4495	100	S	34	11	Low	Proline 1088	Y1088C-01	SI	2	2011	67	
SWYC	4496	100	S	37	11	Cu	Interlux Ultra	Y3669U	SI	12	2015	57	
SWYC	4497	100	P	21	7	Low			Sunset Aquat	12	2004	67	
SWYC	4499	75	S	21	8	Low	Micron Extra	5490	self	8	2016	35	2693-181-AA
SWYC	4500	94	S	27	9	Low	Interlux Ultra	Y3449F	SI	8	2012	55	2693-212-AA
SWYC	4501	100	P	31	10	Cu	Interlux Ultra	Y3779U	SI	5	2016	57	
SWYC	4502	92	S	34	12	Cu	Z-Spar Bottor	41127706	Dr	6	2015	45	60061-94-ZE
SWYC	4503	98	S	37	12	Cu	Interlux Ultra	Y3779F	SI	2	2015	55	2693-212-AA

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SWYC	4504	100	S	50	13	Low	Interlux Ultra	Y3449F	SI	6	2014	55	
SWYC	4505	100	P	24	6	Cu	Proline 1088	Y1088C-01	self	7	2016	68	
SWYC	4507	100	S	27	8	Low	Proline 1088	Y1088C-01	SI	5	2010	67	
SWYC	4508	90	P	30	10	Low	Interlux Ultra	Y3779F	SI	1	2014	55	2693-212-AA
SWYC	4509	90	P	40	14	Cu	Interlux Ultra	Y3669F	SI	7	2015	55	2693-212-AA
SWYC	4513	98	P	21	8	Low	Micron Extra	5490	NB	6	2017	35	2693-181-AA
SWYC	4515	88	S	39	11	Low	Proline 1088	Y1088C-01	KK	1	2014	67	
SWYC	4516	100				Cu	Interlux Ultra	Y3669U	Basin Marine	4	2015	57	
SWYC	4517	80	P	42	14	Low	Interlux Ultra	Y3669F	SI	2	2010	55	2693-212-AA
SWYC	4518	94	S	31	10	Cu	Interlux Ultra	Y3669F	SI	5	2017	55	2693-212-AA
SWYC	4519	0	Vacant									0	
SWYC	4520	100	S	35	11	Low	Aquaguard B	10103	SI	11	2011	26	9339-19-AA-70383
SWYC	4523	100	S	30	11	Low	Interspeed 64	BRA642	purch	12	2015	38	2693-142-ZM
SWYC	4524	100	S	32	7	Low	Interlux Ca B	YBA140	Dr	2	2010	35	2693-18-ZA
SWYC	4525	100	P	27	8	Low	Interlux Ca B	YBA143	Brewer Cap, I	6	2014	35	2693-18-ZA
SWYC	4527	100	S	46	13	Low	Trinidad SR	A1227Q	Dr	8	2014	60	60061-94-ZD
SWYC	4529	100	P	25		Non	no paint					0	
SWYC	4530	92	P	21	8	Low			purch	2	2014	67	
SWYC	4531	80	P	36	13	Low	Interlux Ultra	Y3779F	Dr MB	12	2012	55	2693-212-AA
SWYC	4532	100	S	30	11	Low	Interlux Ultra	Y3669F	SI	3	2013	55	2693-212-AA
SWYC	4533	100	S	31	11	Low	Interlux Ultra	Y3779F	SI	9	2014	55	2693-212-AA
SWYC	4536	100	P	53	15				pirch	5	2017		
SWYC	4537	0	Vacant			Non						0	
SWYC	4538	0	Vacant			Non						0	
SWYC	4540	100	P	31	11				purch	10	2016		
SWYC	4541	100	S	37	12	Low	Interspeed 64	BQA679/5GL	SI	4	2016	38	2693-132-ZY
SWYC	4542	100	P	41	15	Low			Purch	10	2009		
SWYC	4544	90	S	34	12	Cu	Interlux Ultra	Y3779F	SI	2	2015	55	2693-212-AA
SWYC	4547	100	S	43	14	Non	CeRam-Kote	99M	SI	5	2015	0	
SWYC	4549	96	P	36	12	low	Microm Extra	5793	SI	4	2016	35	2693-190-ZJ
SWYC	4550	100	P	26	9	Low	Interlux Ultra	Y3669F	SI	4	2014	55	2693-212-AA
SWYC	4551	96	S	27	9	Low			SI	6	2010		
SWYC	4552	100	S	42	12	Low	copper oxide		Dr	6	2007	67	
SWYC	4556	94	S	34	10	Low	Interlux Ultra	Y3669F	SI	3	2013	55	2693-212-AA
SWYC	4558	98	S	43	12	Cu	Interlux Ultra	Y3779F	SI	8	2015	55	2693-212-AA
SWYC	4560	100	P	37	13	Non	CeRam-Kote	99M	SI	5	2011	0	
SWYC	4562	94	S	36	13	Low			purch	5	2014	67	
SWYC	4564	100	S	42	13	Low	Interlux Ultra	Y3779F	SI	7	2014	55	2693-212-AA
SWYC	4566	100	S	27	9	Low			purch	9	2014		

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SWYC	4568	100	S	29	10	Low	Pettit Vivid	11161	SI	6	2013	25	60061-116-AA
SWYC	4569	94	S	37	12	Low	Proline 1088	Y1088C-01	SI	5	2010	67	
SWYC	4571	100	P	32	11	Cu	Interlux Ultra	Y3779U	SI	7	2017	57	
SWYC	4573	100	S	33	7	Cu	Trinidad VOC	1278	SI	6	2015	76	
SWYC	4574	92	S	38	12	Low			MG	11	2011		
SWYC	4575	94	S	36	11	Cu	Z-Spar Bottor	411187706	Dr	5	2015	45	60061-94-ZE
SWYC	4576	100	P	33	12	Cu	Interlux Ultra	Y3449U	SI	6	2016	57	
SWYC	4577	100	P	35	11	Cu	Trinidad Pro	16471757	Ireland Yacht	11	2015	60	
SWYC	4579	100	S	43	14	Cu	Ultra-Kote	Y3779U	SI	6	2016	67	
SWYC	4582	92	S	39	12	Low	Pettit Trinida	1875	SI	8	2014	70	
SWYC	4584	100	S	38	13	Low	Interlux Ultra	Y3669F	SI	4	2010	55	2693-212-AA
SWYC	4586	100	S	35	7	Low	Pettit Z-spar I	B90VOC	Dr SI	9	2014	60	
SWYC	4587	100	P	34	12				purch	6	2016		
SWYC	4590	100	S	28	10	Low	Interlux Ultra	Y3669F	SI	7	2014	55	2693-212-AA
SWYC	4591	100	S	30	11	Non	Intersleek 90	FXA970/A	SI	1	2013	0	
SWYC	4592	94	P	39	13	Low	Interlux Ultra	Y3779F	SI	1	2013	55	2693-212-AA
SWYC	4593	100	S	34	12	Low	Pettit Trinida	1875	Marina Shipy	7	2014	70	
SWYC	4595	100	P	32	11	Low	Interlux Ultra	Y3449F	SI	6	2014	55	2693-212-AA
SWYC	4596	100	S	33	11	Low	Interlux Ultra	Y3669F	SI	7	2014	55	2693-212-AA
SWYC	4598	90	S	26	8	Non	EP2000	EP-401	SI	8	2008	0	
SWYC	4600	100	P	29	9	Cu			purch	9	2015		
SWYC	10256	100	S	40	14	Low	Z-Spar Protec	B-91	Dr	6	2010	65	
SGYC	3002	95	S	42	13	**COPPER**	RLUX ULTRA	Y3669F	R ISLAND BOA	02	2017	55	2693-212-AA
SGYC	3004	99	S	27	8.9	NON	SLIP LINER		AQUARIUS BOAT Y	06	2015	0	
SGYC	3018	96	S	34.6	11.9	**LOW**	PETTIT	1281	R ISLAND BOA	02	2012	37	60061-71-ZA
SGYC	3021	98	S	25.11	8	**COPPER**	TTIT TRINIDA	1675	WNER APPLIE	04	2016	70	
SGYC	3024	95	S	34	11.6	**COPPER**	ERLUX SUPER	K90B	R ISLAND BOA	11	2011	70	
SGYC	3027	95	S	32	10.9	**COPPER**	TIT PROTECT	B-91	DRISCOLL	03	2016	65	
SGYC	3028	100	S	38	12				SHELTER ISLAND BOA	01	2012	unknown	
SGYC	3030	99	S	36	12	**COPPER**	INTERLUX	Y3669F	R ISLAND BOA	05	2013	55	2693-212-AA
SGYC	3031	95	S	40	12	**LOW**	ERLUX MICR	5583G	R ISLAND BOA	10	2014	35	
SGYC	3035	99	P	50.5	15.7	**COPPER**	TERLUX ULT	Y3779F	R ISLAND BOA	03	2015	57	2693-212-AA
SGYC	3036	95	P	50.3	15.7	**COPPER**	TERLUX ULT	3779	LSON BEAUM	01	2013	55	
SGYC	3047	100	S	30	9				purchase	04	2015	unknown	
SGYC	3061	99	S	34	10	**NON**	NO PAINT			06	1995	0	
SGYC	3066	100	P	48	15	**COPPER**	TERLUX ULT	2669N	R ISLAND BOA	03	2015	67	
SGYC	3074	100	S	38	13.5	**COPPER**	TERLUX ULT	3669	R ISLAND BOA	04	2017	55	
SGYC	3078	98	S	36.3	11.9	**COPPER**	RLUX MICRO	Y3669F	DEHLER KRA	01	2015	55	2693-212-AA
SGYC	3085	100	S	44	14.5	**COPPER**	TERLEX ULT	3669	R ISLAND BOA	06	2017	55	

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SGYC	3086	100	S	43	13.1	**COPPER**	INTERLUX	1878	ARD YACHT	05	2014	76	
SGYC	3088	100	S	35	12	**COPPER**	TERLUX ULT	Y3669F	R ISLAND BO	11	2014	55	2693-212-AA
SGYC	3090	100	S	37	12.5	**COPPER**	PRO LINE 108	Y1088C-01	IGHT & CARV	08	2012	67	
SGYC	3096	100	P	35	12.9	**COPPER**	TERLUX ULT	3779	R ISLAND BO	09	2015	55	
SGYC	3108	90	S	39	12.1	**COPPER**	INTERLUX	Y3669F	R ISLAND BO	07	2015	55	2693-212-AA
SGYC	3113	98	S	26.6	9.3	**COPPER**	TIT PROTECT	B-91	LL SHELTER	07	2016	65	
SGYC	3114	100	S	39.5	13	**COPPER**	PROLINE	Y1088C-01	ARINE GROU	03	2017	67	
SGYC	3115	90	P	30	10.6	COPPER	INTERLUX	3432	DRICOLLS	07	2017	47	
SGYC	3118	100	P	40	12.2		INTERLUX ULT	3779	KOHLER	05	2017	55	
SGYC	3125	90	S	32	9.1	**COPPER**	RLUX ULTRA	Y3559U	R ISLAND BO	07	2017	57	
SGYC	3127	100	S	43	12.5	**COPPER**	PROLINE	Y1088C-01	R ISLAND BO	11	2016	67	
SGYC	3131	90	S	33.3	10	**COPPER**	PRO LINE	Y1088C-01	R ISLAND BO	12	2014	67	
SGYC	3139	80	S	35	12	**COPPER**	INTERLUX	Y3669F	R ISLAND BO	08	2015	55	2693-212-AA
SGYC	3141	95	S	51.6	15.3	**COPPER**	TERLUX ULT	3669	R ISLAND BO	07	2013	55	
SGYC	3147	90	S	46	14	**COPPER**	RLUX EXTRA	Y3669U	R ISLAND BO	04	2016	57	
SGYC	3149	vacant										0	
SGYC	3163	100	S	36	12	**COPPER**	TERLEX ULT	3669	R ISLAND BO	04	2015	55	
SGYC	3165	100	S	30	10.3	**COPPER**	PRO-LINE	1088c-02	R ISLAND BO	08	2015	56	
SGYC	3166	95	S	26.9	9	COPPER	TERLUX ULT	3669	LSON BEAUM	04	2013	55	
SGYC	3167	90	S	41	12.6	**COPPER**	PROLINE	A10886	R ISLAND BO	11	2016	60	60061-94-ZB
SGYC	3168	100	S	34.6	11.9	**COPPER**	TERLUX ULT	Y3669U	R ISLAND BO	06	2016	55	
SGYC	3170	100	S	11.6	10.8	COPPER	INTERLUX	2449H	R ISLAND BO	05	2016	76	
SGYC	3177	100	S	27	9	**COPPER**	TERLUX ULT	3669	R ISLAND BO	07	2017	55	
SGYC	3180	100	P	36	12.2	**COPPER**	RLUX ULTRA	Y3449U	R ISLAND BO	10	2015	57	
SGYC	3186	100	S	39.8	12.8	**COPPER**	INTERLUX	3559	R ISLAND BO	11	2014	55	
SGYC	3203	90	S	49	13	**COPPER**	RLUX EXTRA	Y3449U	R ISLAND BO	11	2017	57	
SGYC	3205	75	P	59	18	**COPPER**	RLUX ULTRA	Y3779U	R ISLAND BO	01	2016	57	
SGYC	3207	98	P	27	8.6	COPPER	ARINE BOTT	411127906	EACH YACHT	09	2016	40	60061-117-ZE
SGYC	3212	50	S	39.9	13.8	**COPPER**	Z SPAR	B-94	R ISLAND BO	10	2014	65	
SGYC	3217	99	S	33	8.6	**NON**	SLIP LINER					0	
SGYC	3219	98	P	43	14	**COPPER**	PRO LINE	Y1088C-01	R ISLAND BO	09	2017	67	
SGYC	3221	90	S	37	10.1	**COPPER**	PRO LINE	Y1088C-01	R ISLAND BO	05	2015	67	
SGYC	3225	95	S	35	12	**LOW**	K MICRON EX	5790	DRISCOLL	05	2014	35	2693-190-ZI
SGYC	3231	99	S	34	10.8				8/17				
SGYC	3234	90	S	39.8	12.6	**COPPER**	TERLUX ULT	3669	R ISLAND BO	07	2016	55	
SGYC	3236	95	S	32.5	11.75	**COPPER**	Z-SPAR	B90VOC	OLL BOAT W	10	2015	76	
SGYC	3240	99	S			**COPPER**	ETIT TRINIDA	A10886	DRISCOLLS	05	2014	60	60061-94-ZB
SGYC	3241	100	S	34	10			UNKNOWN			2003		
SGYC	3247	90	S	38	13	**COPPER**	TERLUX ULT	3669	R ISLAND BO	07	2015	55	

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SGYC	3258	100	S	30	10.8	COPPER	AR BOTTOM	41127706	DRISCOLL	09	2017	65	60061-94-ZE
SGYC	3260	100	S	32	6.8	LOW	NE VIVID AN	11161	NTED BY OW	03	2016	25	60061-116-AA
SGYC	3266	100	P	30	10				purchase	8	2011	unknown	
SGYC	3268	75	P	42	15	**COPPER**	TERLUX ULT	Y3779U	R ISLAND BO	01	2013	57	
SGYC	3271	90	S	40	11.8	**COPPER**	TERLUX ULT	3779	R ISLAND BO	07	2016	55	
SGYC	3277	87	S	44	13.6	**COPPER**	TIT PROTECT	B-91	DRISCOLLS	12	2016	65	
SGYC	3279	95	S	28	9.6	**COPPER**	RLUX ULTRA	Y3669U	R ISLAND BO	07	2013	57	
SGYC	3280	100	S	32	11	**COPPER**	TERLUX ULT	3669	R ISLAND BO	02	2014	55	
SGYC	3284	99	P	28	10	COPPER	TERLUX ULT	Y3779F	R ISLAND BO	02	2017	55	2693-212-AA
SGYC	3288	100	S	31	10.6	**COPPER**	PRO LINE	Y1088C-01	R ISLAND BO	07	2015	67	
SGYC	3295	vacant										0	
SGYC	3299	99	S	30	11	NON	OPPER COAT	85396	DRICOLLS	03	2016	0	
SGYC	3305	98	S	30	10	COPPER	TERLUX ULT	3559	R ISLAND BO	12	2012	55	
SGYC	3306	100	S	44	14.6	**COPPER**	RLUX ULTRA-	Y3669U	R ISLAND BO	11	2015	57	
SGYC	3309	100	S	37	11.6	**COPPER**	INTERLUX	Y3669F	R ISLAND BO	07	2016	55	2693-212-AA
SGYC	3324	90	S	30	10.1				purchase	10	2012	unknown	
SGYC	3325	100	P	36	12.6				purchase	12	2015	unknown	
SGYC	3326	100	S	49.5	14.8	**COPPER**	INTERLUX	3559	R ISLAND BO	01	2017	55	
SGYC	3333	98	S	30	10.9	COPPER	TERLUX ULT	Y3559F	R ISLAND BO	04	2014	55	
SGYC	3336	95	S	35	12	**COPPER**	TERLUX ULT	Y3669U	R ISLAND BO	04	2016	57	
SGYC	3341	100	S	30	9.6	COPPER			SHELTER ISLAND BO	03	2016	unknown	
SGYC	3342	100	P	43	13.7	**COPPER**	Z-SPAR	B-91	DEHLER KRA	01	2017	65	
SGYC	3343	100	P	42	13.7	**COPPER**	TERLUX ULT	Y3449F	R ISLAND BO	06	2015	55	2693-212-AA
SGYC	3344	100	P	43	14.6	**COPPER**	INTERLUX		KOHLER	04	2013	67	
	3347	vacant										0	
SGYC	3348	98	S	28	7.8	COPPER	TERLUX ULT	3669	R ISLAND BO	11	2011	55	
SGYC	3352	99	S	32.8	9.15	NON	SLIP LINER					0	
SGYC	3355	100	P	37	12	LOW	MICRON CSC	YBC583	LSON BEAUM	03	2009	33.4	2693-225-AA
SGYC	3357	100	P	43	15	**COPPER**	TERLUX ULT	Y3669U	OLLS MISSIO	07	2006	55	
SGYC	3358	100	S	42.6	13	**COPPER**	PRO LINE 108	Y1088C-01	R ISLAND BO	03	2012	67	
SGYC	3364	75	P	28	10	COPPER	PROLINE	Y1088C-01	R ISLAND BO	08	2014	67	
SGYC	3365	100	S	34	11	**COPPER**	TERLUX ULT	3669	LSON BEAUM	04	2013	55	
SGYC	3368	100	S	33	12.6	**COPPER**	TERLUX ULT	Y3779F	R ISLAND BO	04	2014	55	2693-212-AA
SGYC	3372	98	S	39.25	12.5	**COPPER**	PROLINE	1088C-02	R ISLAND BO	11	2015	56	
SGYC	3373	90	S	36	6	**COPPER**	TRINIDAD	1875	DRISCOLLS	03	2015	70	
SGYC	3374	100	S	32	10.6		UNKOWN			05	2007		
SGYC	3375	90	S	41	13	**COPPER**	TERLUX ULT	3669	R ISLAND BO	10	2015	55	
SGYC	3377	100	P	42	13.6	**COPPER**	unknown			01	2011		
SGYC	3382	99	S	30	10	**NON**	TERSLEEK 9	FXA972/A	R ISLAND BO	04	2013	0	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SGYC	3390	95	S	42.8	13.7	**COPPER**	SPAR BP GOL	411167706	ARINE GROU	12	2014	60	60061-94-ZE
SGYC	3396	98	S	32	10	**COPPER**	PETITE	B-91	DRISCOLL	04	2016	65	
SGYC	3400	100	P	38	12	**COPPER**	PROLINE 108	Y1088C-01	ISLAND BO	04	2016	67	
SGYC	3406	99	S	29.11	10.6	**COPPER**	TERLUX ULT	Y3669U	ISLAND BO	08	2012	55	
SGYC	3413	85	S	30	10.5	**NON**	ERLUX PACI	YBA163	ISLAND BO	01	2014	0	
SGYC	3415	95	P	46.8	14.1	**COPPER**	ERLUX ULT	3779	SON BEAUM	07	2014	55	
SGYC	3419	90	P	57	14.5				SHELTER ISLAND BO	01	2013	unknown	
SGYC	3421	90	S	30	11	**COPPER**	UX ULTRA B	Y3669F	ISLAND BO	07	2014	55	2693-212-AA
SGYC	3424	95	S	41.1	13.1	**COPPER**	NATIONAL U	3669	ISLAND BO	10	2017	55	
SGYC	3428	100	P	42	15.7	**COPPER**	PROLINE	Y1088C-01	ISLAND BO	06	2015	67	
SGYC	3430	100	S	30	11	COPPER	INTERLUX	3779	ISLAND BO	06	2015	55	
SGYC	3438	95	S	38	12	**COPPER**	PRO LINE	1088C-01	ISLAND BO	03	2015	67	
SGYC	3440	100	P	30	10	**NON**	SLIP LINER					0	
SGYC	3450	97	S	36	12.5	**COPPER**	TERLUX ULT	3669	ISLAND BO	04	2014	55	
SGYC	3454	100	S	38	14.2	**COPPER**	PER INTERL	K90B	ISLAND BO	07	2008	70	
SGYC	3455	50	S	44	12.6	**COPPER**	COMEX	30	R YARD MA	03	2015	unknown	#N/A
SGYC	3459	100	P	50	16	**COPPER**	LUX ULTRA	Y3449U	ISLAND BO	10	2015	57	
SGYC	3463	98	P	42	14	**COPPER**	PROLINE 108	Y1088C-01	SON BEAUM	08	2015	67	
SGYC	3473	90	P	50	16	**COPPER**	TERLUX ULT	3669	EHLER KRA	09	2017	55	
SGYC	3477	100	S	30	12	COPPER	TERLUX ULT	3669	ISLAND BO	06	2016	55	
SGYC	3482	90	S	34	11	**COPPER**	TERLUX ULT	Y3669U	ISLAND BO	07	2017	57	
SGYC	3483	98	P	31	10				5/17				
SGYC	3484	100	P	54	14	**COPPER**	TERLUX ULT	Y3779F	ISLAND BO	07	2017	55	2693-212-AA
SGYC	3487	90	S	40	10	**COPPER**	TERLUX ULT	Y3669F	ISLAND BO	01	2017	55	2693-212-AA
SGYC	3489	90	S	36	12	**COPPER**	UX ULTRA B	2669N	EHLER KRA	07	2014	67	
SGYC	3499	99	S	42	13.9	**COPPER**	RLUX MICR	YBA470	ISLAND BO	09	2012	35	2693-187-ZD
SGYC	3500	100	S	30	10	COPPER	TERLUX ULT	Y3669F	ISLAND BO	01	2013	55	2693-212-AA
SGYC	3503	85	S	36	12	**COPPER**	TERLUX ULT	3669	ISLAND BO	02	2013	55	
SGYC	3506	98	S	27	8.1	**COPPER**	TERLUX ULT	3669	ISLAND BO	04	2014	55	
SGYC	3527	100	S	38	12.6	**COPPER**	TERLUX ULT	Y3669F	ISLAND BO	05	2014	55	2693-212-AA
SGYC	3529	100	S	30	10	COPPER	RLUX NAUT	3432	OLLS MISSIO	01	2006	47	
SGYC	3531	99	S	32	11.9	**COPPER**	TERLUX ULT	3669	ISLAND BO	03	2015	55	
SGYC	3535	100	P	31.6	12	**COPPER**	LUX ULTRA	Y3779F	ISLAND BO	06	2017	55	2693-212-AA
SGYC	3536	100	S	34.5	12	**COPPER**	TERLUX ULT	3669	ISLAND BO	03	2017	55	
SGYC	3543	95	S	45	15	**COPPER**	PETTIT	B-91	DRISCOLLS	12	2016	65	
SGYC	3546	100	S	30	10.1	NON	TERSLEEK 9	FXA970/A	ISLAND BO	05	2014	0	
SGYC	3549	99	S	27	8	COPPER	RLUX ULTRA	Y3669U	ISLAND BO	11	2016	57	
SGYC	3551	90	S	42	11	**COPPER**	PROLINE	Y1088C-01	ISLAND BO	06	2008	67	
SGYC	3555	vacant										0	

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SGYC	3562	100	S	37.7	12.8	**COPPER**	PROLINE	1088C-02	R ISLAND BOA	03	2016	67	
SGYC	3564	100	S	30	10.1	COPPER	TERLUX ULT	3669	R ISLAND BOA	10	2009	55	
SGYC	3565	90	S	34	11.9				12/15				
SGYC	3567	100	S	43	14.5		UNKNOWN		KNIGHT & CARV	01	2009	unknwon	
SGYC	3570	100	P	30	12	**COPPER**	TERLUX ULT	Y3779F	R ISLAND BOA	04	2015	55	2693-212-AA
SGYC	3576	50	S	42	12	**COPPER**	TRINIDAD	A10886	KOHLER	09	2014	60	60061-94-ZB
SGYC	3583	90	S	32.5	11.9	**COPPER**	PETIT ZSPAR	B-91	OLL BOAT W	11	2016	65	
SGYC	3594	98	S	37	11.8	**COPPER**	ETIT TRINIDA	1875	DEL REY BOA	05	2015	70	
SGYC	3597	100	S	30	10				purchase	01	2011	unknown	
SGYC	3598	99	S	26	8	**NON**	SLIP LINER					0	
SGYC	3599	99	S	36	11.11		UNKNOWN		SHELTER ISLAND BOA	03	2007	67	
SIM	5009	97	S	44	10	Copper	Interlux Ultra	3449	XIBY	10	2015	55	
SIM	5010	93	S	51	14	Low	Micron CSC	YBA060	SIBY	7	2017	17	2693-203-AA
SIM	5013		Vacant	Vacant	Vacant		Vacant					0	
SIM	5014	85	P	38	14	Copper	Interlux Ultra	3779	Unknown	2	2015	55	
SIM	5019	98	S	42	13	Low	Micron CSC	YBC583	Driscolls MB	1	2015	35	2693-225-AA
SIM	5023	64	S	63	18.5	Copper	Petit Protector	B-94	Driscoll's- SI	8	2016	65	
SIM	5027	100	S	24	8	COPPER	nterluxUltra Ko	3669	SIBY	9	2017	55	
SIM	5036	91	P	25	8.5	Copper	nterlux Ultrako	3669	ncisco s Boat S	11	2016	55	
SIM	5038	100	S	41	12	Low	Proline	Y1088c-01	SIBY	6	2013	67	
SIM	5044	100	S	44	13.9	Copper	Biolux Blue	3779	Basin Marine	6	2015	55	
SIM	5045	96	P	103	24.5	Low	Seahawk AF33	3345	SIBY	8	2015	33	44891-12-AA
SIM	5047	100	P	20	7	Copper	Interlux Ultra	3779	SIBY	5	2016	55	
SIM	5048	93	S	30	9.6	Copper	Petit	B-91	SIBY	4	2013	55	
SIM	5050	100	P	37	14	Copper	Interlux Ultra	Y3669F	Hall Marine/AZ	4	2016	55	
SIM	5051	100	S	35.5	11.9		Petit		South Texas Yacl	11	2016	?	
SIM	5052	86	P	27	9	COPPER	TERLUX ULT	3779	SIBY	1	2014	55	
SIM	5058	99	P	32	12	Non	Hydrohoist		Sits on Hydrohoi	unknown	2008	0	
SIM	5061	95	S	30	10.8	Copper	Proline	Y1088C-01	Knight & Carve	2	2013	67	
SIM	5066	100	S	50.5	14.9	Copper	Interlux Ultra	Y3779U	SIBY	3	2016	55	
SIM	5070	85	P	76	19	Low	. Micron CSC	YBC581	Cable Marine	1	2017	35	2693-225-AA
SIM	5071	100	P	30	10.4	Copper	Interlux Ultra	3779	Driscolls MB	4	2014	55	
SIM	5074		Vacant	Vacant	Vacant		Vacant					0	
SIM	5076	100	S	44	12	Copper	Interlux Ultra	3669	SIBY	5	2017	55	
SIM	5078	87	S	46.5	14	Copper	Zspar	B-91	wport Harb Shi	11	2016	55	
SIM	5079	85	S	44	12.5	LOW	TER ULTRA/E	Y3669F	DEHLER KRA	8	2011	67	2693-212-AA
SIM	5080	100	P	38	13	Copper	Proline	Y1088c-01	Oct-13	10	2013	67	
SIM	5081	81	P	144	28	NON	ahawk Smart E	4705	Rybovich	3	2017	0	
SIM	5082	100	P	21	8.6	Copper	Interlux Ultra	Y3779U	SIBY	5	2017	55	

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SIM	5088	92	P	30	11	Copper	Micron CSC	YBC580	SIBY	12	2011	67	2693-225-AA
SIM	5094	100	P	22	8.6	COPPER	TIT ZSPAR PI	B-94	SET AQUA C	1	2014	60	
SIM	5101	99	P	22	8.3	Copper	Unknown		Aug-17	Unknown	Unknown	67	
SIM	5104	100	S	39	12.4	Low	Hydrocoat	1840	Self Applied	6	2016	40	60061-87-ZI
SIM	5107	89	P	34	13	Copper	Micron CSC	YBC580	SIBY	11	2014	33	2693-225-AA
SIM	5108	98	P	31	9.6	Copper	Ultra	3669	SIBY	6	2013	67	
SIM	5111	71	P	25	8.6	Copper	InterluxUltra	3779	H Marine Servi	9	2017	55	
SIM	5113	100	P	30	10	Low	Proline	Y1088c-01	SIBY	5	2016	67	
SIM	5115	86	P	44.9	15.8	Copper	Interlux Ultra	3779	SIBY	4	2015	55	
SIM	5117	100	S	24	8	Copper	Interlux Ultra	3669	ceanside Mari	7	2011	55	
SIM	5128	98	P	13	6	Copper	Petit Hydrocoa	1840	INFLATABL	4	2017	67	60061-87-ZI
SIM	5129	77	P	115	25	Low	awk Solutions	3345	ARINE GROU	4	2015	33	44891-12-AA
SIM	5131	90	P	140	30	Low	TRILUX 33	YBA060	ARINE GROU	3	2016	17	2693-203-AA
SIM	5134	79	S	30	10.6	COPPER	TERLUX ULT	3449	ARINE GROU	7	2014	55	
SIM	5136	99	S	40	11	Copper	Biocop	1205-1	ottoms Up - W	6	2016	42	
SIM	5144	86	S	30	11.1	Copper	Interlux Ultra	3669	SIBY	6	2017	55	
SIM	5148	76	S	106	27	Low	eahawk Bioco	1205-1	Marine Group	8	2017	33	
SIM	5150	98	P	38	12.8	Non	Pacifica Black	YBA163	Marine Group	4	2014	0	
SIM	5160	100	S	30	10.2	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	?	2008		
SIM	5163	100	S	50	14	Low	Proline 1088	Y1088C-01		7	2017	33	
SIM	5164	100	P	29	13	Non	Proguard	NAU773	ielson Beaumo	3	2016	0	23566-20-ZT
SIM	5167	100	S	25	8	COPPER	terluxUltra Ko	3669	SIBY	8	2017	55	
SIM	5168	100	S	42	13.9	Copper	Interlux Ultra	3669	Koehler	10	2016	55	
SIM	5176	100	P	40	13.9	Copper	Unknown		Oct-17	Unknown	Unknown		
SIM	5180	90	P	84	21.5	Copper	Z-Spar Protect	41127706	Marine Group	8	2016	67	60061-94-ZE
SIM	5181	100	P	40	14.2	Copper	Proline 1088	Y1088C-01	Oct-13	10	2013	67	
SIM	5182	74	P	28	11	Copper	Interlux Ultra	3779	Driscolls	8	2017	55	
SIM	5188	97	P	26	8	Copper	Interlux Ultra	Y3779U	SIBY	3	2016	55	
SIM	5192	100	S	23	7.8	Copper	Interlux Ultra	3779	Koehler	4	2016	55	
SIM	5195	100	S	30	11.3	COPPER	Interlux Ultra	3669	SIBY	10	2007	55	
SIM	5197	98	S	34	11.5	Copper	Interlux Ultra	3669	Koehler Kraft	6	2013	55	
SIM	5199	100	S	37	11.5	Copper	Interlux Ultra	Y3779U	Aug-16	Unknown	Unknown	55	
SIM	5202	94	P	27	8	Copper	Proline	Y1088C-01	alm Bch Florid	2	2015	67	
SIM	5205	100	S	42	13	Copper	Zspar Progold	A41127706	Driscolls- SI	8	2016	67	
SIM	5206	98	S	40	14	Copper	terlux Ultra Ko	Y3669U	SIBY	4	2017	55	
SIM	5209	99	P	77	30	Copper	ahawk Sharksk	6142	Marine Group	10	2015	55	44891-11-AA
SIM	5210	100	S	33	11	Copper	Proline 1088	Y1088C-01	Knight & Carve	1	2013	67	
SIM	5215	100	S	36	12	Non	Ceram Kote	99M	SIBY	5	2015	0	
SIM	5216	50	P	90	22	Low	Proline	Y1088c-01	Marine Group	11	2017	33	

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SIM	5217	99	P	38	13	Copper	Interlux Ultra	3669	Koehler Kraft	3	2017	55	
SIM	5218	100	P	39	14	Copper	Interlux Ultra	Y3779F	SIBY	4	2013	67	2693-212-AA
SIM	5219	100	P	23	8.5	Copper	Interlux Ultra	3669	SIBY	2	2016	55	
SIM	5225	100	P	40	13.5	Copper	known- New boat		Unkown	Unknown	Unknown		
SIM	5229	100	S	33	10.5	Copper	Interlux Ultra	3779	SIBY	11	2017	55	
SIM	5237	100	P	35.5	11.5	Copper	Micron CSC	5583G	SIBY	11	2016	33	
SIM	5243	100	S	35.1	11.8	Copper	Interlux Ultra	Y3779U	Dec-16	4	2016	55	
SIM	5255	85	S	43	13.6	Copper	CSC Micron	5583G	e Boat Yard M	11	2012	37	
SIM	5257	78	P	62	16.1	Copper	Interlux Ultra	Y3779F	SIBY	7	2017	55	2693-212-AA
SIM	5261	100	S	40	13.5	Low	Micron CSC	5583G	SIBY	9	2016	33	
SIM	5267	82	P	151	30.7	NON	BESTCOAT	2.2	RYBOVICH	8	2015	0	
SIM	5269	100	S	30	11	LOW	TRINIDAD	A1108206	SIBY	9	2011	70	
SIM	5277	100	S	41.6	13.1	Non	Intersleek	FXA972/A	SIBY	3	2013	0	
SIM	5279	100	S	30	10	Copper	Zspar Pro Gol	A41127706	Driscoll's	5	2016	67	
SIM	5280	100	P	36	12	Copper	Interlux Ultra	3779	SIBY	3	2015	55	
SIM	5281	100	P	42	12	Copper	Interlux Ultra	3779	SIBY	10	2015	55	
SIM	5287	74	P	79	21	Low	Micron CSCHS	YBC581	SIBY	5	2017	35	2693-225-AA
SIM	5295	100	P	18	6	Copper	InterluxUltra	3779	SIBY	4	2016	55	
SIM	5299	100	P	36	12.5	Copper	Interlux Ultra	3669	Dirscoll's	7	2012	55	
SIM	5302	85	S	38	12.3	LOW	Interlux Ultra	3779	DRISCOLLS	9	2009	67	
SIM	5305	93	S	30	10.25	Copper	Petit Protector	B-91	Driscoll's	6	2015	55	
SIM	5306	97	S	32.5	11.75	Copper	Interlux Ultra	3669	SIBY	7	2016	55	
SIM	5310	100	P	48.7	16.5	Copper	Proline 1088	Y1088C-02	Unknown	?	2013		
SIM	5312	100	P	30	11.5	Copper	Interlux Ultra	3779	SIBY	12	2015	55	
SIM	5313	100	S	29	7.1	Copper	Interlux Ultra	3779	SIBY	4	2012	55	
SIM	5315	97	S	33	11	Low	Proline 1088	Y1088c-01	SIBY	4	2011	33	
SIM	5317	94	S	30	11.8	Copper	Unknown		SIBY	2	2014	67	
SIM	5319	100	S	38	11.5	Copper	Interlux Ultra	3779	Anchors Away	10	2010	55	
SIM	5323	92	S	34	10	COPPER	INT ULTRA	3779	SIBY	10	2014	55	
SIM	5324	100	S	30	11	COPPER	TERLUX ULT	3669	SIBY	9	2015	55	
SIM	5326	100	P	36.4	12.5	Copper	Interlux Ultra	3449	SIBY	1	2014	55	
SIM	5327	99	P	46	15	Copper	terlux Ultra K	3779	SIBY	6	2016	55	
SIM	5330	100	P	44	13.9	Copper	Micron CSC	5583G	SIBY	9	2011	37	
SIM	5331	100	S	45	14	Low	Petit Vivid	1261	obile Moore-G	8	2013	33	60061-116-AA
SIM	5333	100	P	38	13.4	Copper	Interlux Ultra	3669	SIBY	6	2014	55	
SIM	5337	100	S	25	8	COPPER	Micron CSC	YBC580	SIBY	11	2013	33	2693-225-AA
SIM	5339	87	P	92	21	Copper	Interlux Ultra	Y3779F	Driscoll's SI	5	2015	55	2693-212-AA
SIM	5340	93	S	31	11.8	Copper	Unknown		Unknown	Unknown	Unknown		
SIM	5343	99	S	47	14	Copper	Proline	Y1088c-01	SIBY	4	2016	67	

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SIM	5345	100	P	44	14.6	Copper	Unknown		Sep-17	Unknown	Unknown		
SIM	5347	100	S	36	11.2	Copper	st Marine Bottom		Ventura Harbor E	2	2015		
SIM	5348	100	S	41	12	Copper	OOLSEY AGI	4802	ELF APPLIEI	2	2011	33	60061-101-ZA
SIM	5349	100	P	38	14	Non	Proguard	NAU773	ielson Beaumo	1	2016	0	23566-20-ZT
SIM	5352	100	S	48.6	14.2	COPPER	Int Ultra w/bio	Y3669F	SIBY	3	2012	67	2693-212-AA
SIM	5353	100	P	33	12	COPPER	INT ULTRA	3449	SIBY	1	2015	55	
SIM	5354	97	S	40	13.6	Low	Micron CSC	5583G	SIBY	10	2016	33	
SIM	5358	100	P	35	13	Copper	Petit Protector	B-94	Driscoll's	9	2013	60	
SIM	5359	95	P	40	12	Copper	Proline 1088	Y1088C-01	Self Applied	7	2016	67	
SIM	5362	82	P	34	13	Copper	Interlux Ultra	Y3669U	SIBY	7	2017	55	
SIM	5363	99	P	56	15.9	Copper	Proline 1088	Y1088C-02	SIYB	5	2015	67	
SIM	5367	100	S	21	6.3	COPPER	T ULTRA KO	3669	SIBY	9	2017	55	
SIM	5368	97	S	30	11	COPPER	TERLUX ULT	3779	DRISCOLLS	5	2013	55	
SIM	5373	93	P	44	13	Low	Hydrocoat	1840	e Boat Yard MI	1	2014	40	60061-87-ZI
SIM	5387	91	S	46	13	Copper	terlux Ultra Kote		SIBY	5	2017	55	
SIM	5392	79	P	13	5	Non	None	None	None	None	None	0	
SIM	5393	99	S	37	12	Copper	Imeron	ABC3-2	entura Harbor E	10	2014	50	
SIM	5406	82	P	28	10.5	Copper	Unknown		Jun-17	Unknown	Unknown		
SIM	5408	100	P	20.9	8.1	Copper	st Marine Bottom		Boat House Anahe	12	2013	67	
SIM	5412	66	P	105	25	Low	Seaguard P30	P30BQ12	Delta - WA	5	2015	0	
SIM	5415	99	P	21	8	COPPER	ERLUX ULTI	3779	SIBY	1	2015	55	
SIM	5426	78	P	30	10.5	Copper	Micron CSC	5583G	SIBY	4	2015	33	
SIM	5429	92	P	26	8.9	Low	Petit Vivid	1861	SIBY	11	2013	25	60061-116-AA
SIM	5430	93	P	35	13	Copper	Interlux Ultra	3779	SIBY	12	2011	55	
SIM	5432	79	S	47	14	Low	CSC Micron	5583G	SIBY	1	2016	33	
SIM	5433	100	P	54	16	NON	EPAINT	EPT S1-305-1	DRISCOLLS	8	2015	0	
SIM	5436	100	P	48	15	COPPER	Ultra w/Bio	Y3669F	Koehler Kraft	10	2013	55	2693-212-AA
SIM	5439	100	P	17	6	Copper	Proline 1088	Y1088C-01	Self Applied	12	2012	67	
SIM	5440	99	S	30	11.1	COPPER	PAR PROGOI	A41127706	SIBY	8	2012	67	
SIM	5443	100	P	16	5	Copper	Trilux	YBA060	ELF APPLIEI	10	2013	17	2693-203-AA
SIM	5444	97	S	34.5	11	Low	Micron CSC	YBC580	SIBY	9	2016	33	2693-225-AA
SIM	5449	80	S	45	14	Copper	Proguard	NAU773	Koehler Kraft	3	2013		23566-20-ZT
SIM	5450	98	P	34	13.5	Copper	Interlux Ultra	3779	SIBY	10	2015	55	
SIM	5452	100	S	35.6	12	Copper	Voolsey Defens	4902	ielson Beaumo	8	2017	40	60061-117-ZA
SIM	5453	100	P	30	11.3	Copper	Interlux Ultra	3779	SIBY	3	2017	55	
SIM	5454	93	P	50	14.6	Copper	Unknown		Aug-17	Unknown	Unknown		
SIM	5457	100	P	32	11.3	COPPER	TERLUX ULT	3779	DRISCOLLS	2	2014	55	
SIM	5465	100	P	25	7	Copper	Interlux Ultra	3669	SIBY	4	2015	55	
SIM	5468	93	S	40	12	Copper	Ultra w/Bio	Y3669F	SIBY	1	2014	55	2693-212-AA

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
SIM	5469	100	S	30	11	COPPER	UNKNOWN		Jan-17	Unknown	Unknown		
SIM	5470	100	S	44.5	14	Copper	Interlux Ultra	3779	SIBY	4	2014	55	
SIM	5475	92	P	53	15	Copper	Interlux Ultra	3779	Marine Group	7	2016	55	
SIM	5480	100	P	36	12.6	COPPER	TERLUX ULT	3669	SIBY	11	2014	55	
SIM	5481	99	S	27	8	Copper	Interlux Ultra	3779	Koehler Kraft	3	2015	55	
SIM	5482	100	S	27	8	Copper	Proline 1088	Y1088C-01	Aug-17	Unknown	Unknown		
SIM	5483	99	S	36	11.9	Copper	Petit Zspar	B-91	Driscolls	5	2017	55	
SIM	5485	100	S	33	11.6	Copper	Interlux Ultra	3779	SIBY	5	2016	55	
SIM	5490	97	P	43	14	Copper	ProGold	411127906	arsen's Boatya	10	2016	67	60061-117-ZE
SIM	5491	100	P	30	12	Copper	Unknown		May-17	Unknown	Unnown		
SIM	5494	90	S	42	14	Copper	Interlux Ultra	3559	SIBY	2	2015	55	
SIM	5497	100	S	35	10	NON	CERAM KOT	99M	SIBY	3	2015	0	
SIM	5504	91	S	38	13.3	Copper	Interlux Ultra	3779	SIBY	2	2016	55	
SIM	5506	100	S	21	8	Non	Seahawk Smar	4705	Koehler	3	2015	0	
SIM	5509	84	P	63.5	17.3	Copper	Interlux Ultra	Y3779U	SIBY	8	2017	55	
SIM	5511	77	P	30	10.5	Copper	nterlux Ultrakote		SIBY	10	2016	55	
SIM	5513	100	S	35	12	Copper	Interlux Ultra	Y3669U	SIBY	10	2017	55	
SIM	5516	100	S	30	11	Low	Micron CSC	5583G	SIBY	9	2016	33	
SIM	5517	100	P	100	25.2	Copper	Interlux Ultra	Y3669F	SIBY	10	2017	55	2693-212-AA
SIM	5518	100	S	41	13	LOW	MICRON CS	5583G	SIBY	5	2017	33	
SIM	5519	100	P	29	10	Copper	Interlux Ultra	Y3669U	SIBY	7	2016	55	
SIM	5529	95	S	36	11.8	Copper	Interlux Ultra	Y3449u	SIBY	7	2017	55	
SIM	5530	100	S	42	13.9	Low	Micron CSC	5583G	SIBY	10	2014	33	
SIM	5538	100	P	18	7.9	Copper	Unknown		Factory Applie	11	2009	67	
SIM	5539	82	S	54	16	Copper	Micron CSC	5583G	SIBY	11	2015	33	
SIM	5540	55	S	39.7	12.6	Low	Int Micron CS	YBC580	SIBY	8	2017	33	2693-225-AA
SIM	5547	69	P	115	25	Low	Micron CSC	5583G	escent Boat Ya	6	2016	35	
SIM	5554	96	P	43	14	Copper	Interlux Ultra	3669	Kings Harbor	8	2015	55	
SIM	5557	100	S	40	13.6	Low	Micron CSC	5583G	SIBY	9	2016	33	
SIM	5561	81	P	13	5	Low	Neptune Hybri	1243	ELF APPLIE	3	2016	25	
SIM	5565	67	S	40	11	Copper	etit Black Wid	1186906	SIBY	12	2016	25	
SIM	5571	100	S	23	9	NON	NON	NON	SIBY	4	2006	0	
SIM	5575	95	S	34	11.9	Copper	Micron csc	5583G	SIBY	11	2015	33	
SIM	5577	95	P	50	15	Copper	Petit Trinidad	1878	SIBY	3	2017	75	
SIM	5579	88	S	36	12.5	Copper	Interlux Ultra	Y3669F	SIBY	4	2014	55	2693-212-AA
SIM	5580	100	S	22	7.9	Non	Sea shell	CUNI-90-10	SIBY	8	2015	0	
SIM	5581	100	P	42	14	Copper	terlux Ultra K	2669N	SIBY	11	2015	67	
SIM	5584	100	P	39.5	13	Copper	Proline 1088	Y1088c-01	Marine Group	3	2017	67	
SIM	5585	98	S	39	13	Copper	oolsey Defens	4902	ielson Beaumo	8	2017	67	60061-117-ZA

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SIM	5588	100	S	46	13.9	Copper	Interlux Ultra	Y3779U	SIBY	8	2017	55	
SIM	5589	99	P	68	20	Copper	Petit Zspar	B-94	Driscoll's	6	2015	55	
SIM	5590	99	S	27	9	Copper	terlux Ultra Ko	3779	SIBY	10	2016	55	
SIM	5603	78	P	37	14	Copper	Interlux Ultra	3779	SIBY	7	2012	55	
KKM	997	90%	P	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	405	100%	P	32	13	copper	70%	TRINIDAD PETTIT	1877	driscoll	04	2016	
KKM	932	60%	S	32	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	372	50%	P	35	13	COPPER	65%	INTERLUX ULTRA	160	BASIN MARINE	04	2012	
KKM	399	80%	S	34	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	510	60%	S	34	10	UNK	NA	E PAINT EP2000	EP-401	NA	NA	NA	
KKM	167	80%	P	30	10	UNK	NA	INTERLUX ULTRA	160	NA	NA	NA	
KKM	959	85%	P	36	11	COPPER	70%	TRINIDAD PETTIT	1877	driscolls	05	2015	
KKM	389	90%	S	34	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	507	90%	S	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	118	90%	P	27	8	UNK	NA	NA	NA	NA	NA	NA	
KKM	760	90%	P	39	13	LOW	NA	INTERLUX ULTRA	NA	ER ISLAND BOAT	02	2009	
KKM	549	80%	S	34	13	COPPER	NA	INTERLUX	66	DRISCOLLS	07	2013	
KKM	859	70%	S	36	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	328	70%	S	32	10	LOW	NA	Proline 1088-6	NA	Driscoll MB	06	2009	
KKM	637	95%	P	28	9	LOW	NA	NA	NA	BASIN MARINE	12	2010	
KKM	62	90%	P	35	13	UNK	NA	INTERSEEK 900	35	lter Island Boaty	05	2013	
KKM	815	95%	P	32	12	LOW	76%	ERLUX ULTRAKO	NA	ER ISLAND BOAT	03	2017	
KKM	271	70%	S	30	10	LOW	NA	NA	NA	ER ISLAND BOAT	04	2011	
KKM	461	90%	P	34	13	UNK	NA	NA	NA	DRISCOLLS	05	2014	
KKM	414	98%	P	33	11.5	UNK	NA	NA	NA	NA	06	2016	
KKM	516	90%	S	35	11	UNK	NA	NA	NA	DRISCOLLS	09	2013	
KKM	476	VACANT											
KKM	118	97%	P	34	12	LOW	65%	Interlux Ultr	160	lter Island Boaty	11	2012	
KKM	676	90%	P	32	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	562	90%	P	32	11	LOW	65%	INTERLUX	NA	ER ISLAND BOAT	07	2010	
KKM	56	VACANT											
KKM	107	25%	S	36	11	COPPER	65%	Proline 1088	168	lter Island Boaty	06	2013	
KKM	505	VACANT											
KKM	616	90%	S	34	10	UNK	NA	NA	NA	DRISCOLL	10	2012	
KKM	245	VACANT											
KKM	513	80%	S	30	9	UNK	NA	NA	NA	SHELTER ISLAND	07	2012	
KKM	230	VACANT											
KKM	714	70%	P	26	10	UNK	NA	NA	NA	BASIN	05	2012	
KKM	709	100%	P	32	12	COPPER	55%	INTERLUX ULTRA	3669F	SHELTER ISLAND	12	2017	

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KKM	615	70%	P	32	10	UNK	NA	NA	NA	SHELTER ISLAND	02	2013	
KKM	835	VACANT											
KKM	388	55%	P	32	10	UNK	NA	E PAINT EP2000	35	DRISCOLL	08	2012	
KKM	117	100%	S	32	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	635	100%	HYDRAHOIST	34	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	633	85%	P	34	11	copper	NA	NA	NA	ER ISLAND BOAT	02	2017	
KKM	862	50%	P	33	12	UNK	NA	INTERLUX	NA	BASIN	07	2013	
KKM	136	VACANT											
KKM	773	95%	S	35	10	UNK	NA	NA	NA	DRISCOLL	12	2012	
KKM	482	55%	S	34	10	LOW	NA	NA	NA	DRISCOLL MB	10	2011	
KKM	307	95%	S	36	11	LOW	NA	NA	NA	SHELTER ISLAND	11	2004	
KKM	597	70%	P	28	10	NON	0%	NA	NA	NA	NA	NA	
KKM	313	80%	P	35	11	UNK	NA	NA	NA	SHELTER ISLAND	07	2013	
KKM	754	85%	S	36	12	Non	0%	INTERSEEK 900	35	lter Island Boaty	04	2012	
KKM	883	90%	S	31	22	NON	0%	EP-2000	14	lter Island Boaty	12	2011	
KKM	484	100%	S	34	11	copper	76%	ERLUX ULTRAK	NA	KOLAR MARINE	02	2010	
KKM	114	90%	P	32	14	NA	NA	NA	NA	NA	NA	NA	
KKM	786	100%	P	50	17	NA	NA	NA	NA	Marine Works	06	2010	
KKM	815	95%	P	35	13	NA	NA	NA	NA	ER ISLAND BOAT	08	2012	
KKM	243	95%	P	38	12	NA	NA	NA	NA	NA	NA	NA	
KKM	471	VACANT											
KKM	827	VACANT											
KKM	31	60%	P	24	8.5	NA	NA	International	NA	ura Harbor Boat	02	2015	
KKM	109	90%	P	42.9	14.5	LOW	NA	oolsey Defense	NA	ELSON BEAUMO	11	2016	
KKM	199	95%	P	24	8	NA	NA	ANTI-FOUL VIVID	NA	ER ISLAND BOAT	11	2013	
KKM	224	80%	P	30	12	NA	NA	NA	NA	NA	NA	NA	
KKM	611	40%	S	28	10	LOW	65%	Proline 1088	168	lter Island Boaty	07	2009	
KKM	227	100%	P	35	16	NON	NA	NA	NA	Neilsen Boatyard	04	2014	
KKM	221	VACANT											
KKM	925	90%	P	40	13.5	NA	40%	INTERLUX ULTRA	NA	driscoll	03	2017	
KKM	39	50%	P	23	6	LOW	NA	PETTIT VIVIB	73	lter Island Boaty	09	2011	
KKM	782	75%	P	44	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	77	95%	P	30	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	604	VACANT											
KKM	153	50%	P	26	7	COPPER	NA	ERLUX HIGH COP	NA	DRISCOL	NA	NA	
KKM	749	90%	P	42	16	UNK	0%	NA	NA	MARINE WORKS	05	2013	
KKM	457	90%	S	27	9	LOW	NA	NA	NA	DRISCOLL	05	2013	
KKM	492	90%	S	40	13	LOW	NA	NA	NA	Driscoll MB	06	2012	
KKM	997	60%	S	30	9	LOW	NA	INTERSEEK 900	35	SHELTER ISLAND	09	2009	

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KKM	3	90%	P	40	14	COPPER	55%	ERLUX ULTRAKC	3779	SHELTER ISLAND	06	2017	
KKM	191	75%	P	28	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	470	25%	P	40	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	309	45%	S	25	8	UNK	NA	NA	NA	NA	NA	NA	
KKM	604	40%	P	28	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	46	VACANT											
KKM	822	100%	P	28	9	UNK	NA	NA	NA	DRISCOLL	07	2015	
KKM	280	100%	S	40.5	13.5	COPPER	55%	ERLUX ULTRAKC	3669U	lter Island Boaty	08	2016	
KKM	90	95%	P	28	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	912	50%	P	36	12	UNK	NA	NA	NA	lter Island Boaty	07	2014	
KKM	290	90%	P	28	10	LOW	NA	EST BOTTOM PR	NA	MARINE WORKS	04	2009	
KKM	587	70%	P	38	14	UNK	NA	NA	NA	BAVARIA	NA	NA	
KKM	88	95%	S	30	11	LOW	NA	NA	NA	BASIN	05	2009	
KKM	671	VACANT											
KKM	864	100%	HYDRAHOIST	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	794	95%	P	42	42	UNK	NA	NA	NA	NA	NA	NA	
KKM	272	VACANT							NA				
KKM	103	80%	P	40	13	UNK	NA	NA	NA	SHELTER ISLAND	05	2013	
KKM	518	80%	S	31	15	LOW COPPER	NA	Ultralux	160	lter Island Boaty	11	2011	
KKM	152	75%	S	42	15	UNK	NA	NA	NA	SHELTER ISLAND	10	2013	
KKM	393	75%	P	30	11	UNK	NA	NA	NA	SHELTER ISLAND	06	2012	
KKM	621	70%	P	33	12	UNK	NA	NA	NA	DRISCOLL	09	2013	
KKM	215	50%	S	30	10	Non Copper	0%	pettit hydracoat	93-18406g	ELSON BEAUMO	08	2016	
KKM	954	95%	S	29	10	UNK	NA	NA	NA	DRISCOLL	01	2013	
KKM	955	50%	S	29	10	LOW COPPER	NA	NA	NA	SHELTER ISLAND	05	2010	
KKM	623	90%	P	30	10	LOW COPPER	NA	NA	NA	NA	12	2010	
KKM	714	90%	S	30	8	LOW COPPER	NA	INTERLUX ULTRA	NA	KOEHLER KRAFT	05	2008	
KKM	911	100%	S	30	11	NON	0%	NA	NA	ER ISLAND BOAT	01	2017	
KKM	314	70%	S	27	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	185	85%	P	48	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	959	95%	P	56	15	LOW COPPER	NA	INTERLUX	78	ER ISLAND BOAT	01	2014	
KKM	249	90%	P	42	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	611	95%	P	58	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	114	88%	P	35	13	COPPER	76%	ERLUX ULTRAKC	117598	ER ISLAND BOAT	09	2017	
KKM	500	85%	P	60	15	COPPER	NA	INTERLUX	NA	lter Island Boaty	03	2012	
KKM	238	75%	P	41	12	LOW COPPER	NA	NA	NA	lter Island Boaty	02	2009	
KKM	380	30%	P	60	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	541	75%	S	36	11	UNK	NA	NA	NA	lter Island Boaty	05	2012	
KKM	558	80%	P	55	15	LOW COPPER	NA	PETTIT	NA	TOWNSEND SHII	06	2013	

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KKM	2	95%	P	41	13.5	LOW COPPER	NA	UPER PRO GUAR	NA	Neilsen Boatyarc	07	2016	
KKM	569	VACANT											
KKM	747	90%	S	41	12.6	copper	65%	NTERLUX ULTRA	160	SHELTER ISLAND	02	2012	
KKM	801	25%	P	58	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	277	90%	S	42	14	copper	65%	INTERLUX ULTRA	3669F	ER ISLAND BOAT	07	2015	
KKM	905	70%	P	58	18	copper	76%	TERLUX ULTRAKC	NA	SHELTER ISLAND	04	2016	
KKM	524	90%	P	30	8	UNK	NA	INTERLUX ULTRA	NA	ER ISLAND BOAT	01	2012	
KKM	382	55%	P	53	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	874	60%	S	42	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	280	60%	P	55	16	UNK	NA	Z-SPAR	147	riscoll's Ship Yar	04	2016	
KKM	877	40%	P	42	16	UNK	NA	NA	NA	ER ISLAND BOAT	07	2014	
KKM	692	60%	S	54	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	430	80%	S	36	12	UNK	NA	NA	NA	ER ISLAND BOAT	07	2014	
KKM	903	95%	P	60	16.4	COPPER	55%	INTERLUX ULTRA	3669F	ER ISLAND BOAT	11	2012	
KKM	870	70%	P	42	14	COPPER	NA	INTERLUX	NA	ER ISLAND BOAT	02	2014	
KKM	985	90%	P	60	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	283	90%	P	37	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	811	20%	P	60	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	710	100%	P	40	15	UNK	NA	NA	NA	lter Island Boaty	11	2013	
KKM	671	70%	P	48	16	NA	NA	NA	NA	NA	NA	NA	
KKM	403	80%	P	35	12	NA	NA	NA	NA	NA	NA	NA	
KKM	200	80%	P	56	17	NON	NA	comex	NA	opequimar PV	09	2014	
KKM	952	88%	P	41	13	copper	NA	INTERLUX	NA	lter Island Boaty	02	2013	
KKM	20	90%	S	52	16	copper	67%	INTERLUX ULTRA	NA	lter Island Boaty	04	2014	
KKM	790	25%	P	33	12	UNK	NA	NA	NA	lter Island Boaty	10	2013	
KKM	153	90%	S	63	17	UNK	NA	NA	NA	NA	NA	NA	
KKM	554	95%	P	38	14	LOW COPPER	37%	INTERLUX CSC	319293	lter Island Boaty	05	2015	
KKM	396	80%	P	52	16	LOW COPPER	40%	interlux 3449	3449	lter Island Boaty	12	2015	
KKM	496	70%	P	59	15	LOW COPPER	NA	INTERLUX ULTRA	3779F	ER ISLAND BOAT	02	2011	
KKM	188	VACANT											
KKM	52	80%	S	42	11	COPPER	65%	-SPAR bottom pr	NA	DRISCOLL	03	2017	
KKM	436	80%	P	43	15.2	NON	0%	INTERLUX 1088	168	lter Island Boaty	04	2010	
KKM	952	80%	P	38	13	COPPER	66%	-SPAR bottom pr	NA	Driscoll MB	08	2017	
KKM	430	90%	P	38	15	UNK	NA	INTERLUX ULTRA	NA	ER ISLAND BOAT	09	2012	
KKM	998	30%	P	48	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	320	40%	P	40	16	LOW	NA	NA	NA	NA	11	2009	
KKM	933	95%	P	52	15	LOW	65%	PETIT PRO	NA	lter Island Boaty	10	2018	
KKM	459	30%	S	34	14	UNK	NA	INTERLUX	NA	ER ISLAND BOAT	04	2014	
KKM	446	90%	P	41	14	UNK	NA	NA	NA	NA	NA	NA	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
KKM	785	90%	S	40	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	242	95%	P	42.9	13.9	LOW	40%	PROLINE 1088C	168	IIGHT AND CARV	11	2012	
KKM	535	60%	S	40	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	404	60%	P	48	14	LOW	NA	INTERLUX	NA	ER ISLAND BOAT	05	2011	
KKM	470	90%	P	38	13	NON	0%	INTERLUX	NA	DRISCOL	04	2011	
KKM	202	100%	P	46	12	LOW	NA	NA	NA	SHELTER ISLAND	12	2007	
KKM	805	75%	S	42	14	COPPER	66%	PROLINE	1088	lter Island Boaty	05	2015	
KKM	777	20%	P	36	16	LOW	NA	NA	NA	lter Island Boaty	09	2011	
KKM	170	VACANT											
KKM	227	90%	P	44	12.8	LOW	NA	NA	NA	lter Island Boaty	06	2012	
KKM	212	90%	P	43	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	865	40%	S	44	12.8	UNK	NA	NA	NA	IIGHT AND CARV	06	2012	
KKM	569	80%	S	42	12	copper	76%	ERLUX ULTRAKC	Y3669U/I	SHELTER ISLAND	03	2017	
KKM	118	90%	P	51	15	UNK	NA	LLS STANDARD	NA	DRISCOLL	10	2016	
KKM	599	30%	S	38	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	216	80%	S	46	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	322	VACANT											
KKM	871	95%	P	43	16	copper	60%	NA	NA	uth coast boat y	06	2014	
KKM	158	VACANT											
KKM	511	92%	P	43	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	432	70%	P	38	14	UNK	NA	PROLINE	NA	NA	NA	NA	
KKM	447	90%	P	50	16	UNK	NA	NA	NA	ELSON BEAUMO	12	2014	
KKM	885	80%	S	43	14	Copper	55%	Interlux Ultra	3779f	lter Island Boaty	06	2015	
KKM	885	50%	P	42	14	NON	0%	Micron	NA	lter Island Boaty	05	2015	
KKM	977	95%	S	43	12	LOW	NA	NA	NA	lter Island Boaty	12	2008	
KKM	33	80%	P	41	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	530	95%	S	38	13	Copper	NA	INTERLUX ULTRA	NA	SHELTER ISLAND	10	2017	
KKM	51	VACANT											
KKM	852	95%	P	43	14	UNK	NA	INTERLUX ULTRA	NA	ER ISLAND BOAT	05	2014	
KKM	560	98%	S	44	14	copper	NA	nterlux ultra blu	NA	lter Island Boaty	12	2017	
KKM	885	95%	P	40	14	NON	0%	INTERLUX	NA	G BEACH BOAT Y	11	2017	
KKM	896	90%	S	49	15	NON	66%	Z-SPAR	B-90	SHELTER ISLAND	04	2015	
KKM	378	95%	P	50	17	LOW	NA	PETTIT TRINIDA	NA	lter Island Boaty	01	2010	
KKM	817	90%	S	41	13	LOW	40%	PETTIT TRINIDA	NA	IIGHT AND CARV	05	2010	
KKM	862	VACANT											
KKM	951	95%	S	42	13	LOW	40%	Interlux Ultra	160	Koehler Kraft	07	2012	
KKM	137	90%	P	50	17	COPPER	55%	INTERLUX ULTRA	NA	SHELTER ISLAND	04	2014	
KKM	946	75%	P	55	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	46	70%	P	60	17	LOW	NA	NA	NA	NA	05	2011	

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KKM	492	60%	P	59	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	185	90%	P	52.5	16	COPPER	66%	proline	1088	›at yard, marina	03	2015	
KKM	88	VACANT											
KKM	275	40%	S	70	15	UNK	NA	NA	NA	DRISCOL	11	2014	
KKM	198	90%	P	58	16	UNK	40%	NA	4nk	ER ISLAND BOAT	03	2014	
KKM	968	95%	P	75.8	17.8	COPPER	NA	nterlux ultra kot	NA	·lter Island Boaty	05	2016	
KKM	8	VACANT											
KKM	270	65%	P	86	22	LOW	40%	PROLINE 1088c	168	MARINE GROUP	09	2010	
KKM	340	90%	P	57	14.5	LOW	40%	INTERLUX		Driscoll MB	03	2010	
KKM	742	60%	P	57	16	UNK	NA	NA	NA	OXNARD	01	2012	
KKM	570	30%	P	70	17	UNK	NA	NA	NA	NA	NA	NA	
KKM	722	90%	P	90	21	COPPER	NA	SHARKSKIN	NA	NA	01	2013	
KKM	521	65%	P	72	20	UNK	NA	NA	NA	·lter Island Boaty	10	2016	
KKM	172	45%	P	70	19	UNK	NA	NA	NA	NA	NA	NA	
KKM	568	35%	P	74	22	LOW	60%	PETTIT VSPAR	B94	Driscoll MB	10	2011	
KKM	237	92%	S	63	20	NON	NA	PROLINE	160	WARD YACHT CE	02	2016	
KKM	215	90%	P	52	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	479	100%	P	50	15	COPPER	NA	E PROTECTOR Z-	B-94	DRISCOLL	02	2011	
KKM	434	60%	P	54	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	559	65%	P	55	17.6	LOW	65%	Interluxe Ultra	160	·lter Island Boaty	05	2010	
KKM	381	75%	S	70	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	652	90%	P	65	19	UNK	UKN	pettit protector	b49	Driscol	11	2015	
KKM	977	95%	P	85	20	LOW	40%	PETIT TRINIDAD	NA	MARINE GROUP	12	2012	
KKM	75	95%	P	57	17	copper	65%	INTERLUX ULTRA	NA	·lter Island Boaty	06	2014	
KKM	59	90%	P	75	20	UNK	NA	NA	NA	NA	NA	NA	
KKM	452	45%	P	60	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	805	100%	P	90	20	LOW	NA	PROLINE	1088-6	NA	02	2009	
KKM	377	95%	P	60	18	LOW	65%	TTITT TRINIDAD	NA	·lter Island Boaty	12	2013	
KKM	469	70%	P	70	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	635	95%	P	59	16	LOW	NA	PETTIT	NA	·lter Island Boaty	07	2011	
KKM	621	35%	S	100	20	UNK	NA	NA	NA	MARINE GROUP	05	2013	
KKM	574	90%	P	50	16	Copper	76%	TERLUX ULTRAKC	NA	SHELTER ISLAND	05	2017	
KKM	785	90%	P	92	23	UNK	NA	NA	NA	·lter Island Boaty	12	2015	
KKM	633	45%	P	78	21	LOW	NA	NA	NA	NA	10	2005	
KKM	504	60%	P	60	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	232	90%	P	57	15.6	LOW	40%	TTIT TRINIDAD P	NA	.T YARD MARINA	06	2017	
KKM	105	100%	P	75	22	COPPER	50%	NA	NA	driscol	11	2014	
KKM	513	60%	S	45	14	LOW	65%	INTERLUX	NA	SELF APPLIED	07	2011	
KKM	569	70%	S	62	17	UNK	NA	NA	NA	NA	NA	NA	

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KKM	202	75%	P	58	16	LOW	40%	NA	NA	ER ISLAND BOAT	02	2010	
KKM	331	95%	P	58	18	LOW	65%	Interlux Ultra	160	lter Island Boaty	05	2010	
KKM	524	75%	P	50	17	LOW	NA	NA	NA	NA	NA	NA	
KKM	317	95%	S	57	16	LOW	NA	RLUX BOTTOM K	79	ENSENADA	07	2008	
KKM	483	35%	P	59	18	LOW	NA	NA	NA	NA	NA	NA	
KKM	631	95%	P	70	18	NON	NA	PETTIT	1204G	Driscol	12	1013	
KKM	926	50%	P	50	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	870	85%	S	52	15	UNK	NA	z-spar	NA	dricoll	04	2017	
KKM	741	VACANT											
KKM	65	100%	P	50	16	UNK	NA	NA	NA	NA	09	2013	
KKM	462	95%	P	50	16	LOW	65%	INTERLUX ULTRA	160	lter Island Boaty	08	2009	
KKM	685	15%	P	75	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	651	90%	S	55	15	LOW	0%	Interlux VC	56	Driscoll MB	06	2010	
KKM	648	80%	P	78	17	COPPER	55%	LTRA COTE BLAC	169	NEWPORT	02	2014	
KKM	680	VACANT											
KKM	794	90%	P	57	17	UNK	NA	NA	NA	shelter island	05	2016	
KKM	360	80%	S	52	14	UNK	NA	VIVID	72	lter Island Boaty	05	2012	
KKM	880	90%	S	44	9	COPPER	76%	TERLUX ULTRAKC	3449U	Driscoll MB	12	2017	
KKM	741	95%	P	52	15.3	copper	55%	INTERLUX ULTRA	3779U	lter Island Boaty	06	2016	
KKM	810	95%	P	74	18.2	copper	65%	INTERLUX ULTRA	3779F	lter Island Boaty	08	2015	
KKM	713	35%	S	44	13	UNK	NA	PETTITE	NA	ER ISLAND BOAT	10	2014	
KKM	169	95%	P	58	18	UNK	NA	PROLINE	1088/01	ER ISLAND BOAT	02	2014	
KKM	337	95%	S	47	13	LOW	40%	EST BOTTOM PR	NA	lter Island Boaty	01	2015	
KKM	456	90%	P	70	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	12	45%	S	52	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	874	85%	S	59	17	LOW	NA	INTERLUX ULTRA	NA	lter Island Boaty	09	2010	
KKM	292	45%	P	74	18.6	UNK	55%	INTERLUX ULTRA	3779U	lter Island Boaty	08	2015	
KKM	688	95%	P	43	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	182	95%	S	48	11	UNK	NA	EST BOTTOM PR	NA	KOEHLER	10	2013	
KKM	671	VACANT											
KKM	520	95%	S	50	13	UNK	60%	PETTIT Z-SPAR	B94	lter Island Boaty	12	2012	
KKM	59	90%	S	39	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	863	100%	HYDRAHOIST	31	10	LOW	NA	PETTIT	1261	lter Island Boaty	04	2005	
KKM	309	90%	P	47	15	UNK	NA	NA	NA	lter Island Boaty	11	2012	
KKM	418	90%	S	28	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	556	VACANT											
KKM	653	90%	S	27	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	617	100%	P	42	13	LOW	NA	NA	NA	NA	06	2002	
KKM	488	80%	P	31	12	UNK	NA	NA	NA	NA	NA	NA	

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KKM	314	95%	S	45	14	Copper	NA	ULTRAKOTE	NA	JK3	10	2016	
KKM	77	VACANT											
KKM	886	100%	P	44	13	UNK	NA	NA	NA	ER ISLAND BOAT	11	2013	
KKM	997	80%	S	32	11.2	UNK	NA	INTERLUX ULTRA	NA	ER ISLAND BOAT	01	2014	
KKM	965	55%	P	44	10	COPPER	55%	nterlux Ultra Blac	NA	ER ISLAND BOAT	06	2015	
KKM	309	VACANT											
KKM	859	100%	S	41	8	COPPER	53%	PETTIT	B91	DRISCOLLS	07	2016	
KKM	720	90%	P	37	12	LOW	NA	NA	NA	NA	01	2010	
KKM	224	VACANT											
KKM	872	90%	P	32.9	12	COPPER	NA	INTERLUX ULTRA	NA	DRISCOLL	08	2017	
KKM	413	90%	P	45	14	LOW	40%	interlux	yba163	ER ISLAND BOAT	03	2014	
KKM	166	80%	P	28	10	COPPER	66%	ZSPAR	NA	Bricks Marine	01	2018	
KKM	279	95%	P	45	15	LOW	NA	NA	NA	NA	NA	NA	
KKM	410	92%	S	27	8	LOW	NA	NA	NA	NA	NA	NA	
KKM	255	90%	S	50	12	LOW	40%	ZSPAR B94	164	ura Harbor Boat	12	2011	
KKM	848	95%	P	54	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	59	30%	P	26	8	UNK	NA	NA	NA	NA	NA	NA	
KKM	229	VACANT											
KKM	360	20%	P	25	8	UNK	NA	NA	NA	NA	NA	NA	
KKM	581	VACANT											
KKM	228	95%	P	34	12	LOW	NA	NA	NA	DRISCOLL	02	2011	
KKM	783	30%	P	45	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	648	45%	S	42	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	219	95%	P	33	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	817	90%	S	43	14	UNK	NA	NTERLUX PACIFIC	YBB263	SHELTER ISLAND	01	2012	
KKM	176	VACANT											
KKM	567	98%	S	35	11	LOW	65%	Interlux	NA	Driscoll MB	10	2010	
KKM	593	45%	S	27	8	UNK	NA	NA	NA	NA	NA	NA	
KKM	375	25%	P	45	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	440	80%	P	38	13	copper	45%	SEAHAWK	6145	Neilsen Beaumor	09	2006	
KKM	797	85%	S	33	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	669	99%	S	40	13	LOW	65%	Proline 1088	168	lter Island Boaty	07	2011	
KKM	642	95%	S	24	5	LOW	NA	NA	NA	NA	NA	NA	
KKM	764	85%	P	44	13.5	LOW	NA	NA	NA	NA	09	2004	
KKM	531	25%	P	30	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	253	45%	P	28	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	425	45%	S	46	14	LOW	NA	PETTIT TRINIDAD	174	ura Harbor Boat	12	2011	
KKM	829	85%	S	46	14	LOW	NA	PETTIT TRINIDAD	174	ura Harbor Boat	12	2011	
KKM	162	90%	P	32	11	UNK	NA	NA	NA	NA	NA	NA	

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KKM	752	30%	P	37	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	813	VACANT											
KKM	771	15%	P	45	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	618	95%	P	29	10.4	copper	NA	INTERLUX ULTRA	NA	lter Island Boaty	03	2016	
KKM	201	35%	P	43	14	LOW	NA	PETTIT TRINIDA	NA	lter Island Boaty	07	2011	
KKM	887	88%	S	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	370	VACANT											
KKM	274	100%	P	29	10	NON	0%	NA	NA	NA	NA	NA	
KKM	728	95%	P	42	14	copper	65%	Interlux	NA	lter Island Boaty	05	2016	
KKM	675	45%	S	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	974	75%	S	44	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	322	85%	P	20	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	316	25%	P	47	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	174	95%	P	34	11	copper	65%	Interlux	160	lter Island Boaty	01	2017	
KKM	54	VACANT											
KKM	951	30%	S	35	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	904	95%	P	45	10	LOW	40%	ettit Trinidad Pr	NA	SHELTER ISLAND	03	2016	
KKM	212	95%	S	32	11	NON	NA	PETTIT	NA	IGHT AND CARV	08	2011	
KKM	782	60%	S	45	13	LOW	NA	PROLINE VINYL	NA	SHELTER ISLAND	06	2008	
KKM	834	VACANT											
KKM	91	VACANT											
KKM	459	VACANT											
KKM	95	85%	P	43	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	428	75%	S	30	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	126	80%	S	45	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	668	VACANT											
KKM	42	100%	P	45	14	LOW	NA	PETIT TRINIDAD	NA	NA	07	2016	
KKM	142	VACANT											
KKM	744	25%	S	42	14	UNK	NA	SPAR PRO GOLD	NA	DRISCOLL	09	2014	
KKM	308	90%	P	32	11	LOW	20%	Epoxy Modified	147	leilsen Beaumor	05	2007	
KKM	111	VACANT											
KKM	887	30%	P	32	10.5	UNK	NA	INTERLUX Ultra	NA	Shelter Island	10	2017	
KKM	919	95%	P	46	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	444	95%	P	30	9	LOW	NA	ettitt vivid whit	NA	lter Island Boaty	11	2015	
KKM	142	VACANT											
KKM	611	VACANT											
KKM	408	85%	P	45	15	LOW	NA	HAWK SHARKS	NA	NA	01	2010	
KKM	279	95%	P	28	10	LOW	NA	NA	NA	NA	NA	NA	
KKM	1000	VACANT											

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KKM	671	VACANT											
KKM	770	100%	HYDRAHOIST	30	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	708	VACANT											
KKM	523	100%	S	35	19	NON	NA	INTERSLEEK 900	NA	DRISCOLL	NA	2009	
KKM	289	40%	S	40	15	UNK	NA	NA	NA	SHELTER ISLAND	07	2013	
KKM	152	VACANT											
KKM	457	75%	P	38	14	UNK	NA	PETIT TRINIDAD	NA	NA	NA	NA	
KKM	991	95%	S	32	8	UNK	NA	NA	NA	lter Island Boaty	06	2012	
KKM	762	92%	S	42	15	LOW	NA	NA	NA	lter Island Boaty	11	2012	
KKM	549	100%	P	40	12.6	COPPER	67%	INTERLUX ULTRA	3779F	ER ISLAND BOAT	11	2012	
KKM	907	100%	S	40	12.6	copper	NA	NTRULUX ULTRA	NA	NA	NA	NA	
KKM	914	95%	P	42	13			INTRULUX ULTRA	NA	shelter island	08	2017	
KKM	563	75%	P	42	14	LOW	65%	Interlux Ultra	160	eilsen Beaumor	07	2011	
KKM	563	90%	S	38	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	759	90%	S	40	14	LOW	NA	NA	NA	SHELTER ISLAND	09	2009	
KKM	522	95%	P	33	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	763	90%	P	38	13	LOW	NA	NA	NA	DRISCOLL	08	2010	
KKM	79	90%	S	36	13	LOW	NA	INTERLUX ULTRA	NA	SHELTER ISLAND	06	2009	
KKM	392	30%	S	36	11	copper	65%	ettit Trinidad Pr	174	lter Island Boaty	09	2012	
KKM	459	15%	P	38	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	759	35%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	453	100%	S	38	13	UNK	NA	STANDARD PAI	NA	DRISCOLL	11	2013	
KKM	920	90%	P	41	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	848	98%	P	38	13	UNK	NA	NA	NA	DRISCOLL	12	2013	
KKM	695	90%	P	39	13	copper	NA	nterlux ultra blac	NA	lter island boaty	11	2015	
KKM	220	85%	P	33	13	COPPER	NA	NTRULUX ULTRA	3779F	lter island boaty	11	2017	
KKM	453	70%	P	39	14	LOW	67%	INTERLUX ULTRA	NA	eilsen Beaumor	07	2012	
KKM	416	90%	P	38	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	257	100%	S	42	13	COPPER	66%	PROLINE	1088	SHELTER ISLAND	06	2017	
KKM	921	100%	P	39	13	LOW	NA	NA	NA	NA	10	2009	
KKM	900	25%	S	40	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	641	40%	P	49	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	807	25%	P	37	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	263	VACANT											
KKM	341	95%	P	35	12	LOW	NA	interlux ultra	NA	NA	06	2017	
KKM	675	90%	P	44	15	copper	65%	Interlux Ultra	160	lter Island Boaty	05	2012	
KKM	146	25%	S	37	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	505	45%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	880	90%	P	48	15	UNK	NA	NA	NA	NA	NA	NA	

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KKM	697	95%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	468	35%	S	43	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	729	95%	S	39	12	LOW	NA	PETTIT TRINIDAD	6	ER ISLAND BOAT	09	2009	
KKM	212	VACANT											
KKM	379	85%	P	37	12	UNK	NA	NA	NA	ER ISLAND BOAT	03	2014	
KKM	400	100%	S	48	15	LOW	67%	nterlux ultrakote	168	lter Island Boaty	08	2017	
KKM	751	88%	P	38	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	307	50%	P	44	13.5	UNK	NA	NA	NA	NA	NA	NA	
KKM	972	90%	S	38	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	437	40%	P	40	16	LOW	NA	pettit ultima ssa	NA	Basin Marine	NA	NA	
KKM	210	90%	S	38	12.3	COPPER	60%	TTIT TRINIDAD P	1082	SHELTER ISLAND	03	2014	
KKM	766	80%	P	50	15.6	copper	67%	NA	NA	lter Island Boaty	09	2014	
KKM	560	90%	P	38	12	LOW	NA	PETTIT TRINIDAD		Shelter Island Boaty	02	2010	
KKM	264	VACANT		40	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	591	50%	S	41	14	LOW	NA	PETTIT TRINIDAD	NA	ENSENADA	04	2008	
KKM	260	95%	S	46	14	NON	0%	trilux	33	Shelter Island	11	2017	
KKM	348	30%	S	36	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	631	85%	P	40	13.5	copper	55%	INTERLUX	3669	NA	06	2012	
KKM	753	90%	S	36	11	LOW	NA	NA	NA	DRISCOLL	08	2010	
KKM	508	90%	P	40	16	LOW	NA	ETTIT ULTIMA SS	NA	BASIN MARINE	04	2013	
KKM	455	65%	P	38	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	714	85%	P	40	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	326	90%	S	37	18	UNK	NA	NA	NA	NA	NA	NA	
KKM	1	90%	P	38	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	341	35%	P	24	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	573	98%	P	36	13	UNK	NA	NA	NA	lter Island Boaty	NA	NA	
KKM	134	90%	S	38	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	796	40%	P	37	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	131	85%	S	38	12	LOW	65%	ZSPAR B94	165	self applied	01	2007	
KKM	461	35%	S	37	11	copper	65%	Interlux Ultra	160	lter Island Boaty	07	2012	
KKM	618	98%	S	38	11	UNK	NA	AWLGRIP	SR	SHELTER ISLAND	12	2016	
KKM	101	95%	S	36	12	copper	NA	OXY COPPERCO	NA	NA	06	2014	
KKM	632	VACANT											
KKM	128	55%	P	36	13	UNK	NA	NA	NA	ER ISLAND BOAT	08	2017	
KKM	402	90%	P	35	12.5	UNK	NA	NA	NA	ER ISLAND BOAT	11	2014	
KKM	706	90%	S	42	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	213	VACANT											
KKM	534	25%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	624	60%	P	40	14	copper	65%	Interlux Ultra	160	eilsen Beaumor	07	2012	

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KKM	322	85%	P	32	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	766	100%	S	37	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	857	90%	P	36	13	UNK	NA	ERSLEEK 900 BL	NA	Shelter island	05	2013	
KKM	537	90%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	532	40%	S	39	12	LOW	NA	NA	NA	DRISCOLL	10	2010	
KKM	651	90%	S	40	11	LOW	NA	NA	NA	lter Island Boaty	12	2007	
KKM	151	98%	S	42	13	LOW	67%	INTERLUX ULTRA	NA	lter Island Boaty	06	2010	
KKM	639	15%	S	36	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	793	95%	P	35	14	UNK	NA	nterlux Ultra Blac	NA	SHELTER ISLAND	03	2015	
KKM	163	95%	S	35	11	UNK	NA	NA	NA	NA	NA	NA	
KKM	704	98%	S	36	12	LOW	40%	ERLUX ULTRAKC	3779U	lter Island Boaty	06	2017	
KKM	795	95%	S	37	12	UNK	NA	INTERLUX	NA	DRISCOLL	09	2014	
KKM	795	65%	P	47	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	626	VACANT											
KKM	876	98%	S	42	14	copper	76%	nterlux UltraKote	3779	SHELTER ISLAND	10	2017	
KKM	427	90%	P	43	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	623	75%	S	46.9	12	UNK	NA	NA	NA	na Del Ray Boat	09	2013	
KKM	912	92%	P	48	16	LOW	NA	NA	NA	SHELTER ISLAND	11	2007	
KKM	1000	60%	P	43	12	UNK	NA	RLUX BOTTOM K	NA	self applied	05	2013	
KKM	547	90%	P	46	14	LOW	NA	NA	NA	SHELTER ISLAND	02	2007	
KKM	926	VACANT											
KKM	988	90%	P	48	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	871	VACANT											
KKM	598	93%	P	43	16	LOW	40%	Proline 1088	168	lter Island Boaty	11	2011	
KKM	327	65%	P	36	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	541	100%	P	46	16	LOW	65%	TRINIDAD SR	174	lter Island Boaty	05	2010	
KKM	890	VACANT											
KKM	522	90%	P	48	15	LOW	NA	NA	NA	NA	NOV	2005	
KKM	579	85%	P	44	15	LOW	NA	PROLINE 1088-6	NA	NA	03	2006	
KKM	776	75%	P	48	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	964	VACANT											
KKM	404	95%	S	46	15	copper	NA	pettit protector	NA	Driscoll MB	07	2015	
KKM	39	90%	P	43	15	UNK	NA	NA	NA	DRISCOLL MB	11	2013	
KKM	626	90%	P	50	16	LOW	NA	PROLINE 1088-6	NA	lter Island Boaty	03	2008	
KKM	616	VACANT											
KKM	572	88%	P	43	15'10"	LOW	NA	PROLINE LOLO	1088	ER ISLAND BOAT	07	2013	
KKM	663	25%	S	35	17.5	UNK	NA	INTERLUX HARD	NA	lter Island Boaty	02	2014	
KKM	658	92%	P	39	14	LOW	NA	PROIINE 1088-6	NA	lter Island Boaty	10	2010	
KKM	177	90%	S	34	12	LOW	65%	E EPOXY PRIMEI	164	Driscoll MB	05	2011	

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KKM	95	90%	S	44	13	LOW	65%	Proline 1088	168		02	2010	
KKM	548	75%	P	34	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	559	100%	P	48	15	copper	65%	Interlux Ultra	3669U	lter Island Boaty	08	2017	
KKM	552	65%	S	36	11	copper	NA	TRINIDAD SR	NA	DRISCOLLS MB	05	2015	
KKM	289	90%	P	47.8	15	copper	67%	ETTIT/TRINIDAD	NA	DRISCOLLS	05	2015	
KKM	621	25%	P	46	16	UNK	NA	NA	NA	DRISCOLLS MB	11	2014	
KKM	860	80%	P	46	14	LOW	NA	NA	NA	NA	01	2007	
KKM	853	25%	P	36	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	523	VACANT											
KKM	801	65%	S	35	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	647	20%	P	48	16	copper	60%	Interlux Ultra	160	lter Island Boaty	12	2012	
KKM	314	60%	P	27	9	UNK	NA	PROLINE	NA	DRISCOLLS MB	01	2014	
KKM	201	85%	P	54	16	copper	NA	interlux ultra	3779f	lter Island Boaty	07	2015	
KKM	975	90%	P	28	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	499	95%	P	47	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	274	90%	P	32	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	868	98%	S	50	14	LOW	40%	NA	NA	SHELTER ISLAND	08	2002	
KKM	710	90%	S	36	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	294	98%	P	49	15	LOW	NA	NA	NA	NA	12	2010	
KKM	45	50%	S	34	12	UNK	NA	NA	NA	NA	NA	NA	
KKM	76	85%	P	49.12	16	LOW	NA	pettit B-94	NA	DRISCOLLS	08	2014	
KKM	527	93%	P	25	9	UNK	NA	NA	NA	NA	NA	NA	
KKM	74	90%	S	44	14	COPPER	76%	ERLUX ULTRAKC	NA	lter Island Boaty	03	2016	
KKM	761	40%	P	30	10	UNK	NA	NA	NA	NA	NA	NA	
KKM	508	40%	S	48	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	697	40%	S	41	14	NON	NA	VC PERF	NA	ER ISLAND BOAT	11	2013	
KKM	406	98%	S	50	16	LOW	NA	ISSION BAY BLU	4002	DRISCOLL	09	2007	
KKM	954	VACANT											
KKM	899	95%	P	43	15	LOW	40%	Z Spar Gold	164	Driscoll MB	02	2012	
KKM	400	80%	P	49	15	LOW	NA	INTERLUX KL-6	NA	lter Island Boaty	03	2007	
KKM	361	98%	P	51	15	LOW	40%	Blue Water 8601	NA	Driscolll MB	10	2008	
KKM	796	85%	S	50	13	UNK	NA	Interlux Micro	NA	lter Island Boaty	03	2014	
KKM	865	VACANT											
KKM	578	40%	S	50	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	967	45%	P	47	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	155	90%	P	43	15	LOW	65%	Interlux Ultra	160	lter Island Boaty	04	2012	
KKM	706	90%	P	47	15	COPPER	65%	oolsey Defense (	593-4301G	Nielson Beumon	06	2017	
KKM	877	80%	S	48	14	UNK	NA	SEA HAWK	NA	BAJA NAVAL	02	2015	
KKM	308	100%	P	50	17	NON	NA	NA	NA	SHELTER ISLAND	04	2015	

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KKM	920	100%	P	43	14	COPPER	55%	Interlux Ultra	117598	SIBY	08	2016	
KKM	530	20%	S	47	14	LOW	NA	NA	NA	NA	NA	NA	
KKM	947	32%	P	47	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	332	90%	S	45	15	UNK	NA	NA	NA	SHELTER ISLAND	10	2015	
KKM	461	80%	S	50	13	UNK	NA	NA	NA	NA	NA	NA	
KKM	466	VACANT											
KKM	156	95%	P	48	16	UNK	NA	NA	NA	lter Island Boaty	04	2014	
KKM	637	50%	P	48	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	846	35%	P	53	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	731	93%	P	48	15	LOW	40%	AUTICAL ABLATI	NA	Nielson Beumon	03	2017	
KKM	25	75%	S	45	14	copper	40%	Interlux Ultra	160	lter Island Boaty	11	2015	
KKM	879	90%	P	54	17	UNK	NA	NA	NA	NA	NA	NA	
KKM	809	60%	P	41	13	LOW	65%	Interlux Ultra	160	IIGHT AND CARV	11	2011	
KKM	197	98%	P	44	16	COPPER	45%	oolsey Defense	4501G	Neilsen Beaumon	04	2016	
KKM	16	25%	P	41	14	UNK	NA	NA	NA	NA	NA	NA	
KKM	559	90%	P	65	16	COPPER	76%	TERLUX ULTRAK	NA	SHELTER ISLAND	11	2016	
KKM	509	60%	S	78	17	copper	67%	TTIT TRINIDAD P	NA	DRISCOLLS	01	2018	
KKM	474	80%	P	97.6	24.5	UNK	UKN	TRILUX	33	Marine Group	10	2016	
KKM	576	88%	P	140	25	Combo	0%	A HAWK SHARKS	NA	Marine Group	10	2015	
KKM	421	90%	P	65	16	copper	NA	nterlux ultra kot	NA	lter island boaty	11	2016	
KKM	766	45%	P	142	25	UNK	NA	NA	NA	NA	NA	NA	
KKM	763	60%	P	160	25	UNK	NA	NA	NA	NA	NA	NA	
KKM	315	15%	P	205	25	UNK	NA	Micron	1317-39-1	ancouver Drydo	09	2013	
KKM	614	70%	S	40	16	UNK	NA	NA	NA	NA	NA	NA	
KKM	913	65%	S	42	23	LOW	40%	Marine Bottom	10175156	rkavitch La Paz	12	2016	
KKM	922	10%	S	45	15	UNK	NA	NA	NA	NA	NA	NA	
KKM	923	100%	HYDRAHOIST	15	8	NON	NA	NA	NA	NA	NA	NA	
HMM	9601	95	S	38	11	Copper	Interlux Ultra	Y3669U	Koehler Kraft	7	2015	55	
HMM	9595	100	S	32	9	Low	Unknown		Shelter Island	12	2012	67	
HMM	9589	90	S	53	13	Copper							
HMM	9583	100	S	36	13	Copper						67	
HMM	9582	100	S	42	14	Copper						67	
HMM	9581	95	S	34	10	Copper	Interlux Ultra	Y3669U	Shelter Island	7	2016	55	
HMM	9573	99	P	46	14	Copper	Interlux Ultra	Y3779F	Shelter Island	2	2014	55	2693-212-AA
HMM	9572	100	P	32	12	Copper						67	
HMM	9570		vacant									0	
HMM	9568	90	S	27	8	Low	Interlux Supe	K90B	Driscolls MB	11	2008	33	
HMM	9560	100	S	47	13	Low	Unknown		Unknown	12	2006		
HMM	9555	65	S	33	11	Copper	Proline	1088c-01	Shelter Island	4	2012	33	

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HMM	9554	100	S	30	11	Copper						67	
HMM	9552	100	S	36	11	Low	Z Spar	B-91	Driscoll SI	6	2015	35	
HMM	9549	100	S	50	12	Copper	Unknown		Koehler Kraft	3	2014	67	
HMM	9541	100	P	32	12	Copper						67	
HMM	9540	100	S	30	11	Copper	Interlux Ultra	Y3669F	Shelter Island	4	2015	67	2693-212-AA
HMM	9531	100	S	30	12	Copper						67	
HMM	9530	100	P	38	14	Copper						67	
HMM	9529	100	S	26	10	Copper						67	
HMM	9523	100	S	35	10	Low	None		Unknown	3	2011	33	
HMM	9522	100	P	39	13	Copper						67	
HMM	9520		vacant			vacant						0	
HMM	9518	100	P	24	8	Low	None		None	1	2001	67	
HMM	9513	100	S	34	12	Non	None					0	
HMM	9506	95	P	33	11	Low	Unknown		Drisoll SI	10	2012	67	
HMM	9501		vacant									0	
HMM	9498	90	S	30	11	Low	Seahawk	6142	Driscoll SI	1	2006	33	44891-11-AA
HMM	9497	95	S	35	13	Copper	Z spar	B90VOC	Driscolls	11	2015	76	
HMM	9492	90	S	37	12	Copper						67	
HMM	9488	85	S	35	12	Copper	Interlux Ultra	Y3669U	Shelter Island	12	2016	55	
HMM	9487	100	S	47	14	Low	Interlux Ultra	2449H	Koehler Kraft	1	2012	76	
HMM	9486	100	S	30	10	Copper	Interlux	Y3669U	Shelter Island	4	2015	55	
HMM	9485	90	P	29	10	Non	Thorn D		Shelter Island	6	2013	0	
HMM	9480		vacant									0	
HMM	9478		vacant									0	
HMM	9475	100	P	41	12	Copper	Interlux Ultra	Y3779F	Shelter Island	9	2013	55	2693-212-AA
HMM	9474	100	S	25	9	Non						0	
HMM	9472	100	S	37	12	Copper						67	
HMM	9470	100	S	34	10	Copper	Interlux Ultra	Y3669F	Shelter Island	9	2014	55	2693-212-AA
HMM	9469	100	S	35	12	Copper						67	
HMM	9468	100	P	33	12	Copper						67	
HMM	9463	100	S	30	9	Low	Interlux Ultra	Y3779F	Shelter Island	5	2010	55	2693-212-AA
HMM	9458		vacant									0	
HMM	9457	100	S	35	11	Copper	Trinidad	A10886	Koehler Kraft	12	2015	67	60061-94-ZB
HMM	9449	100	P	42	15	Copper						67	
HMM	9447		vacant									0	
HMM	9445	80	S	30	11	Non	Interlux/Inters	FXA972/A	Shelter Island	5	2015	0	
HMM	9443	90	P	29	10	Non	Pettit	1808Q	Shelter Island	4	2015	0	#N/A
HMM	9423	98	S	32	11	Copper	Interlux Ultra	Y3779F	Nielsen-Beau	8	2013	55	2693-212-AA
HMM	9421	95	S	32	12	Copper	Unknown					67	

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HMM	9416	100	P	21	9	Copper							
HMM	9414	100	S	38	13	Copper						67	
HMM	9412	100	S	27	12	Non	None					0	
HMM	9411	100	P	37	13	Copper	Interlux Ultra	Y3779U	Shelter Islan	1	2013	57	
HMM	9399	100	S	17	6	Copper						67	
HMM	9397	95	S	34	10	Copper	Interlux Ultra	Y3669U	Shelter Islan	2	2015	55	
HMM	9396	100	S	38	12	Copper						67	
HMM	9395	100	S	14	5	Low	Interlux Micr	5691	Self	7	2016	35	
HMM	9392	100	P	36	13	Copper	None		Unknown	Unknown			
HMM	9387	95	S	41	12	Copper	Interlux Ultra	Y3669U	Shelter Islan	10	2016	57	
HMM	9386	100	P	32	13	Copper						67	
HMM	9376	100	P	20	9	Non	Pettit Hydro	1104	self	7	2017	0	#N/A
HMM	9363	100	S	27	9	Low	Interlux Ultra	Y3449F	Shelter Islan	6	2012	55	2693-212-AA
HMM	9361	100	S	30	11	Copper	Interlux Ultra	Y3669U	Shelter Islan	6	2016	67	
HMM	9356	70	S	38	12	Copper						67	
HMM	9355	100	S	22	9	Low	Unknown		Unknown	12	2011	67	
HMM	9351		vacant									0	
HMM	9349	100	S	38	12	Copper						67	
HMM	9346	100	S	36	12	Copper						67	
HMM	9344		vacant									0	
HMM	9342	100	S	23	8	Low	None		Unknown	12	1990	67	
HMM	9341	100	E	18	7	Copper						67	
HMM	9336	100	S	26	10	Copper	Interlux Ultra	Y3669F	Driscoll MB	5	2014	55	2693-212-AA
HMM	9335	100	P	30	10	Copper	Nautical Supe	NAU773	Nielsen-Beau	2	2016	55	23566-20-ZT
HMM	9334	100	S	42	13	Copper						67	
HMM	9333	100	S	27	9	Low	None		Unknown	2	2011	67	
HMM	9325	95	P	30	12	Copper	Seaguard	P30BQ12	Self	12	2014	48	
HMM	9324	100	S	36	12	Copper	Interlux Ultra	Y3669F	Shelter Islan	7	2015	55	2693-212-AA
HMM	9320	90	P	29	11	Non	Armored Hull	30'		10	2017	0	#N/A
HMM	9315	100	S	30	11	Copper	Pettit Z-Spar	B-91	Driscoll SI	2	2016	67	
HMM	9311	100	P	26	9	Copper	Petit Hydrac	1240	Self	3	2014	40	60061-87-ZH
HMM	9310	98	P	50	15.7	Copper	Interlux Ultra	Y3779F	Driscolls MB	09	2017	55	2693-212-AA
HMM	9304	100	P	28	11	Copper	Interlux Ultra	Y3779U	Shelter Islan	2	2014	67	
HMM	9296		vacant									0	
HMM	9295	100	S	39	12	Copper	Trinidad Micron		Mexico	11	2014	67	
HMM	9294	100	S	30	12	Copper							
HMM	9293	100	S	23	8	Copper	Trinidad Ultra	Y3779U	Shelter Islan	8	2016	55	
HMM	9288	100	P	21	8								
HMM	9285	100	S	27	8	Copper	UK		Driscoll SI	12	2010	67	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
HMM	9283	100	P	35	11	Copper	Z-Spar	B-94	Driscoll SI	8	2014	60	
HMM	9282		vacant									0	
HMM	9280	75	P	28	10	Copper	Petit		Self	Unknown		66	
HMM	9277	100	P	33	11	Copper						67	
HMM	9276	100	S	27	9	Copper						67	
HMM	9267		vacant									0	
HMM	9266		vacant									0	
HMM	9265	100	S	34	11	Low	Unknown		Unknown	4	2011	67	
HMM	9261		vacant									0	
HMM	9257	100	P	24	9	Copper						67	
HMM	9251	100	S	34	11	Copper	Interlux Ultra	Y3669F	Shelter Islanc	4	2015	55	2693-212-AA
HMM	9250	100	P	30	11	Copper						67	
HMM	9248	100	P	22	7	Copper						67	
HMM	9247	100	p	10	5	Copper						67	
HMM	9244	95	P	50	15	Copper	Interlux Ultra	Y3779U	Shelter Islanc	2	2016	57	
HMM	9241	100	S	35	11	Copper	Interlux Ultra	Y3669F	Shelter Islanc	11	2013	55	2693-212-AA
HMM	9239	100	S	30	10	Copper	Proline	1088c-01	Shelter Islanc	10	2012	33	
HMM	9228	100	S	30	11	Non	None					0	
HMM	9218	98	S	33	13	Copper	Interlux Ultra	Y3559U	Shelter Islanc	5	2016	55	
HMM	9215	100	P	35	11	Copper	Z-Spar	B-94	Driscoll SI	8	2014	60	
HMM	9213	100	S	36	10	Copper	Interlux Ultra	Y3779U	Shelter Islanc	6	2016	67	
HMM	9210	98	P	36	13	Copper	Interlux Ultra	Y3779F	Shelter Islanc	10	2014	55	2693-212-AA
HMM	9203	100	P	24	9	Copper						67	
HMM	9201		vacant									0	
HMM	9198	100	S	26	9	Copper	Interlux Ultra	Y3779U	Shelter Islanc	9	2017	55	
HMM	9195	100	S	40	13	Copper						67	
HMM	9190	100	P	32	10	Copper	Interlux	Y3779U	Shelter Islanc	6	2016	55	
HMM	9189	100	S	35	12	Non						0	
HMM	9185	90	P	22	8	Copper	JDK		NeilsenBeaur	7	2017	67	
HMM	9183	100	P	48	15	Copper	Interlux Ultra	Y3779F	Shelter Islanc	8	2013	55	2693-212-AA
HMM	9182	90	S	25	8	Copper	Interlux Ultra	Y3669F	Shelter Islanc	11	2013	55	2693-212-AA
HMM	9181	100	P	18	9	Copper	Trinidad					67	
HMM	9176		vacant									0	
HMM	9172	95	P	18	8	Copper						67	
HMM	9171	100	P	22	8	Copper	Interlux Ultra	Y3779F	Driscoll MB	1	2013	55	2693-212-AA
HMM	9169	90	P	47	14	Copper	Interlux Ultra	Y3779U					
HMM	9168	100	S	24	8	Copper						67	
HMM	9161	100	S	34	12	Copper						67	
HMM	9157	100	S	25	8	Low	Interlux Ultra	Y3559F	Shelter Islanc	5	2011	55	2693-212-AA

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HMM	9156	100	S	48	14	Copper	Unknown			5	2014		
HMM	9153		vacant									0	
HMM	9151	65	P	23	9	Copper	Trinidad SR	A1277Q	Self	5	2015	58	60061-94-ZD
HMM	9150	100	S	38	12	Low	Interlux Micr	5693	British Marin	9	2013	35	
HMM	9148	100	S	22	9	Copper			Unknown	Unknown		67	
HMM	9147	94	S	44	13	Copper	Interlux Ultra	Y3559F	Shelter Island	5	2014	55	2693-212-AA
HMM	9141	100	P	36	12	Copper	Interlux Ultra	Y3779F	Shelter Island	3	2013	55	2693-212-AA
HMM	9140	100	S	40	13	Copper	Ultralux	Y3779F	Shelter Island	??	2013	55	2693-212-AA
HMM	9135	95	P	38	15	Copper	Interlux Ultra	Y3669U	Shelter Island	12	2015	67	
HMM	9133		vacant									0	
HMM	9130	100	S	36	13	Copper						67	
HMM	9129	100	S	36	12	Low	Interlux Ultra	2779N	Shelter Island	5	2011	33	
HMM	9128	95	S	33	12	Copper	Unknown		Dana Point Sh	1	2017	67	
HMM	9127	100	P	36	12	Copper						67	
HMM	9126	100	R	19	6	Copper						67	
HMM	9124	100	S	25	8	Copper						67	
HMM	9123	100	P	28	10	Copper						67	
HMM	9121	100	S	33	10	Low	Unknown		Nielsen-Beau	10	2012	67	
HMM	9117		vacant									0	
HMM	9115	100	S	47	14	Low	Trinidad	1275	Self	3	2011	70	
HMM	9114	100	S	34	12	Copper	Interlux Ultra	Y3779F	Shelter Island	4	2014	55	2693-212-AA
HMM	9113		vacant									0	
HMM	9111	100	S	33	9	Copper	Interlux Ultra	Y3779F	Shelter Island	8	2014	55	2693-212-AA
HMM	9106	100	S	31	11	Copper						67	
HMM	9099	90	S	25	8	Copper							
HMM	9096		vacant									0	
HMM	9090	98	S	28	9	Low	Unknown		Unknown	4	2012	67	
HMM	9088	100	P	42	14	Non	Interlux Inter	BZA646	Baja Naval	4	2016	0	
HMM	9085	100	P	21	8	Copper						67	
HMM	9084	95	P	30	8	Copper	Interlux Ultra	Y3669F	Shelter Island	6	2013	55	2693-212-AA
HMM	9083	100	S	30	10	Copper	Interlux Ultra	Y3779F	Shelter Island	9	2014	55	2693-212-AA
HMM	9077	95	S	37	12	Low	Micron Extra	5693	Mexico	3	2014	35	
HMM	9069		vacant									0	
HMM	9068	100	S	26	8	Copper						67	
HMM	9066	100	P	26	8	Copper						67	
HMM	9065	100	P	23	10	Copper							
HMM	9061	100	P	40	12	Low	Unknown		Unknown	1	2000		
HMM	9051	100	S	20	6	Copper						67	
HMM	9048	100	P	52	14	Copper	Unknown		Baja Naval	1	2009	67	

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HMM	9047	100	P	23	7	Low	Unknown		Los Alamitos	3	2012	67	
HMM	9044	99	S	36	12	Low	Interlux Ultra	Y3669F	Shelter Island	4	2015	33	2693-212-AA
HMM	9031	100	P	18	8	Low	Unknown		Self	12	2010	67	
HMM	9029	90	S	36	12	Low	Interlux CSC	5583G	Shelter Island	6	2017	36	
HMM	9027	100	P	21	8	Copper						67	
HMM	9024	90	P	17	6	Copper			Shelter Island	2	2015	67	
HMM	9020	50	S	47	14	Low	Interlux Ultra	Y3669F	Shelter Island	5	2012	55	2693-212-AA
HMM	9017	90	P	32	10	Copper						67	
HMM	9015	100	S	38	13	Non	Sea Speed	121509-BP	Driscoll SI	2	2015	0	
HMM	9010	100	S	35	11	Copper						67	
BCM	8600	100	S	46	14	LOW COPPER	PROLINE	1088C-02	SIBY	2	2009	67	
BCM	8596	100	S	30	10.1	COPPER							
BCM	8592	100	S	30	10.1	LOW COPPER	ULTRA RED	3449	NB	3	2014	55	
BCM	8590	100	P	42	13.6	COPPER	ULTRA-KOTE	Y3669U	SIBY	7	2017	55	
BCM	8578	0				NON COPPER						0	
BCM	8576	100	S	31	11	COPPER							
BCM	8574	0				NON COPPER						0	
BCM	8572	93	P	42	13.5	LOW COPPER	ULTRA RED	3449	SIBY	7	2014		
BCM	8567	88	S	30	9.6	COPPER	TTIT TRINID	1875	KOEHLER	9	2015	28	
BCM	8560	80	P	32.5	11.1	COPPER	Z*SPAR	B-94	DRISCOLL	9	2015	65	
BCM	8559	0				NON COPPER						0	
BCM	8557	90	S	36	12.6	COPPER	Z*SPAR	B-91	SIBY	4	2015	65	
BCM	8554	100	S	34	11	COPPER	ULTRA-KOTE	Y3559U	SIBY	2	2017	55	
BCM	8547	97	S	31	10	COPPER							
BCM	8545	100	S	43	11.8	LOW COPPER	ICRON CSC H	YBC583	KOEHLER	7	2014	35	2693-225-AA
BCM	8544	100	S	30	10.1	COPPER	TRAKOTE BL	2669N	SIBY	9	2015	67	
BCM	8543	90	S	41	12.6	LOW COPPER	PROLINE	1088C-02	SIBY	3	2014	67	
BCM	8539	100	S	30	9.5	COPPER							
BCM	8533	100	S	46	12.2	COPPER							
BCM	8526	100	S	29		COPPER							
BCM	8525	97	P	56	16.4	LOW COPPER	Z*SPAR	B90VOC	DRISCOLL	8	2013	60	
BCM	8524	100	S	24	9	LOW COPPER	ICRON EXTR	5793	DRISCOLL	4	2014	35	2693-190-ZJ
BCM	8523	99	S	36	11.9	COPPER	PROLINE	1088C-02	SIBY	7	2016	67	
BCM	8519	90	S	30	10	LOW COPPER	CRON 66 BLA	YBA473	KOEHLER	8	2014	28	2693-187-ZG
BCM	8516	97	S	38	12	LOW COPPER			SIBY	1	2012	unknown	
BCM	8515	100	S	30	9.6	COPPER	ARINE CPP A	5436936	OHLER KRAF	5	2016	38	
BCM	8509	96	S	36	10	LOW COPPER			BAY MARINE	6	2011	unknown	
BCM	8508	100	P	36	14	COPPER							
BCM	8500	100	P	57	16.5	COPPER							

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BCM	8487	100	P	32	11	LOW COPPER			102012				
BCM	8482	0				NON COPPER						0	
BCM	8478	100	P	34.5	11.8	LOW COPPER	Z*SPAR	B-91	NB	10	2010	65	
BCM	8474	100	S	32	9.6	LOW COPPER	TTIT TRINID	A1088G	KOEHLER	6	2012	67	60061-94-ZB
BCM	8471	100	S	32	10.1	LOW COPPER			DRISCOLL	7	2010	unknown	
BCM	8469	100	S	35.5	11.5	LOW COPPER	PROLINE	1088C-02	SIBY	5	2011	67	
BCM	8468	100	S	46	13.8	COPPER							
BCM	8467	96	S	25	8	LOW COPPER	Z*SPAR	B-91	DRISCOLL	6	2011	65	
BCM	8464	100	P	40	14	COPPER	ULTRA BLAC	3779	KOEHLER	8	2015	55	
BCM	8463	100	S	40.6	12.1	LOW COPPER			122011				
BCM	8459	100	S	26	4.6	LOW COPPER			32012				
BCM	8456	100	P	36.3	12.1	COPPER							
BCM	8454	89	S	43.5	13.9	COPPER	TTIT HORIZO	1850	SIBY	8	2016	39	60061-101-AA
BCM	8442	100	S	50	14.9	COPPER							
BCM	8436	100	S	42	14.5	LOW COPPER			KNIGHT & CAR	8	2010	unknown	
BCM	8433	100	P	32	12	COPPER			62015				
BCM	8431	77	S	30	10.6	LOW COPPER	LASS BOTTO	YBB669G	HYLEBOS	2	2012	22	2693-18-ZB
BCM	8428	97	S	36	11.5	COPPER							
BCM	8425	93	S	31	10	COPPER	TIT HYDROC	1640	NB	1	2017	0	60061-87-ZL
BCM	8424	100	S	33	11.5	COPPER	PROLINE	1088C-02	SIBY	3	2016	67	
BCM	8421	73	S	44	13	COPPER	ULTRA-KOTE	Y3779U	SIBY	4	2017	60	
BCM	8415	100	S	32.8	12	COPPER							
BCM	8410	100	S	30	10	COPPER				6	2013		
BCM	8401	99	S	38	12	NON COPPER	TER ISLAND	8201	SIBY	1	2017		
BCM	8400	100	S	40	13	COPPER	TRA-KOTE BL	Y3669U	SIBY	4	2017		
BCM	8397	100	P	37	14	COPPER	ULTRA BLAC	3779	SIBY	10	2016	55	
BCM	8396	100	S	29	8	COPPER							
BCM	8395	100	S	34	11.5	COPPER							
BCM	8394	96	S	36	10.5	NON-COPPER	ERSHIELD 3	ENA311	KOEHLER	3	2017	0	
BCM	8393	100	S	27	9	COPPER			22017			55	
BCM	8392	100	S	37	12	LOW COPPER	Z*SPAR	B-91	DRISCOLL	9	2012	65	
BCM	8384	96	P	48	12	LOW COPPER	PROLINE	1088C-02	SIBY	7	2012	67	
BCM	8382	93	P	36	12	LOW COPPER	ULTRA BLAC	3779	SIBY	1	2013	55	
BCM	8380	100	S	27	8.6	COPPER							
BCM	8374	100	P	26	7	COPPER	PROLINE	1088C-02	SELF	4	2016	67	
BCM	8372	67	S	35	11.4	COPPER	ULTRA BLUE	3669	SIBY	3	2015	55	
BCM	8371	96	S	31	9.75	COPPER							
BCM	8370	100	S	34	12	COPPER	ULTRA GREE	3559	SIBY	2	2015	55	
BCM	8368	88	P	26	8.6	COPPER	ULTRA-KOTE	Y3779U	DRISCOLL M	9	2017	55	

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BCM	8361	86	S	26	11	LOW COPPER			22011				
BCM	8360	94	S	30	9	LOW COPPER	ULTRA BLUE	3669	SIBY	7	2014	55	
BCM	8351	100	S	28	8.5	COPPER							
BCM	8349	93	S	30	11	COPPER	ULTRA BLUE	3669	SIBY	5	2015	55	
BCM	8340	90	S	34.8	10	COPPER			62016			0	
BCM	8336	100	S	29	10	COPPER			KOEHLER	1	2016		
BCM	8332	97	S	32	11	LOW COPPER	PER PROGUA	NAU770	NB	7	2016	55	23566-20-ZR
BCM	8331	100	S	40	22	COPPER	BOTTOM PR	41127706	DRISCOLLS	8	2015	65	60061-94-ZE
BCM	8328	68	S	31	10	COPPER			72016			55	
BCM	8324	100	P	36	12.9	LOW COPPER			SIBY	12	2011	unknown	
BCM	8322	99	S	37.1	11.7	COPPER							
BCM	8317	92	S	37	12.6	COPPER							
BCM	8314	0				NON COPPER						0	
BCM	8310	95	S	44	8	COPPER							
BCM	8308	82	S	29.11	10.1	LOW COPPER	PROLINE	1088C-02	SIBY	7	2014	67	
BCM	8304	0				NON COPPER						0	
BCM	8300	82	S	27	9	COPPER	BOTTOM PR	A41127706	DRISCOLL	10	2017		
BCM	8296	100	P	16	4	LOW COPPER	ULTRA BLUE	3669	SIBY	12	2014	55	
BCM	8290	100	S	25	8	LOW COPPER	TIT PROTECTOR		DRISCOLL	6	2011	65	
BCM	8289	100	S	29	11	LOW COPPER	WEST MARINE		82005	8	2005	unknown	
BCM	8286	99	S	32.6	11.6	COPPER	ULTRA BLUE	3669	SIBY	11	2015	55	
BCM	8284	96	S	34	11.3	LOW COPPER	ULTRA BLUE	3669		3	2011	55	
BCM	8270	97	P	39.5	14.2	COPPER	BOTTOM PR	411187706	DRISCOLL	3	2017		60061-94-ZE
BCM	8267	87	P	34	11.6	COPPER	BOTTOM PR	A411187706	DRISCOLL	11	2017		
BCM	8265	100	S	35	11.5	LOW COPPER	LTRA BLACI	3779	SIBY	9	2012	55	
BCM	8250	97	S	33	10	COPPER	RAKOTE BLA	2779N	SIBY	3	2016	67	
BCM	8246	92	S	34	11.9	COPPER	ULTRA BLUE	3669	SIBY	6	2015	55	
BCM	8245	95	S	35	10	LOW COPPER	LTRA BLACI	3779	SIBY	7	2010	55	
BCM	8244	100	S	38	14.11	LOW COPPER	RINE BOTTO	411186606	OHLER KRAF	2	2015	29	60061-129-AA
BCM	8240	100	S	40	13	LOW COPPER			SIBY	3	2011	iunkown	
BCM	8239	100	S	30	10	LOW COPPER	PROLINE	1088C-02	SIBY	3	2012	67	
BCM	8235	98	P	44	11	LOW COPPER	AGUARD BL	P30LQ13	DRISCOLL	9	2014	48	
BCM	8232	100	S	26.6	10.6	COPPER	ULTRA BLUE	3669	SIBY	7	2015		
BCM	8214	0				NON COPPER						0	
BCM	8213	100	S	44.6	14	LOW COPPER	PROLINE	1088C-02	SIBY	10	2011	67	
BCM	8206	100	S	36	11	LOW COPPER	BOTTOM PR	411187706	SIBY	2	2014	60	60061-94-ZE
BCM	8204	98	S	44	13	COPPER	TIT ULTIMA S	1109606	DRISCOLL	10	2017	65	
BCM	8193	100	S	35	9	COPPER	JLTRA BLACI	3779	SIBY	6	2015	55	
BCM	8191	100	S	34	11	LOW COPPER			22014			67	

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BCM	8188	96	S	32	11.5	COPPER	PROLINE	1088C-02	SIBY	5	2015	67	
BCM	8184	100	P	28	10	COPPER	ULTRA BLUE	3669	SIBY	4	2016	55	
BCM	8182	100	P	30	12.3	COPPER							
BCM	8175	100	P	32	11	LOW COPPER	ULTRA BLACI	3779	SIBY	7	2010	55	
BCM	8171	100	S	36	11	LOW COPPER	ULTRA BLUE	3669	SIBY	1	2014	55	
BCM	8160	100	P	40	10.6	LOW COPPER	ULTRA GREEI	3559	SIBY	3	2012	55	
BCM	8156	88	S	45	13.6	COPPER	TRAKOTE BL	2669N	KOEHLER	11	2017		
BCM	8150	100	S	37	12	LOW COPPER	ULTRA BLUE	3669	SIBY	5	2010	55	
BCM	8149	100	S	46	13.5	COPPER	PROLINE	1088C-02	SIBY	4	2016	67	
BCM	8147	100	S	35	10.5	LOW COPPER	ULTRA BLACI	3779	KOEHLER	2	2013	55	
BCM	8146	100	S	45	14.5	LOW COPPER			KNIGHT & CARV	12	2011		
BCM	8138	82	P	26	8.6	COPPER	TRAKOTE BL	2669N	KOEHLER	4	2017	55	
BCM	8137	100	S	47	15	LOW COPPER	TTIT TRINID/	1878	OPEQUIMAR	5	2012	76	
BCM	8131	93	S	35	11.6	COPPER	ULTRA BLUE	3669	SIBY	5	2017	55	
BCM	8121	99	P	40	14.1	LOW COPPER	TRINIDAD	1088C-02	Vee Jay Marine	5	2006	67	
BCM	8119	100	S			NON COPPER	TERSLEEK 9	FXA979/A	SIBY	10	2013	0	
BCM	8115	100	S	36	11.6	COPPER			72013				
BCM	8111	100	S	41	12	COPPER	ULTRA BLACI	3779	SIBY	11	2017	55	
BCM	8105	99	S	32	11.8	LOW COPPER	TTIT TRINIDAD		SIBY	3	2011	unknown	
BCM	8100	100	S	30	10.1	COPPER							
BCM	8099	100	S	39	19.4	COPPER	ULTRA BLUE	3669	SIBY	9	2016	55	
BCM	8096	100	S	36	11	COPPER			52016				
BCM	8094	75	P	19	8	COPPER			22017				
BCM	8091	100	P	30	9.9	COPPER	ULTRA BLUE	3669	SIBY	7	2016	55	
BCM	8090	100	P	32	11.6	LOW COPPER	ULTRA BLUE	3669	SIBY	7	2013	55	
BCM	8086	100	P	34	11	LOW COPPER	ULTRA-KOTE	Y3669U	SIBY	5	2011	55	
BCM	8083	100	P	46	14.6	LOW COPPER	ULTRA BLUE	3669	DRISCOLL	3	2010	55	
BCM	8076	100	P	38	13	LOW COPPER	ULTRA BLACI	3779	SIBY	2	2014	55	
BCM	8073	100	S	41	12	LOW COPPER	Z*SPAR	B90VOC	LONG BEACH	6	2011	76	
BCM	8070	92	S	38	21.5	COPPER	ULTRA-KOTE	Y3669U	SIBY	3	2017	65	
BCM	8064	84	P	65	14	COPPER							
BCM	8060	99	P	34	11	COPPER	ULTRA-KOTE	Y3669U	SIBY	10	2016	55	
BCM	8043	93	S	34	9.8	LOW COPPER	ULTRA BLACI	3779		4	2010	55	
BCM	8041	100	S	29.11	10.1	LOW COPPER	IT TRINIDAD	A1088G	KOEHLER	8	2014	70	60061-94-ZB
BCM	8037	96	S	33	9.7	LOW COPPER	ULTRA BLACI	3779	SIBY	6	2011	55	
BCM	8034	82	P	46	14.5	COPPER	Z*SPAR GOLI	41127706	SIBY	3	2015	65	60061-94-ZE
BCM	8030	92	S	31	10.4	LOW COPPER	PROLINE	1088C-02	DRISCOLL	9	2010	67	
BCM	8029	0				NON COPPER						0	
BCM	8026	100	S	33	9.7	COPPER	PROLINE	1088C-02	DRISCOLL	5	2016	67	

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
BCM	8024	100	S	33.5	11.5	LOW COPPER			122013				
BCM	8023	84	S	33	11.1	COPPER	JLTRA BLACI	3779	DRISCOLL MI	4	2015	55	
BCM	8022	100	S	32	11.5	LOW COPPER	TRAKOTE BLA	2779N	KOEHLER	8	2011	67	
BCM	8019	99	P	38	13	COPPER	JLTRA BLACI	3779	SIBY	8	2013	55	
BCM	8014	93	P	48	12	LOW COPPER	JLTRA BLACI	3779	SIBY	12	2014	55	
BCM	8012	100	P	13.3	4	LOW COPPER			SELF	6	2011	unknown	
BCM	8011	100	P	34	7.3	COPPER	ULTRA BLUE	3669	SIBY	7	2017	55	
BCM	8010	100	S	36	11.6	COPPER							
BCM	8007	99	S	32	11	LOW COPPER	PETTIT		SIBY	4	2009	uinlnown	
BCM	8006	90	S	35.5	13.3	LOW COPPER	JLTRA BLACI	3779	SIBY	1	2014	55	
GCA	2035	100	Sail	67'	19'	Copper	Pettit Pro	B90VOC	Driscoll's	7	2016	65	
GCA	2064	100	Power	80'	22'	Unknown							
GCA	2070												
GCA	2130	90	Power	29'	10'	Copper	Interlux Ultra	Y3779F	ter Island Boat	9	2016	55	2693-212-AA
GCA	2131	95	Power	30'	10'	Copper	Interlux Ultra	Y3779F	Beaumont Ma	5	2017	55	2693-212-AA
GCA	2138												
GCA	2139	95	Sail	46'	12'	Low-copper	lux Micron CS	YBC580	ter Island Boat	4	2017	38	2693-225-AA
GCA	2148	80	Power	40'	13'	Copper	Interlux Ultra	Y3779F	ter Island Boat	7	2017	55	2693-212-AA
GCA	2173	100	Power	58'	16'	Unknown							
GCA	2175	100	Power	75'	21'	Copper	ABC3		Driscoll's	12	2014	48	
GCA	2180	100	Power	30'	12'	Unknown							
GCA	2193	100	Power	38'	14'	Non-Copper	Hydrocoat Ec	1840	Beaumont Ma	11	2015	0	60061-87-ZI
GCA	2209	90	Power	38'	13'	Copper	Proline	1088c-01	Koehler Kraft	8	2017	67	
GCA	2222	90	Power	85'	21'	Copper	Interlux Ultra	Y3779F	ter Island Boat	6	2016	55	2693-212-AA
GCA	2239	100	Power	61'	17'4"	Copper	Interlux Ultra	Y3779F	er Island Boat	5	2014	55	2693-212-AA
GCA	2247	90	Power	56'	15'	Copper	Interlux Ultra	Y3779F	er Island Boat	2	2016	55	2693-212-AA
GCA	2278												
GCA	2287	95	Power	45'	14'7"	Copper	oolsey Defen	4501	Beaumont Ma	5	2017	65	
GCA	2301	100	Power	70'	16'	Copper	Proline	1088c-01	er Island Boat	3	2017	67	
GCA	2329	80	Power	41'	13'	Copper	Interlux Ultra	Y3449F	er Island Boat	3	2017	55	2693-212-AA
GCA	2346	100	Sail	65'	15'5"	Non-Copper	terlux-Micron	YBD101G	Unknown	11	2014	0	
GCA	2351	80	Power	42'	14'	Copper	Interlux Ultra	Y3779F	ter Island Boat	8	2017	55	2693-212-AA
GCA	2371	100	Power	48'	13'	Copper	Aqua Interlux	YBA579	Beaumont Ma	4	2012	47	
GCA	2396	100	Power	54'	16'8"	Copper	Seaguard	P30LQ13	he Group Boat	12	2016	49	
GCA	2399	100	Power	42'	14'3"	Copper	Interlux Ultra	Y3779F	Beaumont Ma	11	2014	55	2693-212-AA
GCA	2442	90	Sail	65'	16'	Low-copper	lux Micron CS	YBC580	er Island Boat	7	2017	38	2693-225-AA
GCA	2445	50	Power	54'	17'	Copper	Interlux Ultra	Y3779F	er Island Boat	1	2014	55	
GCA	2446	95	Power	42'	10'	Low-copper	Petit Vivid	11161	Beaumont Ma	10	2017	17	60061-116-AA
GCA	2463	50	Power	56'	15'	Copper	Interlux Ultra	Y3779F	er Island Boat	11	2017	55	2693-212-AA

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low Copper, or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
GCA	2474	100	Power	48'	17'	Low-copper	Petit Vivid	11161	ort Harbor Sh	5	2013	17	60061-116-AA
GCA	2475	75	Power	37'	11'	Copper	Proline	1088c-01	er Island Boat	10	2017	67	
GCA	2525	80	Sail	30'	11'	Copper	Aqua Interlux	YBA579	Beaumont Ma	6	2016	47	
GCA	2539	100	Power	24'	9'	Copper	Proline	1088c-01	er Island Boat	8	2017	67	
GCA	2549												
GCA	2556	100	Power	40'	11'5"	Copper	Z-Spar Protecto	B-94	Beaumont Ma	11	2013	60	
GCA	2582	80	Power	40'	13'	Unknown							
Tonga	2460												
Tonga	2438												
Tonga	2417	100	Power	41		Copper	ukote Black G	3445				47	
Tonga	2325	100	Power	65			unknown						
Tonga	2262	100	Power	47			unknown						
Tonga	2250	100	Power	40			unknown						
Tonga	2238	100	Power	68			unknown						
Tonga	2201	100	Power	34			unknown						
Tonga	2171	100	Power	33			unknown						
Tonga	2132	100	Power	33			unknown						
Tonga	2126	100	Power	29			unknown						
Tonga	2073	100	Power	32			unknown						
Tonga	2011	100	Power	42			unknown						
Tonga	2008	100	Power	44	15	Low Copper	micron	YBC583				35	2693-225-AA
Tonga	2006	100	Power	39		Copper	ukote Black G	3445				47	
Crow's Nest	1001		Vacant										
Crow's Nest	1008		Vacant										
Crow's Nest	1009		Vacant										
Crow's Nest	1047	10	Power	58	18	copper	Proline	1088c-01			2014		
Crow's Nest	1094	10	Power	54	15	copper	Interlux						
Crow's Nest	1191	10	Power	48	15	Copper							
Crow's Nest	1195	10	Power	82	19	copper	Interlux Ultra	3639U			2015		
Crow's Nest	1271		Vacant										
Crow's Nest	1274	50	Power	35	12	Micron Non	Micron Non						
Crow's Nest	1295	10	Power	50	14		Zspar		Seattle	Dec	2012		
Crow's Nest	1306	10	Power	32	12								
Crow's Nest	1314	90	Sail	42	10	Copper	Biolux Green	5490	Walsh Marine	7	2012		2693-181-AA
Crow's Nest	1325	10	Power	35	12	copper	Interlux Ultra	3696U			2016		
Crow's Nest	1373		Vacant										
Crow's Nest	1420		Vacant										
Crow's Nest	1432	50	Sail	42	12				Koehler	Nov	2017		
Crow's Nest	1517	10	Power	36	13		Proline	1088c-01			2014		

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Category 1 reg #
Crow's Nest	1565		Vacant										
Crow's Nest	1573		Vacant										
Crow's Nest	1575		Vacant										
LPYC	1434	vacant											
LPYC	3473	vacant											
LPYC	3292	vacant											
LPYC	3090	vacant											

APPENDIX D

WATER QUALITY RESULTS

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WATER QUALITY

FIELD WATER QUALITY DATA SHEETS

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB - ER

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 0645 Ended: (hh:mm) 0715

GPS: (WGS84) Lat. 32.70996 Long. -117.23410

Tide (ft): ↑ 1.0 ft Time of Slack High Tide: 1115

Water Depth (ft): NA

Weather conditions: calm; over cast

Wind (mph): 0.5 Time of CTD Cast: NA

Current Speed and Direction: NA

Water Visibility (ft): NA

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	NA	NA	NA
During sample collection	│	│	│
End of sample collection	│	│	│
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: took equip. blank away from ocean King. calm, overcast conditon's sample taken at 0645.

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB - REF

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 0745 Ended: (hh:mm) 0845

GPS: (WGS84) Lat. 32. 70409 Long. -117. 23199

Tide (ft): ↑ 2.25 ft Time of Slack High Tide: 1115

Water Depth (ft): 67 ft

Weather conditions: Calm, overcast, slightly misty

Wind (mph): <0.5 Time of CTD Cast: 0840

Current Speed and Direction: very calm conditions; glassy surface, slight current going NW.

Water Visibility (ft): 9 ft

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.81	33.5	19.1	7.11
During sample collection	7.85	33.5	19.4	7.04
End of sample collection	7.88	33.5	19.2	7.03
Average value	7.85	33.5	19.2	7.06

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Sample taken at 0815

organic debris at surface

wind picked up to 7.0 by end of station collection

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-6

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 0900

Ended: (hh:mm) 0950

GPS: (WGS84) Lat. 32.70877

Long. -117.23511

Tide (ft): ↑ 3.58 ft

Time of Slack High Tide: 1115

Water Depth (ft): 17' 6"

Weather conditions: overcast + misty

Wind (mph): 3.2

Time of CTD Cast: 0945

Current Speed and Direction: slight ripple in water, slight surface current moving out of harbor.

Water Visibility (ft): 9.0'

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.86	33.6	20.5	6.81
During sample collection	7.85	33.6	20.6	6.73
End of sample collection	7.86	33.6	20.5	6.73
Average value	7.86	33.6	20.5	6.76

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: sample taken at 0915
organic debris in water

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-5

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1000 Ended: (hh:mm) 1055

GPS: (WGS84) Lat. 32.71205 Long. -117.23297

Tide (ft): ↑ 4.59 ft Time of Slack High Tide: 1115

Water Depth (ft): 24'

Weather conditions: Overcast + misty

Wind (mph): 5.6 gusts of 8+ Time of CTD Cast: 1050

Current Speed and Direction: calm water, current moving slowly towards head of basin

Water Visibility (ft): 8'

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.87	33.6	20.7	6.92
During sample collection	7.88	33.6	20.7	6.99
End of sample collection	7.87	33.6	20.8	7.00
Average value	7.87	33.6	20.7	6.97

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: sample collected at 1015.
- off F-2

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-4

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1100

Ended: (hh:mm) 1155

GPS: (WGS84) Lat. 32.71657

Long. -117.23117

Tide (ft): 5.09 ↑

Time of Slack High Tide: 1115 (peak 5.10ft)

Water Depth (ft): 17'

Weather conditions: overcast + misty

Wind (mph): 5.8 w/ gusts up to 7.5

Time of CTD Cast: 1150

Current Speed and Direction: boat is being pushed SW

Water Visibility (ft): 8'

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.89	34.0	21.1	7.28
During sample collection	7.88	34.0	21.0	7.29
End of sample collection	7.89	34.0	21.0	7.29
Average value	7.89	34.0	21.0	7.29

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: sample collection at 1115

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-3

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1205 Ended: (hh:mm) 1240

GPS: (WGS84) Lat. 32.71554 Long. -117.22997

Tide (ft): ↓ 4.94 ft Time of Slack High Tide: 1115

Water Depth (ft): 21'6"

Weather conditions: overcast (clearing up),

Wind (mph): 7.4 Time of CTD Cast: 1235

Current Speed and Direction: stronger currents pushing vessel towards head

Water Visibility (ft): 7'6"

Time of Measurement	pH	Salinity (ppt)*	Temperature (°C)	DO
Upon arrival on station	7.88	34.0	20.9	7.29
During sample collection	7.89	34.0	21.0	7.30
End of sample collection	7.89	34.0	21.1	7.31
Average value	7.89	34.0	21.0	7.30

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: sample collected at $\boxed{1215}$

* CTD is reading 33.6

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB - 2

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1250 Ended: (hh:mm) 1405

GPS: (WGS84) Lat. 32. 71416 Long. -117. 22922

Tide (ft): ↓ 4.26 ft Time of Slack High Tide: 1115

Water Depth (ft): 15.0'

Weather conditions: windy, overcast, bright conditions

Wind (mph): 1.0 (blowing in adjacent channel Time of CTD Cast: 1400

Current Speed and Direction: calm at position (tied to dock)

Water Visibility (ft): 12'

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.89	34.0	20.9	7.34
During sample collection	7.88	34.0	21.0	7.37
End of sample collection	7.90	34.0	21.1	7.35
Average value	7.89	34.0	21.0	7.35

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Sample collected at 1315

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-1

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1410

Ended: (hh:mm) 1455

GPS: (WGS84) Lat. 32.71821

Long. -117.22603

Tide (ft): ↓ 3.26

Time of Slack High Tide: 1115

Water Depth (ft): 18'5"

Weather conditions: overcast, bright

Wind (mph): 8.0

Time of CTD Cast: 1450

Current Speed and Direction: slight current pushing south

Water Visibility (ft): 9'4"

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.88	34.0	21.4	7.40
During sample collection	7.89	34.1	21.4	7.38
End of sample collection	7.90	34.1	21.5	7.40
Average value	7.89	34.1	21.4	7.39

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: sample collected at 1415

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-1 (REP)

Date: (mm/dd/yyyy) 8/23/2019

Time Started: (hh:mm) 1455 Ended: (hh:mm) 1520

GPS: (WGS84) Lat. 32.71830 Long. -117.22598

Tide (ft): ↓ Time of Slack High Tide: 1115

Water Depth (ft): 17' 6"

Weather conditions: calm

Wind (mph): 7.0 Time of CTD Cast: 1515

Current Speed and Direction: slight current pushing south

Water Visibility (ft): 9' 0"

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)	DO
Upon arrival on station	7.90	34.1	21.5	7.40
During sample collection	7.90	34.1	21.4	7.44
End of sample collection	7.91	34.1	21.4	7.45
Average value	7.90	34.1	21.4	7.43

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Sample taken at 1455

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-FB

Date: (mm/dd/yyyy) 08/23/2017

Time Started: (hh:mm) 1525

Ended: (hh:mm) 1535

GPS: (WGS84) Lat. 32.71821 Long. -117.22601

Tide (ft): NA

Time of Slack High Tide: NA

Water Depth (ft): NA

Weather conditions: overcast

Wind (mph): NA

Time of CTD Cast: NA

Current Speed and Direction: NA

Water Visibility (ft): NA

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	NA	NA	NA
During sample collection	|	|	|
End of sample collection	|	|	|
Average value	|	|	|

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Sample collected at 1525.

WATER QUALITY RESULTS

2017 FIELD SAMPLING QA CHECKLIST

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: E R

Date/Time: 8/23/17 6:45

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (or tied off)	N/A
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded done on dock.	N/A
Tide recorded	NA
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	NA
Time of sampling recorded	Y
Water depth at sample site recorded	N/A
General site observations recorded	
Check for boat cleaning operations in the area – if active, move to a new station	N/A

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	N/A
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N/A
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	N/A
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	N/A
CTD profile cast completed after water samples bottles are collected and preserved.	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	N/A

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	NA
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: Ref **Date/Time:** 8/23/17

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Construction activity at SPAWAR pier

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB-6 **Date/Time:** 8/23/17
8:15

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (or [✓ tied off])	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion ______

4. Data Recording:

Field notes have been recorded for this site before moving to the next	✓
CTD profile saved as an individual file for each station	✓
Water samples properly logged on COC form	✓
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	✓
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	✓

Additional Notes:

Signature of QA/QC Personnel: Barry T. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB 5 **Date/Time:** 8/23/17 10:20*

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been [✓ anchored] (or tied off)	Y ~ 15 ft
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

* sample collection target time was 10:15. Anchoring on site took a little longer due to variable winds

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17
Kelly

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB 4 **Date/Time:** 8/23/17 1115

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N*
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

* Wind issues - could not anchor within ± 3m

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion ✓

4. Data Recording:

Field notes have been recorded for this site before moving to the next	✓
CTD profile saved as an individual file for each station	✓
Water samples properly logged on COC form	✓
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	✓
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	✓

Additional Notes:

Signature of QA/QC Personnel: **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB 3 **Date/Time:** 8/23/17
1215

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N *
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

* wind issues prevented anchoring within ±3 m

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

Kelly J. Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB2 **Date/Time:** 8/23/17
1:15 pm

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (or [✓ tied off])	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N*
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station **	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

* collected a regular location tied to dock

** hull cleaner showed up ~~when~~ after sample collection was complete. 42 meters to the East

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego,
8/23/17

Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB 1 **Date/Time:** 8/23/17
215

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed ~~after water~~ samples bottles are collected and preserved.	
Equipment rinsate blank and [✓ field blank] have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	Y

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/27/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego,
8/23/17

Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB 1 Rep. **Date/Time:** 8/23/17
1455
(2:55pm)

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	Y

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment	Y
Sampling depth recorded	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, ~~toxicity~~	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	Y
CTD profile cast completed after water samples bottles are collected and preserved.	Y
Equipment rinsate blank and [✓ field blank] have been collected (if applicable)	Y
[✓ Site replicate] (i.e., duplicate) collected (if applicable)	Y

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17
Kelly J Tait

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2017

FIELD SAMPLING QA CHECKLIST

Station Location: Field Blank **Date/Time:** 8/23/17 3:25pm

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	N/A
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	N/A
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, move to a new station	N/A

2. Sampling procedures:

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N/A
Sampling instrument given site water rinse prior to deployment	N/A
Sampling depth recorded	N/A
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Bottles filled in the following order: metals, DOC, TOC, TSS, toxicity	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 3 times: when arriving on station, while water samples are collected and again while sample bottles are being filled	N/A
CTD profile cast completed after water samples bottles are collected and preserved.	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	N/A

FIELD SAMPLING QA CHECKLIST

3. PPE properly removed and disposed of upon station completion Y

4. Data Recording:

Field notes have been recorded for this site before moving to the next	Y
CTD profile saved as an individual file for each station	Y
Water samples properly logged on COC form	Y
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J Snyder **Date/Time** 8/23/17

Print Name/Company: Amec Foster Wheeler

Reviewed and verified by Kelly Tait, Port of San Diego
8/23/17

Kelly

WATER QUALITY RESULTS

2017 SIYB TMDL
2017 TOXICITY TESTING RESULTS (NAUTILUS)

Nautilus Environmental

Toxicity Testing Results for the Shelter Island Yacht Basin Total Maximum Daily Load Monitoring Plan

Monitoring Period: August 2017

Prepared for:
Amec Foster Wheeler
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Prepared by:
Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120
(858) 587-7333

Report Submitted: October 3, 2017

Data Quality Assurance:

- Nautilus Environmental is accredited in accordance with NELAP by the State of Oregon Environmental Laboratory Accreditation Program (Certificate No. 4053). It is also certified by the State of California Water Resources Control Board Environmental Laboratory Accreditation Program (Certificate No. 1802) and the State of Washington Department of Ecology (Lab ID C552). Specific fields of testing applicable to each accreditation are available upon request. All data have been reviewed and verified.
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective EPA protocols, unless otherwise noted in this report.
- All test results have met internal Quality Assurance Program requirements.

Results verified by: Adrienne Cibor

Introduction

Ambient receiving water samples were collected in the Shelter Island Yacht Basin (SIYB), San Diego, California, in August 2017 to fulfill annual monitoring requirements for the SIYB Dissolved Copper Total Maximum Daily Load (TMDL) program. Samples were collected by Amec Foster Wheeler (AMEC) staff and delivered to the Nautilus laboratory for toxicity testing. Six samples were collected at previously monitored locations from the outer basin area nearest to the mouth of San Diego Bay (SIYB-6) inward toward the closed end of the yacht basin that receives the least amount of tidal flushing (SIYB-1). A reference sample (SIYB-REF) was also collected inside San Diego Bay, just outside of the SIYB. Samples were tested using a marine larval fish acute survival toxicity test and a bivalve larvae chronic survival and development test.

Materials and Methods

Sample Information

Client:	Amec Foster Wheeler/Port of San Diego
Sample ID (Sample Collection Date; Time):	1. SIYB-1 (8/23/17; 14:15) 2. SIYB-2 (8/23/17; 13:15) 3. SIYB-3 (8/23/17; 12:15) 4. SIYB-4 (8/23/17; 11:15) 5. SIYB-5 (8/23/17; 10:15) 6. SIYB-6 (8/23/17; 09:15) 7. SIYB-REF (8/23/17; 08:15)
Sample Receipt Date; Time:	8/23/17; 17:15
Sample Material (sample type):	Ambient Water (grab samples)

Bivalve Larvae Chronic Survival and Development Test Specifications

Test Period:	8/24/17; 16:00 – 8/26/17; 16:00
Test Organism:	*Mytilus galloprovincialis* (Mediterranean mussel)
Test Organism Source:	Mission Bay (San Diego, CA)
Control and Dilution Water:	Natural seawater from Scripps Institution of Oceanography inlet, 20 micron (μm)-filtered, 34 ± 2 parts per thousand (ppt). All replicates from each sample were randomized within in a single vial tray, each with its own separate lab control.
Additional Control:	A 0.45 μm-filtered method control was also tested (one filtered method control for all sites).
Test Concentrations:	100, 50, 25, 12.5 and 6.25 percent of each sample. A 100 percent sub-sample from each site was also tested after 0.45 μm filtration for the bivalve test to remove native algae that may interfere with test organisms.
Number of Organisms/Replicate:	~150 embryos
Number of Replicates/Concentration:	5
Test Temperature:	15 ± 1 degrees Celsius (°C)
Test Acceptability Criteria:	Lab control mean percent survival must be 50 percent, and 90 percent of surviving organisms must have normal shell development. The percent minimum significant difference (PMSD) in the test must be less than 25.
Concurrent Reference Toxicant Test:	Copper chloride
Protocol Used:	USEPA West Coast Manual, 1995 (EPA/600/R-95/136), ASTM 1998, PTI 1995

Pacific Topsmelt Acute Survival Test Specifications

Test Period:	8/24/17; 13:40 to 14:30 – 8/28/16; 13:40 to 14:05
Test Organism:	*Atherinops affinis* (Pacific topsmelt; 11 days old at test initiation)
Test Organism Source:	Aquatic BioSystems (Fort Collins, CO)
Control and Dilution Water:	Natural Seawater from Scripps Institution of Oceanography inlet, 20 μm-filtered, at 34 ± 2 ppt. Samples were arranged on multiple shelves within an environmental chamber, each shelf containing its own lab control.
Test Concentrations:	100, 33[a], and 25 percent sample
Number of Organisms/Replicate:	5
Number of Replicates/Concentration:	6
Test Temperature:	21 ± 1°C
Test Acceptability Criterion:	Mean survival in the laboratory control must be ≥ 90 percent
Concurrent Reference Toxicant Test:	Copper chloride
Protocol Used:	USEPA Acute Manual, 2002 (EPA/821/R-02/012)

[a] The middle concentration tested for topsmelt was supposed to be 50 percent, but 33 percent was test (see QA section).

The mussel test was scored by counting all larvae in each test vial using an inverted compound microscope under 100x magnification; each larva was scored as normal or abnormal, and the total number of larvae is compared to the initial density to calculate survival. Mussels exhibiting normal 48-hour development are D-shaped prodissoconch I larvae with clearly defined edges. Embryos and larvae that exhibited an effect, had developmental patterns differing from those in control replicates, or did not reach the straight hinge D-shape stage at test termination were counted as abnormal.

An additional metric was added to the SIYB monitoring Quality Assurance Project Plan (QAPP) (AMEC 2017) in order to provide information regarding the magnitude of effect in the development endpoint for the mussel test. If observed in the samples as in previous years, curve-hinged bivalve larvae are to be enumerated. Therefore, there were three development categories enumerated for 2017: (1) fully developed shell with a straight-hinge D-shape, (2) partially developed larvae with a concave or curved hinge, and (3) larvae that fail to develop a shell or display severe morphological defects. For data analysis and reporting purposes, if observed, larvae with curved hinges are reported in the abnormal category. A separate table has been included in the report, which summarizes the proportion of larvae in all three categories. Example photographs were taken by laboratory staff of the three types of larvae during the counting process.

Toxicity test responses were evaluated statistically using the Comprehensive Environmental Toxicity Information System™ (CETIS) software by Tidepool Scientific according to flowchart specifications provided in method guidance (USEPA 1995 and 2002). Organism performance in each sample was compared to that observed in concurrent laboratory control exposures. The filtration control was compared to the SIYB-1 lab control to ensure no adverse effects were observed due to the filtration procedure itself. A No Observed Effect Concentration (NOEC), Lowest Observed Effect Concentration (LOEC), median effect concentration (EC_{50}), and percent effect relative to the lab control were calculated for all samples.

Additionally, data were analyzed using the Test of Significant Toxicity (TST) t-test approach specified in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (USEPA 2010). The TST applies a modified t-test that takes into account both the statistical power of the test and magnitude of biological effects in determining the presence of a response; results are reported as "Pass" if a sample is considered non-toxic according to the TST calculation, or "Fail" if considered toxic according to TST. If the mean response in the sample was equal to or greater than that in the lab control, the TST analysis was not performed, and results are reported as "Pass".

Results and Discussion

Raw test data and statistical analyses for both species can be found in Appendix A. Sample receipt information is provided in Appendix B, and a copy of the chain-of-custody form is in Appendix C.

Bivalve Larvae Chronic Survival and Development Test

Results of the mussel larvae survival and development test indicated there were no statistically significant differences in the majority of the SIYB samples (Figure 1). Samples were tested unmanipulated and serially diluted per method directions. In addition, an aliquot of each undiluted (i.e., 100 percent only) sample was tested after filtration through a 0.45-μm nylon filter for comparison purposes, as described in the 2017 QAPP for this monitoring event. This step was performed due to interference from native organisms and potentially harmful algae, a confounding factor identified in previous years. Statistical results for the mussel tests are summarized in Table 1, and mean test results are summarized in Table 2.

There was an adverse effect observed in the undiluted SIYB-1 and SIYB-2 samples for the combined survival and development endpoint (Figures 1 through 3; Tables 1 and 2). Normal development was reduced in both the SIYB-1 and SIYB-2 undiluted samples compared to the lab control. The effects observed in SIYB-1 were statistically significant using both the traditional EPA flow-chart statistical approach and the TST analysis for the undiluted sample. The undiluted, unfiltered SIYB-1 sample resulted in 42 percent mean combined development, a 56 percent effect from the associated lab control. A similar, but reduced effect was also observed in the 0.45-μm filtered SIYB-1 sample (34 percent effect relative to the control). A 25 percent effect in the combined development rate was found to be statistically significant in the SIYB-2 100 percent sample according to both the EPA flow-chart statistical method, and the TST. However, the undiluted 0.45-μm filtered SIYB-2 sample resulted in a 9.6 percent effect, which was significant using EPA 1995 flowchart statistics, but not according to the TST. A toxicity identification evaluation (TIE) test would need to be conducted to determine the cause of toxicity in the SIYB-1 and SIYB-2 samples.

Approximately 1 to 3.5 percent of the total number of larvae in the undiluted, unfiltered SIYB-1 through SIYB-3 samples were partially developed, but did not possess a straight hinge (Table 3); this response was not observed in any of the control replicates. The fraction of embryos with curved hinges was generally observed in the highest concentrations, with a single larva present in the lower concentrations of SIYB-1 and SIYB-2 and one in the SIYB-4 and SIYB-6 100 percent filtered samples exhibiting this effect. The proportion of curved hinges observed in the samples overall is reduced compared to the previous year. There were no curved hinges observed in any test concentrations of the SIYB-5 or SIYB-REF sites. Additionally, there were no statistically significant effects detected in any of the test concentrations for the SIYB-3, SIYB-4, SIYB-5, SIYB-6, or SIYB-REF samples with regard to the combined development rate endpoint in the bivalve test.

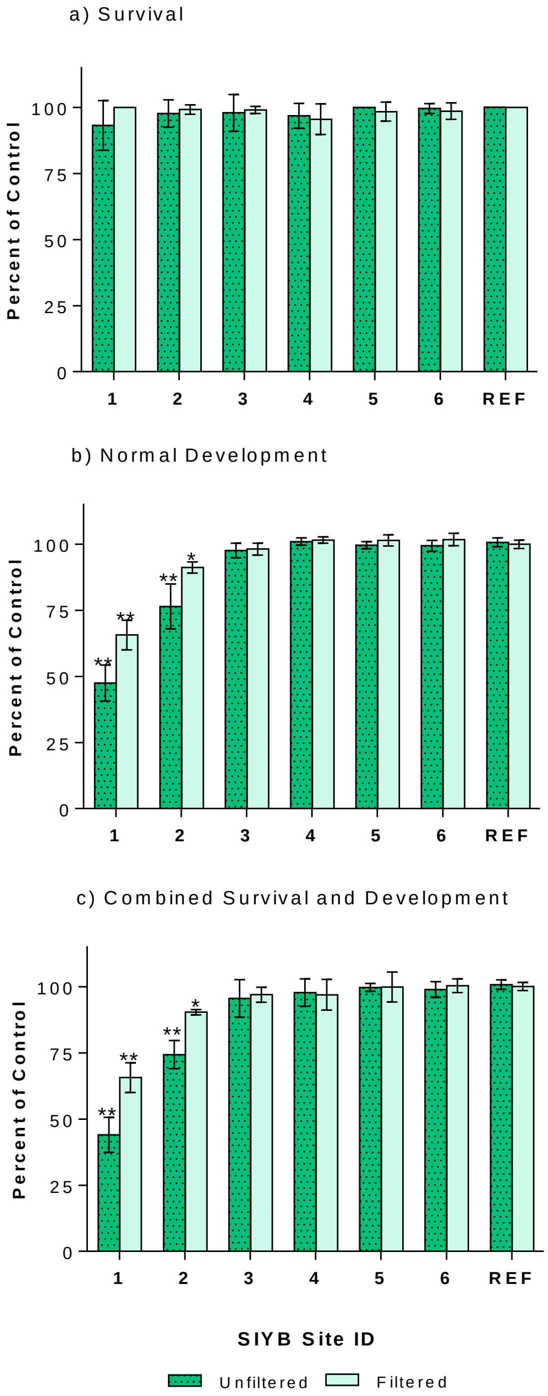
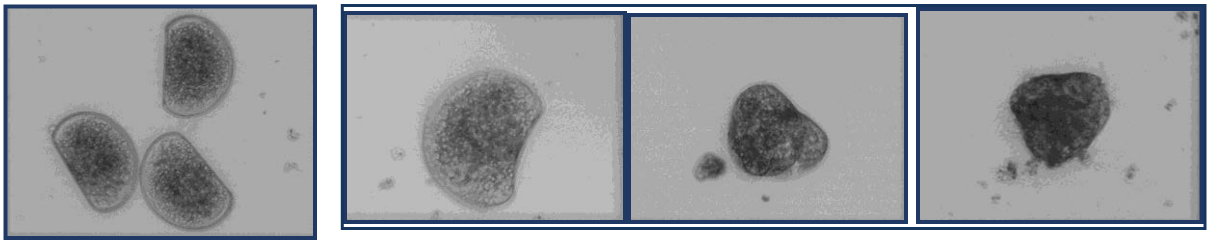


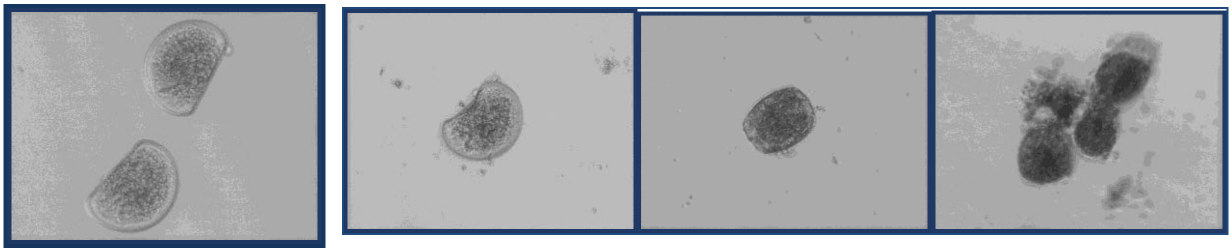
Figure 1. Results of the 48-hour larval bivalve survival and development test for each undiluted sample, a) survival, b) normal development, c) combined survival and normal development; presented as the mean result (± one standard deviation) normalized to the control. Note: all three endpoints are displayed separately here for additional information, but only the combined endpoint is used for NOEC/LOEC determination and TST pass/fail calculations. A single asterisk (*) indicates a significant decrease compared to control using the traditional EPA flow chart statistical methods, a double asterisk (**) indicates a significant decrease with both EPA flow chart methods and the TST.



a) Lab Control

b) SIYB-1

Figure 2. Examples of a) normal mussel larvae development in the lab control, and b) varying degrees of abnormal development observed in the SIYB-1 sample. Note: 2 percent of the larvae counted as abnormal in the unfiltered SIYB-1 sample had curved hinges (see Table 3); the remaining larvae (approx. 52 percent of total) counted as abnormal had severe abnormalities.



a) Lab Control

b) SIYB-2

Figure 3. Examples of a) normal mussel larvae development in the lab control, and b) varying degrees of abnormal development observed in the SIYB-2 sample. Note: 2 percent of the larvae counted as abnormal in the unfiltered SIYB-2 sample had curved hinges (see Table 3); the remaining larvae (approx. 34 percent of total) counted as abnormal had severe abnormalities.

Table 1. Statistical Results Summary - Bivalve 48-hr Combined Survival and Development

Sample ID		NOEC (% sample)	EC_{50} (% sample)	TU_c value	TST (Pass/Fail)	Percent Effect
SIYB-1	Unfiltered	50	94.7	2.0	Fail	56
	Filtered	< 100	> 100	>1.0	Fail	34
SIYB-2	Unfiltered	50	> 100	2.0	Fail	25
	Filtered	< 100	> 100	>1.0	Pass	10
SIYB-3	Unfiltered	100	> 100	1.0	Pass	4.4
	Filtered	100	> 100	1.0	Pass	0.84
SIYB-4	Unfiltered	100	> 100	1.0	Pass	2.3
	Filtered	100	> 100	1.0	Pass	4.7
SIYB-5	Unfiltered	100	> 100	1.0	Pass	0.27
	Filtered	100	> 100	1.0	Pass	2.4
SIYB-6	Unfiltered	100	> 100	1.0	Pass	1.0
	Filtered	100	> 100	1.0	Pass	2.1
SIYB-REF	Unfiltered	100	> 100	1.0	Pass	-0.79
	Filtered	100	> 100	1.0	Pass	0.61

NOEC: the highest concentration tested resulting in no observed effect

EC_{50}: concentration expected to cause an adverse effect to 50 percent of the organisms

TU_c: (Chronic Toxic Unit) = 100 ÷ NOEC. A TU_c value of 1.0 indicates no toxicity.

TST: Pass = sample is non-toxic according to the TST analysis; Fail = sample is toxic according to the TST analysis

Percent effect (PE) from control is calculated as: PE= ((mean response in control-mean response in undiluted sample)/mean response in control) *100. A negative PE results when organism performance in the sample is greater than that in the control.

Table 2. Bivalve 48-hr Development Test Detailed Summary

Test Concentration (% sample)	Mean Combined Survival and Normal Development (%)						
	Sample ID						
	SIYB-1	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6	SIYB-REF
Lab Control	95.0	96.0	93.2	96.9	97.5	97.7	96.0
6.25	95.2	95.2	96.9	93.7	93.7	95.4	94.5
12.5	95.4	95.3	95.5	96.3	94.9	96.2	94.8
25	96.8	96.6	95.9	90.6	93.9	94.2	95.5
50	96.9	95.9	97.0	98.1	95.5	94.8	94.7
100	**41.9****	**71.4****	89.1	94.7	97.2	96.7	96.7
Filter Control	95.2	95.2	95.2	95.2	95.2	95.2	95.2
100 (filtered)	**62.6****	**86.1***	92.4	92.3	95.2	95.6	95.4

* A single bold asterisk indicates a statistically significant decrease compared to the lab control using the traditional EPA flow-chart statistical methods, but no effect with TST.

** Two bold asterisks indicate a statistically significant decrease compared to the lab control using both the traditional EPA flow-chart statistical methods and the TST analysis.

Table 3. Bivalve 48-hr Development Summary of Percentage of Curved Hinges

Test Concentration (% sample)	Mean Number of Curved Hinges (%)						
	Sample ID						
	SIYB-1	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6	SIYB-REF
Lab Control	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Filter Control	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.25	0.11	0.11	0.0	0.0	0.0	0.0	0.0
12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.36	0.0	0.0	0.0	0.0	0.0	0.0
100	1.9	1.9	3.3	0.29	0.0	0.0	0.0
100 (filtered)	2.7	3.5	1.1	0.0	0.0	0.12	0.0

Note: percentage curved expressed as percent of total number counted.

Pacific Topsmelt Acute Survival Test

There were no statistically significant effects to Pacific topsmelt in any of the samples tested. Statistical results for the topsmelt tests are summarized in Table 4, and mean test results are summarized in Table 5.

Table 4. Statistical Results Summary – Pacific Topsmelt 96-hour Survival

Sample ID	NOEC (% sample)	LC_{50} (% sample)	TU_a value	TST (Pass/Fail)
SIYB-1	100	> 100	0.49	Pass
SIYB-2	100	> 100	0.49	Pass
SIYB-3	100	> 100	0.0	Pass
SIYB-4	100	> 100	0.49	Pass
SIYB-5	100	> 100	0.49	Pass
SIYB-6	100	> 100	0.31	Pass
SIYB-REF	100	> 100	0.31	Pass

NOEC: the highest Concentration tested resulting in No Observed Effect

LC_{50}: concentration expected to cause a lethal effect to 50 percent of the organisms

TU_a: (Acute Toxic Unit) = 100 ÷ LC_{50}; or Log (100 - %survival) ÷ 1.7, if LC_{50} is >100%. TU_a = 0 if 100% survival in the undiluted sample

TST: Pass = sample is non-toxic according to the TST analysis; Fail = sample is toxic according to the TST analysis

Table 5. Pacific Topsmelt 96-hr Acute Survival Test Detailed Summary

Test Concentration (% sample)	Mean Survival (%)						
	Sample ID						
	SIYB-1	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6	SIYB-REF
Lab Control	96.7	96.7	96.7	93.3	93.3	96.7	96.7
25	96.7	96.7	100	96.7	100	96.7	96.7
50	100	96.7	96.7	100	93.3	96.7	96.7
100	93.3	93.3	100	93.3	93.3	96.7	96.7

Quality Assurance

All SIYB samples were received in good condition on the same day as collected. The samples were delivered on ice and received in the laboratory within the appropriate temperature range. All tests were initiated within the 36-hour holding time requirement. The controls for each test met the minimum test acceptability criteria as set by US EPA and ASTM, as well as internal QA Program requirements. Additionally, based on the dose responses observed during testing, the calculated effect concentration for each effluent test reported is deemed reliable.

The series of sample concentrations for the Pacific topsmelt test was designed to be 25, 50 and 100 percent sample. However, due to an error in dilution making on the day of test initiation, the 50 percent dilution was actually prepared as 33 percent. The error was identified 24 hours into the test, and after consultation with the AMEC QA officer, the decision was made to continue the test at the 33 percent concentration as no effects in the undiluted sample were apparent. There were no statistically significant effects to topsmelt survival in any of the undiluted samples at 96 hours; therefore, so this error did not impact the calculation of acute toxic units.

The reference toxicant test results for both species are summarized in Table 6 and presented in full in Appendix D. The controls for both reference toxicant tests met the minimum test acceptability criteria. The calculated EC_{50} values for both reference toxicant tests fell within two standard deviations (SD) of the laboratory historical mean, indicating that the test organisms used during this round of testing were of typical sensitivity to copper. Any minor QA/QC issues that were not likely to have any bearing on the test results, such as slight temperature deviations, are noted on the data sheets, and a list of data qualifier codes is available in Appendix E.

Table 6. Reference Toxicant Test Results

Species & Endpoint	EC_{50}/LC_{50} (µg/L copper)	Historical Mean ±2 SD (µg/L copper)	CV (%)
Bivalve: Combined Survival and Development	7.47	8.58 ± 4.62	26.9
Pacific Topsmelt: 96-hr Survival	141	104 ± 60.4	28.9

EC_{50}/LC_{50}: concentration expected to cause an adverse or lethal effect to 50 percent of the test organisms

Historical Mean = the mean EC_{50} or LC_{50} value for previous reference toxicant tests performed by the laboratory, plus or minus two standard deviations

References

AMEC. 2017. Final Quality Assurance Project Plan for Shelter Island Yacht Basin Total Maximum Daily Load Monitoring Plan. August 2017.

ASTM. 1998. Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Four Species of Saltwater Bivalve Molluscs. ASTM E 724 – 98.

PTI Environmental Services for USEPA Region 10, Office of Puget Sound. Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments. July 1995.

Tidepool Scientific Software. 2000-2013. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.8.7.20.

US EPA. 1995. Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA/600/R-95/136). Office of Research and Development, Washington DC. US EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition (EPA/821/R-02/012). Office of Water, Washington DC.

USEPA. 2010. National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document. EPA/833/R-10/003. June 2010.

Appendix A

Test Data and Statistical Analyses

Bivalve Survival and Development Test

Site: SIYB-1

CETIS Summary Report

Report Date: 03 Oct-17 12:39 (p 1 of 4)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	12-2452-1254	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	06-4536-9335	**Code:**	17-0932	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 14:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	26h (8 °C)	**Station:**	SIYB-1		

Batch Note: 101= 100 percent sample filtered to 0.45um

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-2893-1455	Combined Development Ra	50	100	70.71	4.58%	2	Dunnett Multiple Comparison Test
13-3098-4926	Development Rate	50	100	70.71	4.61%	2	Dunnett Multiple Comparison Test
18-0015-8104	Survival Rate	100	>100	NA	2.88%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
11-4446-9095	Combined Development Ra	EC25	72.34	69.52	75.91	1.382	Linear Interpolation (ICPIN)
		EC50	94.68	89.17	101.9	1.056	
19-6851-5795	Development Rate	EC25	73.61	69.78	76.89	1.359	Linear Interpolation (ICPIN)
		EC50	97.22	89.85	N/A	1.029	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-3098-4926	Development Rate	Control Resp	0.9497	0.9 - NL	Yes	Passes Acceptability Criteria
19-6851-5795	Development Rate	Control Resp	0.9497	0.9 - NL	Yes	Passes Acceptability Criteria
18-0015-8104	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
09-2893-1455	Combined Development Ra	PMSD	0.04578	NL - 0.25	No	Passes Acceptability Criteria

Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9497	0.9202	0.9792	0.9091	0.9675	0.01062	0.02375	2.5%	0.28%
6.25		5	0.9523	0.9444	0.9601	0.9454	0.9578	0.002833	0.006334	0.67%	0.01%
12.5		5	0.9542	0.9261	0.9822	0.9289	0.9895	0.0101	0.02259	2.37%	-0.2%
25		5	0.9684	0.9362	1	0.9249	0.9947	0.01161	0.02596	2.68%	-1.69%
50		5	0.969	0.9467	0.9912	0.9565	1	0.008007	0.0179	1.85%	-1.75%
100		5	0.4188	0.3408	0.4967	0.3439	0.5027	0.02806	0.06275	14.98%	56.03%
101		5	0.6255	0.5589	0.692	0.5535	0.6839	0.02397	0.05359	8.57%	34.32%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9497	0.9202	0.9792	0.9091	0.9675	0.01062	0.02375	2.5%	0.28%
6.25		5	0.9523	0.9444	0.9601	0.9454	0.9578	0.002833	0.006334	0.67%	0.01%
12.5		5	0.9542	0.9261	0.9822	0.9289	0.9895	0.0101	0.02259	2.37%	-0.2%
25		5	0.9684	0.9362	1	0.9249	0.9947	0.01161	0.02596	2.68%	-1.69%
50		5	0.969	0.9467	0.9912	0.9565	1	0.008007	0.0179	1.85%	-1.75%
100		5	0.4515	0.3715	0.5315	0.3439	0.5027	0.02881	0.06442	14.27%	52.59%
101		5	0.6255	0.5589	0.692	0.5535	0.6839	0.02397	0.05359	8.57%	34.32%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0	Lab Control	5	1	1	1	1	1	0	0	0.0%	0.0%
6.25		5	1	1	1	1	1	0	0	0.0%	0.0%
12.5		5	1	1	1	1	1	0	0	0.0%	0.0%
25		5	1	1	1	1	1	0	0	0.0%	0.0%
50		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0.9315	0.8137	1	0.8082	1	0.04244	0.09491	10.19%	6.85%
101		5	1	1	1	1	1	0	0	0.0%	0.0%

Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.9675	0.9091	0.9661	0.9533	0.9524
6.25		0.9578	0.9565	0.9563	0.9454	0.9454
12.5		0.9289	0.9418	0.9565	0.9542	0.9895
25		0.9249	0.9947	0.9763	0.9742	0.9721
50		0.9585	0.9565	0.9682	0.9615	1
100		0.4595	0.3439	0.5027	0.3836	0.4041
101		0.5868	0.6478	0.6554	0.6839	0.5535

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.9675	0.9091	0.9661	0.9533	0.9524
6.25		0.9578	0.9565	0.9563	0.9454	0.9454
12.5		0.9289	0.9418	0.9565	0.9542	0.9895
25		0.9249	0.9947	0.9763	0.9742	0.9721
50		0.9585	0.9565	0.9682	0.9615	1
100		0.4595	0.3439	0.5027	0.4516	0.5
101		0.5868	0.6478	0.6554	0.6839	0.5535

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	1	1	1	1	1
0	Lab Control	1	1	1	1	1
6.25		1	1	1	1	1
12.5		1	1	1	1	1
25		1	1	1	1	1
50		1	1	1	1	1
100		1	1	1	0.8493	0.8082
101		1	1	1	1	1

Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	149/154	170/187	171/177	143/150	180/189
6.25		159/166	154/161	153/160	173/183	173/183
12.5		183/197	178/189	176/184	146/153	188/190
25		160/173	187/188	165/169	151/155	174/179
50		185/193	154/161	152/157	150/156	166/166
100		68/148	54/157	94/187	56/146	59/146
101		98/167	103/159	97/148	119/174	88/159

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	149/154	170/187	171/177	143/150	180/189
6.25		159/166	154/161	153/160	173/183	173/183
12.5		183/197	178/189	176/184	146/153	188/190
25		160/173	187/188	165/169	151/155	174/179
50		185/193	154/161	152/157	150/156	166/166
100		68/148	54/157	94/187	56/124	59/118
101		98/167	103/159	97/148	119/174	88/159

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	146/146	146/146	146/146	146/146	146/146
0	Lab Control	146/146	146/146	146/146	146/146	146/146
6.25		146/146	146/146	146/146	146/146	146/146
12.5		146/146	146/146	146/146	146/146	146/146
25		146/146	146/146	146/146	146/146	146/146
50		146/146	146/146	146/146	146/146	146/146
100		146/146	146/146	146/146	124/146	118/146
101		146/146	146/146	146/146	146/146	146/146

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:39 (p 1 of 6)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	09-2893-1455	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:38	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.58%	50	100	70.71	2

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.05755	2.362	0.089	8	0.8498	CDF	Non-Significant Effect
		12.5	-0.3626	2.362	0.089	8	0.9185	CDF	Non-Significant Effect
		25	-1.462	2.362	0.089	8	0.9958	CDF	Non-Significant Effect
		50	-1.481	2.362	0.089	8	0.9960	CDF	Non-Significant Effect
		100*	17.09	2.362	0.089	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.89086	0.3781719	5	106.1	<0.0001	Significant Effect
Error	0.08556408	0.00356517	24			
Total	1.976424		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.668	15.09	0.1755	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9604	0.9031	0.3168	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
6.25		5	0.9523	0.9444	0.9601	0.9563	0.9454	0.9578	0.002833	0.67%	-0.27%
12.5		5	0.9542	0.9261	0.9822	0.9542	0.9289	0.9895	0.0101	2.37%	-0.47%
25		5	0.9684	0.9362	1	0.9742	0.9249	0.9947	0.01161	2.68%	-1.97%
50		5	0.969	0.9467	0.9912	0.9615	0.9565	1	0.008007	1.85%	-2.03%
100		5	0.4188	0.3408	0.4967	0.4041	0.3439	0.5027	0.02806	14.98%	55.91%

Angular (Corrected) Transformed Summary

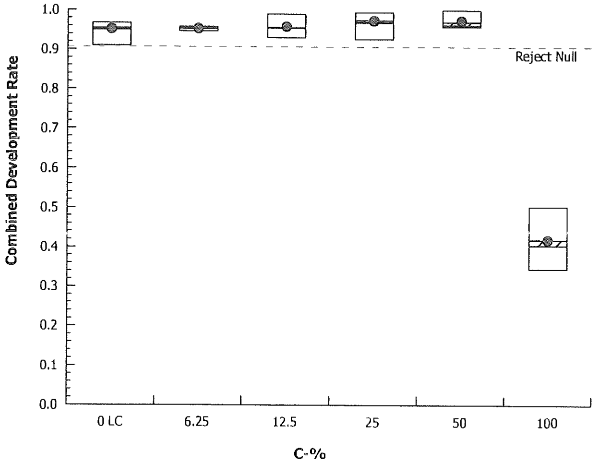
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
6.25		5	1.351	1.333	1.369	1.36	1.335	1.364	0.006585	1.09%	-0.16%
12.5		5	1.362	1.283	1.442	1.355	1.301	1.468	0.02849	4.68%	-1.02%
25		5	1.404	1.313	1.494	1.409	1.293	1.498	0.03262	5.2%	-4.09%
50		5	1.405	1.315	1.494	1.373	1.361	1.532	0.03225	5.13%	-4.15%
100		5	0.7033	0.6242	0.7824	0.6889	0.6267	0.7881	0.0285	9.06%	47.86%

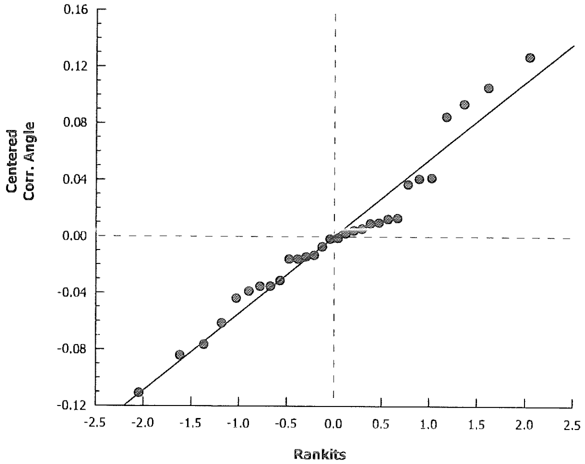
Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 09-2893-1455 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:38 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: AC QA: 9 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:39 (p 3 of 6)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 13-3098-4926 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:38 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.61%	50	100	70.71	2

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.05723	2.362	0.09	8	0.8497	CDF	Non-Significant Effect
		12.5	-0.3606	2.362	0.09	8	0.9181	CDF	Non-Significant Effect
		25	-1.454	2.362	0.09	8	0.9957	CDF	Non-Significant Effect
		50	-1.473	2.362	0.09	8	0.9959	CDF	Non-Significant Effect
		100*	16.13	2.362	0.09	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.710337	0.3420675	5	94.91	<0.0001	Significant Effect
Error	0.08650156	0.003604232	24			
Total	1.796839		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.702	15.09	0.1735	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9552	0.9031	0.2331	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
6.25		5	0.9523	0.9444	0.9601	0.9563	0.9454	0.9578	0.002833	0.67%	-0.27%
12.5		5	0.9542	0.9261	0.9822	0.9542	0.9289	0.9895	0.0101	2.37%	-0.47%
25		5	0.9684	0.9362	1	0.9742	0.9249	0.9947	0.01161	2.68%	-1.97%
50		5	0.969	0.9467	0.9912	0.9615	0.9565	1	0.008007	1.85%	-2.03%
100		5	0.4515	0.3715	0.5315	0.4595	0.3439	0.5027	0.02881	14.27%	52.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
6.25		5	1.351	1.333	1.369	1.36	1.335	1.364	0.006585	1.09%	-0.16%
12.5		5	1.362	1.283	1.442	1.355	1.301	1.468	0.02849	4.68%	-1.02%
25		5	1.404	1.313	1.494	1.409	1.293	1.498	0.03262	5.2%	-4.09%
50		5	1.405	1.315	1.494	1.373	1.361	1.532	0.03225	5.13%	-4.15%
100		5	0.7364	0.655	0.8177	0.7448	0.6267	0.7881	0.02931	8.9%	45.4%

Analyst: AC QA: S10/3/17

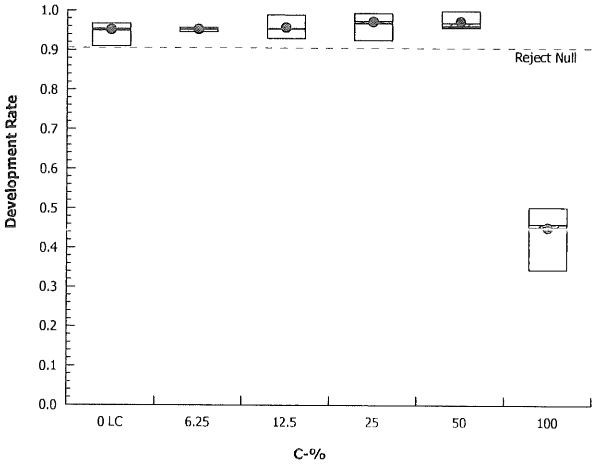
CETIS Analytical Report

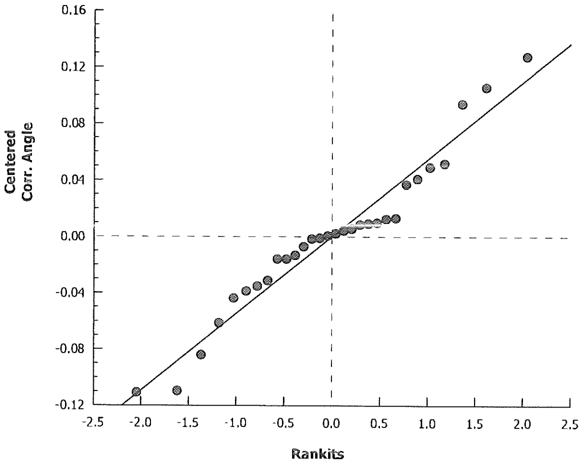
Report Date: 03 Oct-17 12:39 (p 4 of 6)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test
Nautilus Environmental (CA)

Analysis ID: 13-3098-4926
Analyzed: 03 Oct-17 12:38
Endpoint: Development Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics





Analyst: AC QA: 10/13/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	18-0015-8104	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:38	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.88%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		12.5	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		50	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		100	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09860269	0.01972054	5	2.644	0.0485	Significant Effect
Error	0.1789773	0.007457389	24			
Total	0.27758		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.97	4.248	0.0398	Equal Variances
Variances	Levene Equality of Variance	79.32	3.895	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5631	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	1	1	1	1	1	1	0	0.0%	0.0%
12.5		5	1	1	1	1	1	1	0	0.0%	0.0%
25		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.9315	0.8137	1	1	0.8082	1	0.04244	10.19%	6.85%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
100		5	1.376	1.113	1.638	1.529	1.118	1.529	0.0946	15.38%	10.06%

Analyst: AC QA: 10/3/17

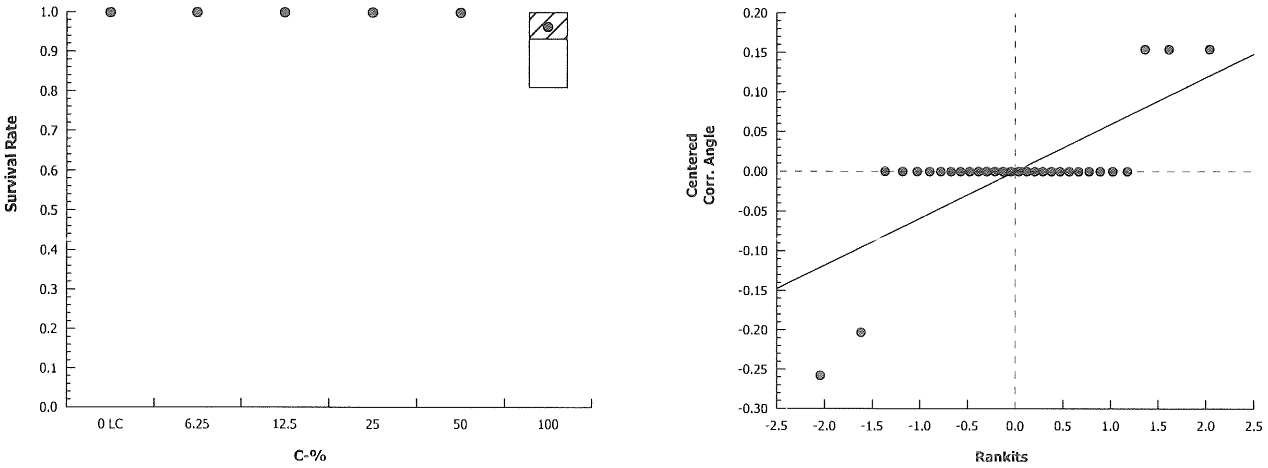
CETIS Analytical Report

Report Date:	03 Oct-17 12:39 (p 6 of 6)
Test Code:	1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	18-0015-8104	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:38	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics



Analyst: AC QA: 6/10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:39 (p 1 of 2)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	11-4446-9095	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:38	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	703014	1000	Yes	Two-Point Interpolation

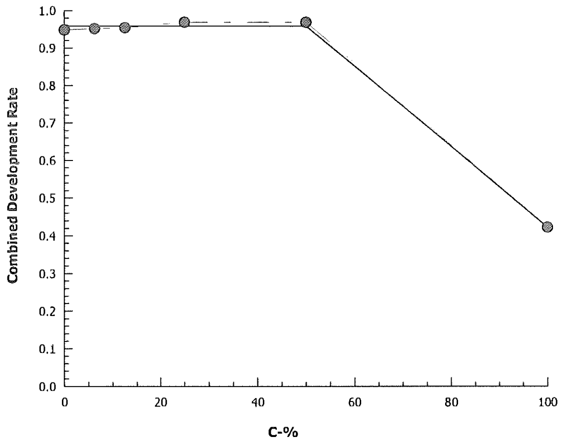
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	72.34	69.52	75.91	1.382	1.317	1.438
EC50	94.68	89.17	101.9	1.056	0.9811	1.121

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9497	0.9091	0.9675	0.01062	0.02375	2.5%	0.0%	813	857
6.25		5	0.9523	0.9454	0.9578	0.002833	0.006335	0.67%	-0.27%	812	853
12.5		5	0.9542	0.9289	0.9895	0.0101	0.02259	2.37%	-0.47%	871	913
25		5	0.9684	0.9249	0.9947	0.01161	0.02597	2.68%	-1.97%	837	864
50		5	0.969	0.9565	1	0.008007	0.0179	1.85%	-2.03%	807	833
100		5	0.4188	0.3439	0.5027	0.02806	0.06275	14.98%	55.91%	331	784

Graphics



Analyst: AC QA: 10/13/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	19-6851-5795	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1242739	1000	Yes	Two-Point Interpolation

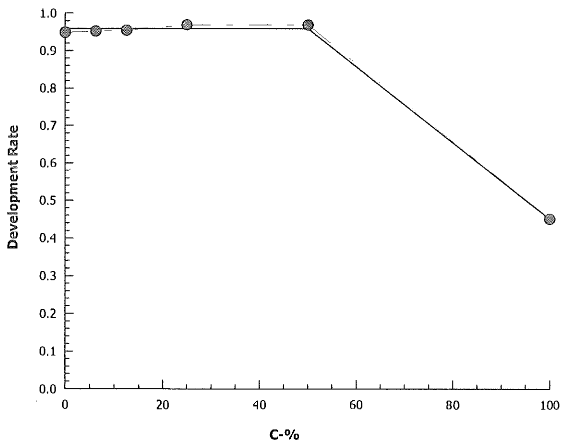
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	73.61	69.78	76.89	1.359	1.301	1.433
EC50	97.22	89.85	N/A	1.029	NA	1.113

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9497	0.9091	0.9675	0.01062	0.02375	2.5%	0.0%	813	857
6.25		5	0.9523	0.9454	0.9578	0.002833	0.006335	0.67%	-0.27%	812	853
12.5		5	0.9542	0.9289	0.9895	0.0101	0.02259	2.37%	-0.47%	871	913
25		5	0.9684	0.9249	0.9947	0.01161	0.02597	2.68%	-1.97%	837	864
50		5	0.969	0.9565	1	0.008007	0.0179	1.85%	-2.03%	807	833
100		5	0.4515	0.3439	0.5027	0.02881	0.06442	14.27%	52.45%	331	734

Graphics



Analyst: AC QA: S 10/3/17

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:40 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 02-9553-7603 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:39 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	2.68%	50	100	70.71	2

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	18.72	2.015	0.037	5	<0.0001	CDF	Non-Significant Effect
		12.5*	10.59	1.943	0.064	6	<0.0001	CDF	Non-Significant Effect
		25*	10.68	1.943	0.071	6	<0.0001	CDF	Non-Significant Effect
		50*	10.8	1.943	0.071	6	<0.0001	CDF	Non-Significant Effect
		100	-8.134	1.943	0.066	6	0.9999	CDF	Significant Effect
		101	-3.296	1.895	0.057	7	0.9934	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.250412	0.3750687	6	106.4	<0.0001	Significant Effect
Error	0.09872697	0.003525963	28			
Total	2.349139		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.757	16.81	0.2565	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9744	0.9146	0.5738	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
6.25		5	0.9523	0.9444	0.9601	0.9563	0.9454	0.9578	0.002833	0.67%	-0.27%
12.5		5	0.9542	0.9261	0.9822	0.9542	0.9289	0.9895	0.0101	2.37%	-0.47%
25		5	0.9684	0.9362	1	0.9742	0.9249	0.9947	0.01161	2.68%	-1.97%
50		5	0.969	0.9467	0.9912	0.9615	0.9565	1	0.008007	1.85%	-2.03%
100		5	0.4515	0.3715	0.5315	0.4595	0.3439	0.5027	0.02881	14.27%	52.45%
101		5	0.6255	0.5589	0.692	0.6478	0.5535	0.6839	0.02397	8.57%	34.14%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
6.25		5	1.351	1.333	1.369	1.36	1.335	1.364	0.006585	1.09%	-0.16%
12.5		5	1.362	1.283	1.442	1.355	1.301	1.468	0.02849	4.68%	-1.02%
25		5	1.404	1.313	1.494	1.409	1.293	1.498	0.03262	5.2%	-4.09%
50		5	1.405	1.315	1.494	1.373	1.361	1.532	0.03225	5.13%	-4.15%
100		5	0.7364	0.655	0.8177	0.7448	0.6267	0.7881	0.02931	8.9%	45.4%
101		5	0.9128	0.8442	0.9815	0.9354	0.839	0.9737	0.02472	6.06%	32.32%

Analyst: AC QA: SW 10/3/17

CETIS Analytical Report

TST

Report Date:	03 Oct-17 12:40 (p 1 of 1)
Test Code:	1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	05-6045-3969	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:39	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	2.68%	50	100	70.71	2

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	18.72	2.015	0.037	5	<0.0001	CDF	Non-Significant Effect
		12.5*	10.59	1.943	0.064	6	<0.0001	CDF	Non-Significant Effect
		25*	10.68	1.943	0.071	6	<0.0001	CDF	Non-Significant Effect
		50*	10.8	1.943	0.071	6	<0.0001	CDF	Non-Significant Effect
		100	-9.306	1.943	0.064	6	1.0000	CDF	Significant Effect
		101	-3.296	1.895	0.057	7	0.9934	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.414275	0.4023792	6	115.2	<0.0001	Significant Effect
Error	0.0977895	0.003492482	28			
Total	2.512065		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.718	16.81	0.2595	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.978	0.9146	0.6933	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
6.25		5	0.9523	0.9444	0.9601	0.9563	0.9454	0.9578	0.002833	0.67%	-0.27%
12.5		5	0.9542	0.9261	0.9822	0.9542	0.9289	0.9895	0.0101	2.37%	-0.47%
25		5	0.9684	0.9362	1	0.9742	0.9249	0.9947	0.01161	2.68%	-1.97%
50		5	0.969	0.9467	0.9912	0.9615	0.9565	1	0.008007	1.85%	-2.03%
100		5	0.4188	0.3408	0.4967	0.4041	0.3439	0.5027	0.02806	14.98%	55.91%
101		5	0.6255	0.5589	0.692	0.6478	0.5535	0.6839	0.02397	8.57%	34.14%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
6.25		5	1.351	1.333	1.369	1.36	1.335	1.364	0.006585	1.09%	-0.16%
12.5		5	1.362	1.283	1.442	1.355	1.301	1.468	0.02849	4.68%	-1.02%
25		5	1.404	1.313	1.494	1.409	1.293	1.498	0.03262	5.2%	-4.09%
50		5	1.405	1.315	1.494	1.373	1.361	1.532	0.03225	5.13%	-4.15%
100		5	0.7033	0.6242	0.7824	0.6889	0.6267	0.7881	0.0285	9.06%	47.86%
101		5	0.9128	0.8442	0.9815	0.9354	0.839	0.9737	0.02472	6.06%	32.32%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:40 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 12-7132-1326 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:40 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.98%	Fails combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	13.03	1.86	0.062	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4749839	0.4749839	1	169.8	<0.0001	Significant Effect
Error	0.02237312	0.002796639	8			
Total	0.497357		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.205	23.15	0.8611	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8981	0.7411	0.2088	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
101		5	0.6255	0.5589	0.692	0.6478	0.5535	0.6839	0.02397	8.57%	34.14%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
101		5	0.9128	0.8442	0.9815	0.9354	0.839	0.9737	0.02472	6.06%	32.32%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:40 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	02-4480-2352	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:40	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.98%	Fails development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	13.03	1.86	0.062	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4749839	0.4749839	1	169.8	<0.0001	Significant Effect
Error	0.02237312	0.002796639	8			
Total	0.497357		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.205	23.15	0.8611	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8981	0.7411	0.2088	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9497	0.9202	0.9792	0.9533	0.9091	0.9675	0.01062	2.5%	0.0%
101		5	0.6255	0.5589	0.692	0.6478	0.5535	0.6839	0.02397	8.57%	34.14%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.349	1.286	1.411	1.353	1.265	1.39	0.02253	3.73%	0.0%
101		5	0.9128	0.8442	0.9815	0.9354	0.839	0.9737	0.02472	6.06%	32.32%

Analyst: AC QA: 10/3/17

Embryo Larval Bioassay **48-hour Development**

Client: AMEC/POSD

Sample ID: SIYB-1

Test ID: 1708-S188

Test Species: *M. galloprovincialis*

Start Date/Time: 8/24/2017 1600

End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
31	59	Ⓐ ~~0~~ 5	54	~~113~~ 118 Ⓐ	RL / 8/28/17
32	160	0	13	173	
33	166	0	0	166	
34	152	0	5	157	
35	159	0	7	166	Ⓑ ↓
36	Ⓑ ~~104~~ 103	Ⓑ ~~0~~ 5	Ⓑ ~~66~~ 51	~~175~~ Ⓑ ~~158~~ 159	Q18 RL 8/28/17
37	97	3	48	148	RL 8/29/17
38	173	1	9	183	
39	54	3	100	157	
40	171	0	6	Ⓑ ~~176~~ 177	
41	173	0	10	183	
42	146	0	7	153	
43	88	6	65	159	
44	185	1	7	193	
45	176	0	8	184	
46	185	0	6	191	
47	56	1	67	124	
48	187	0	1	188	
49	178	0	11	189	
50	183	0	14	197	↓
51	154	0	7	161	8/30/17
52	153	0	7	160	
53	98	7	62	167	
54	187	0	6	193	
55	151	0	4	155	
56	68	2	78	148	
57	176	0	8	184	
58	143	0	7	150	
59	189	0	9	198	
60	119	1	54	174	
61	149	0	5	154	
62	180	0	9	189	
63	170	0	17	187	
64	150	1	5	156	
65	154	1	6	161	
66	174	0	5	179	
67	188	0	2	190	
68	147	0	14	161	
69	94	2	81	187	
70	165	0	4	169	

Comments: Ⓐ Q18 RL 8/29/17 Ⓑ Q18 10/2/17

QC Check: AC 8/30/17

Final Review: 10/2/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:00 (p 1 of 1)
Test Code: 12-4185-0887/1708-S188

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17-0932
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-1

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	FC	1	68			154	140	AC 8/27/17
0	FC	2	57					
0	FC	3	46					
0	FC	4	59					
0	FC	5	54					
0	LC	1	61					
0	LC	2	63					
0	LC	3	40					
0	LC	4	58					
0	LC	5	62					
6.25		1	35					
6.25		2	51					
6.25		3	52					
6.25		4	41					
6.25		5	38					
12.5		1	50					
12.5		2	49					
12.5		3	45					
12.5		4	42					
12.5		5	67					
25		1	32					
25		2	48					
25		3	70					
25		4	55					
25		5	66					
50		1	44					
50		2	65					
50		3	34					
50		4	64					
50		5	33					
100		1	56			150	78	
100		2	39					
100		3	69					
100		4	47					
100		5	31					
101		1	53			165	ⓑ ~~75~~ 122	
101		2	36					
101 ⓐ		3	37					
101		4	60					
101		5	43					

100% filtered

ⓐ Q18 AC 8/21/17
ⓑ Q18 AC 8/30/17

Analyst: AC QA: [illegible] 10/12/17

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-1
Sample Log No.: 17- 0932
Test No.: 1708-S 188

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 1600
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.7	33.0	33.3	15.2	14.9	14.6	8.4	7.8	8.1	8.03	8.05	8.03
6.25	33.8	33.4	33.6	15.2	14.6	14.3	8.3	8.0	8.1	8.01	8.03	8.01
12.5	33.8	33.4	33.6	15.2	14.7	14.3	8.2	7.9	8.1	8.02	8.03	8.00
25	34.0	33.6	33.7	15.2	14.7	14.3	8.2	7.7	8.0	8.01	8.03	8.00
50	33.9	33.6	33.8	15.3	14.7	14.3	8.1	7.9	8.0	8.03	8.03	8.00
100	34.1	33.8	33.9	15.3	14.6	14.3	8.2	7.8	8.0	8.02	8.03	7.99
100 filtered	34.1	33.5	33.8	15.0	14.8	14.3	7.5	76	8.0	8.02	8.01	8.00
ØS AC 8/24/17 ~~Filter control~~												

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: ET 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: Filtration Method Control
Sample Log No.: @ ~~17-~~ N/A
Test Nos.: 1708-S188 to S194

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Filter Control	33.7	33.3	33.3	15.4	14.9	14.3	6.7	7.7	7.9	8.04	8.02	7.99

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG		

Comments:
0 hrs: @ Q18 AC 8/27/17
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: VO 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD-SIYB-1
Test No.: 1708-S188
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, lar Mus
Female 2	2	Good density, ~~white~~ pale orange Ⓐ color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	143	143	100	
TØ D	134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: Ⓐ CH Q18 8/24/17 $\bar{X}$ dividing = 146

QC Check: AC 8/27/17

Final Review: 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-2

CETIS Summary Report

Report Date: 03 Oct-17 12:48 (p 1 of 4)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	09-9185-6649	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	06-5506-1865	**Code:**	17-0933	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 13:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	27h (2.5 °C)	**Station:**	SIYB-2		

Batch Note: 101= 100 percent sample filtered to 0.45um

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-3595-0874	Combined Development Ra	50	100	70.71	2.66%	2	Dunnett Multiple Comparison Test
15-1745-7741	Development Rate	50	100	70.71	3.51%	2	Dunnett Multiple Comparison Test
09-0332-5706	Survival Rate	100	>100	NA	1.62%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
11-1754-6520	Combined Development Ra	EC25	98.41	88.24	N/A	1.016	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
19-5191-4942	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-1745-7741	Development Rate	Control Resp	0.9603	0.9 - NL	Yes	Passes Acceptability Criteria
19-5191-4942	Development Rate	Control Resp	0.9603	0.9 - NL	Yes	Passes Acceptability Criteria
09-0332-5706	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
19-3595-0874	Combined Development Ra	PMSD	0.02662	NL - 0.25	No	Passes Acceptability Criteria

Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9603	0.9467	0.9739	0.9467	0.9737	0.004906	0.01097	1.14%	-0.84%
6.25		5	0.9523	0.9405	0.9641	0.9452	0.9673	0.00425	0.009504	1.0%	0.0%
12.5		5	0.9526	0.9359	0.9694	0.9394	0.9742	0.006025	0.01347	1.41%	-0.03%
25		5	0.9663	0.9499	0.9827	0.9448	0.9809	0.005921	0.01324	1.37%	-1.47%
50		5	0.9585	0.9328	0.9841	0.9231	0.9748	0.009228	0.02063	2.15%	-0.64%
100		5	0.7142	0.6488	0.7797	0.6541	0.7718	0.02357	0.05269	7.38%	25.0%
101		5	0.8607	0.8488	0.8726	0.8447	0.8701	0.004276	0.009562	1.11%	9.62%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9603	0.9467	0.9739	0.9467	0.9737	0.004906	0.01097	1.14%	-0.84%
6.25		5	0.955	0.944	0.9659	0.9463	0.9673	0.00395	0.008832	0.92%	-0.28%
12.5		5	0.9526	0.9359	0.9694	0.9394	0.9742	0.006025	0.01347	1.41%	-0.03%
25		5	0.9663	0.9499	0.9827	0.9448	0.9809	0.005921	0.01324	1.37%	-1.47%
50		5	0.9585	0.9328	0.9841	0.9231	0.9748	0.009228	0.02063	2.15%	-0.64%
100		5	0.7341	0.6325	0.8357	0.6541	0.8527	0.03659	0.08182	11.15%	22.92%
101		5	0.8681	0.843	0.8932	0.8447	0.9	0.009031	0.02019	2.33%	8.84%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0	Lab Control	5	1	1	1	1	1	0	0	0.0%	0.0%
6.25		5	0.9973	0.9897	1	0.9863	1	0.00274	0.006126	0.61%	0.27%
12.5		5	1	1	1	1	1	0	0	0.0%	0.0%
25		5	1	1	1	1	1	0	0	0.0%	0.0%
50		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0.9767	0.9121	1	0.8836	1	0.02329	0.05207	5.33%	2.33%
101		5	0.9918	0.969	1	0.9589	1	0.008219	0.01838	1.85%	0.82%

Analyst: AC QA: 10/5/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.953	0.96	0.9683	0.9737	0.9467
6.25		0.9563	0.9463	0.9452	0.9673	0.9465
12.5		0.9742	0.9394	0.9435	0.9536	0.9524
25		0.9711	0.9809	0.9673	0.9674	0.9448
50		0.9588	0.9231	0.9699	0.9657	0.9748
100		0.7534	0.6541	0.7718	0.7273	0.6646
101		0.8701	0.8609	0.863	0.8647	0.8447

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.953	0.96	0.9683	0.9737	0.9467
6.25		0.9563	0.9463	0.9583	0.9673	0.9465
12.5		0.9742	0.9394	0.9435	0.9536	0.9524
25		0.9711	0.9809	0.9673	0.9674	0.9448
50		0.9588	0.9231	0.9699	0.9657	0.9748
100		0.8527	0.6541	0.7718	0.7273	0.6646
101		0.8701	0.8609	0.9	0.8647	0.8447

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	1	1	1	1	1
0	Lab Control	1	1	1	1	1
6.25		1	1	0.9863	1	1
12.5		1	1	1	1	1
25		1	1	1	1	1
50		1	1	1	1	1
100		0.8836	1	1	1	1
101		1	1	0.9589	1	1

Analyst: AC QA: 3 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	142/149	168/175	183/189	185/190	142/150
6.25		197/206	141/149	138/146	148/153	177/187
12.5		189/194	155/165	167/177	144/151	140/147
25		168/173	154/157	148/153	178/184	154/163
50		163/170	144/156	161/166	197/204	155/159
100		110/146	104/159	115/149	128/176	105/158
101		134/154	130/151	126/146	147/170	136/161

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	142/149	168/175	183/189	185/190	142/150
6.25		197/206	141/149	138/144	148/153	177/187
12.5		189/194	155/165	167/177	144/151	140/147
25		168/173	154/157	148/153	178/184	154/163
50		163/170	144/156	161/166	197/204	155/159
100		110/129	104/159	115/149	128/176	105/158
101		134/154	130/151	126/140	147/170	136/161

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	146/146	146/146	146/146	146/146	146/146
0	Lab Control	146/146	146/146	146/146	146/146	146/146
6.25		146/146	146/146	144/146	146/146	146/146
12.5		146/146	146/146	146/146	146/146	146/146
25		146/146	146/146	146/146	146/146	146/146
50		146/146	146/146	146/146	146/146	146/146
100		129/146	146/146	146/146	146/146	146/146
101		146/146	146/146	140/146	146/146	146/146

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:47 (p 1 of 6)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	19-3595-0874	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.66%	50	100	70.71	2

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.8037	2.362	0.059	8	0.5093	CDF	Non-Significant Effect
		12.5	0.7331	2.362	0.059	8	0.5418	CDF	Non-Significant Effect
		25	-0.6765	2.362	0.059	8	0.9608	CDF	Non-Significant Effect
		50	0.08328	2.362	0.059	8	0.8075	CDF	Non-Significant Effect
		100*	14.49	2.362	0.059	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.5416111	0.1083222	5	68.77	<0.0001	Significant Effect
Error	0.03780413	0.001575172	24			
Total	0.5794153		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.068	15.09	0.5397	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9769	0.9031	0.7384	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
6.25		5	0.9523	0.9405	0.9641	0.9465	0.9452	0.9673	0.00425	1.0%	0.83%
12.5		5	0.9526	0.9359	0.9694	0.9524	0.9394	0.9742	0.006025	1.41%	0.8%
25		5	0.9663	0.9499	0.9827	0.9674	0.9448	0.9809	0.00592	1.37%	-0.62%
50		5	0.9585	0.9328	0.9841	0.9657	0.9231	0.9748	0.009228	2.15%	0.19%
100		5	0.7142	0.6488	0.7797	0.7273	0.6541	0.7718	0.02357	7.38%	25.63%

Angular (Corrected) Transformed Summary

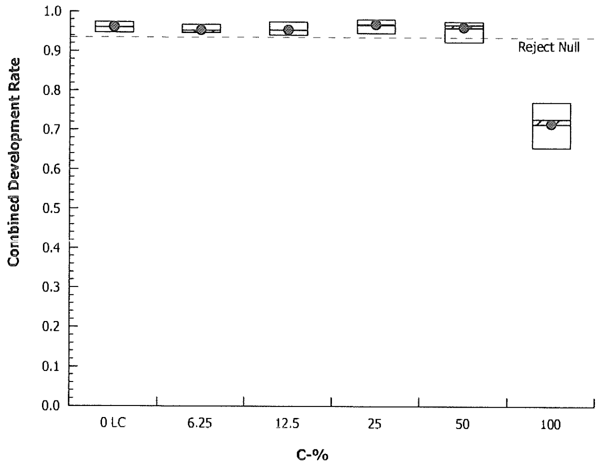
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
6.25		5	1.352	1.323	1.381	1.337	1.335	1.389	0.01044	1.73%	1.47%
12.5		5	1.353	1.311	1.396	1.351	1.322	1.41	0.01525	2.52%	1.34%
25		5	1.389	1.345	1.433	1.389	1.334	1.432	0.01589	2.56%	-1.24%
50		5	1.37	1.311	1.429	1.384	1.29	1.412	0.02131	3.48%	0.15%
100		5	1.008	0.9357	1.08	1.021	0.942	1.073	0.02608	5.79%	26.51%

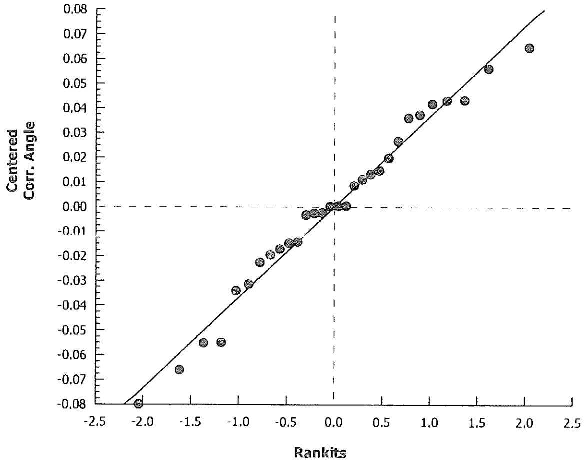
Analyst: AC QA: S10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 19-3595-0874 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:47 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	15-1745-7741	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.51%	50	100	70.71	2

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.4401	2.362	0.075	8	0.6727	CDF	Non-Significant Effect
		12.5	0.5771	2.362	0.075	8	0.6128	CDF	Non-Significant Effect
		25	-0.5326	2.362	0.075	8	0.9445	CDF	Non-Significant Effect
		50	0.06556	2.362	0.075	8	0.8132	CDF	Non-Significant Effect
		100*	10.62	2.362	0.075	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4716344	0.09432688	5	37.12	<0.0001	Significant Effect
Error	0.06099383	0.00254141	24			
Total	0.5326282		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.41	15.09	0.0439	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9351	0.9031	0.0670	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
6.25		5	0.955	0.944	0.9659	0.9563	0.9463	0.9673	0.00395	0.92%	0.56%
12.5		5	0.9526	0.9359	0.9694	0.9524	0.9394	0.9742	0.006025	1.41%	0.8%
25		5	0.9663	0.9499	0.9827	0.9674	0.9448	0.9809	0.00592	1.37%	-0.62%
50		5	0.9585	0.9328	0.9841	0.9657	0.9231	0.9748	0.009228	2.15%	0.19%
100		5	0.7341	0.6325	0.8357	0.7273	0.6541	0.8527	0.03659	11.15%	23.56%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
6.25		5	1.358	1.331	1.385	1.36	1.337	1.389	0.009708	1.6%	1.02%
12.5		5	1.353	1.311	1.396	1.351	1.322	1.41	0.01525	2.52%	1.34%
25		5	1.389	1.345	1.433	1.389	1.334	1.432	0.01589	2.56%	-1.24%
50		5	1.37	1.311	1.429	1.384	1.29	1.412	0.02131	3.48%	0.15%
100		5	1.033	0.9137	1.153	1.021	0.942	1.177	0.04306	9.32%	24.68%

Analyst: AC QA: J 10/30/17

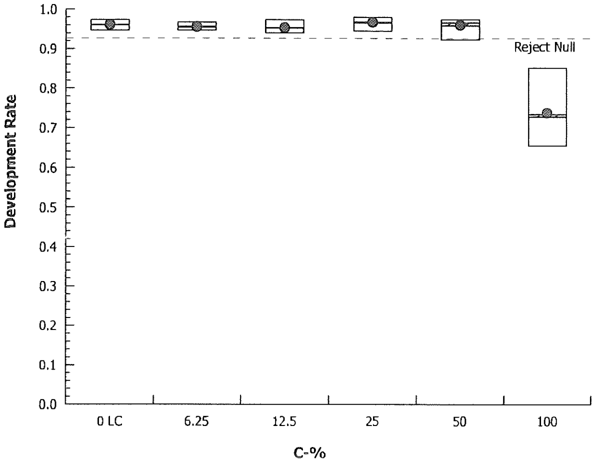
CETIS Analytical Report

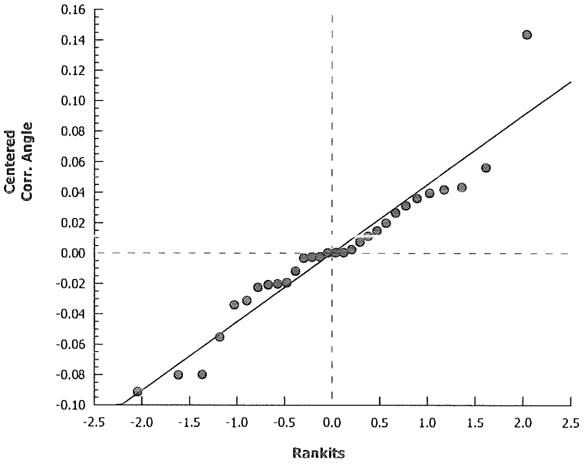
Report Date:	03 Oct-17 12:47 (p 4 of 6)
Test Code:	1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	15-1745-7741	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: S 10/3/17

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	09-0332-5706	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.62%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	25	16	1	8	0.6353	Asymp	Non-Significant Effect
		12.5	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		50	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		100	25	16	1	8	0.6353	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0150988	0.003019759	5	0.9067	0.4930	Non-Significant Effect
Error	0.07992836	0.003330348	24			
Total	0.09502716		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.9067	4.248	0.4983	Equal Variances
Variances	Levene Equality of Variance	6.448	3.895	0.0006	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5134	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	0.9973	0.9897	1	1	0.9863	1	0.00274	0.61%	0.27%
12.5		5	1	1	1	1	1	1	0	0.0%	0.0%
25		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.9767	0.9121	1	1	0.8836	1	0.02329	5.33%	2.33%

Angular (Corrected) Transformed Summary

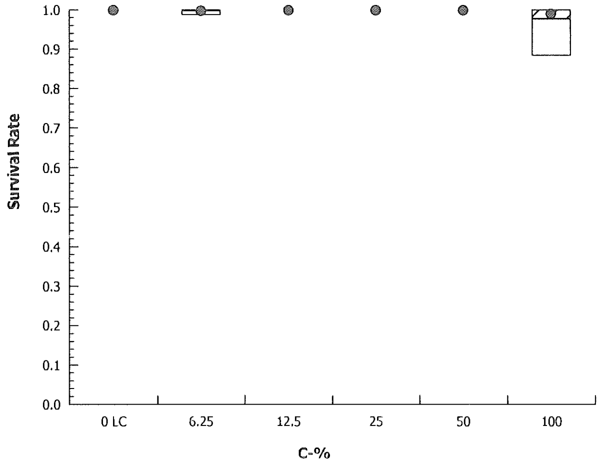
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.514	1.472	1.556	1.529	1.453	1.529	0.01518	2.24%	0.99%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
100		5	1.468	1.298	1.638	1.529	1.223	1.529	0.06137	9.35%	4.01%

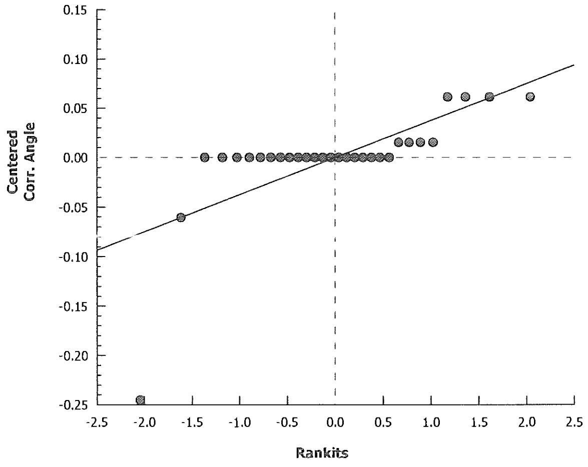
Analyst: AC QA:

Bivalve Larval Survival and Development Test			**Nautilus Environmental (CA)**

Analysis ID: 09-0332-5706	**Endpoint:**	Survival Rate		**CETIS Version:**	CETISv1.8.7
Analyzed: 03 Oct-17 12:47	**Analysis:**	Nonparametric-Control vs Treatments		**Official Results:**	Yes

Graphics





Analyst: AC QA: 10/13/17

CETIS Analytical Report

Report Date:	03 Oct-17 12:48 (p 1 of 2)
Test Code:	1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	11-1754-6520	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1306229	1000	Yes	Two-Point Interpolation

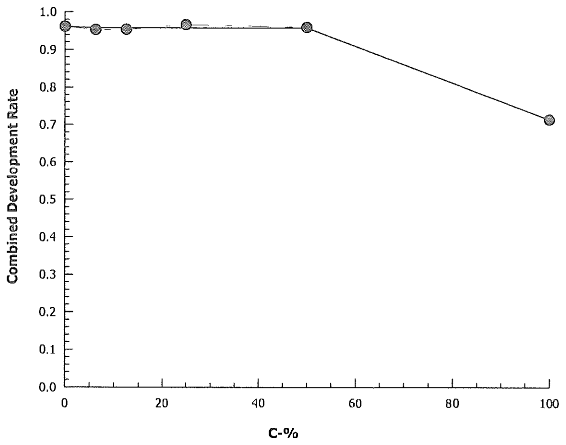
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	98.41	88.24	N/A	1.016	NA	1.133
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9603	0.9467	0.9737	0.004906	0.01097	1.14%	0.0%	820	853
6.25		5	0.9523	0.9452	0.9673	0.00425	0.009504	1.0%	0.83%	801	841
12.5		5	0.9526	0.9394	0.9742	0.006025	0.01347	1.41%	0.8%	795	834
25		5	0.9663	0.9448	0.9809	0.00592	0.01324	1.37%	-0.62%	802	830
50		5	0.9585	0.9231	0.9748	0.009228	0.02063	2.15%	0.19%	820	855
100		5	0.7142	0.6541	0.7718	0.02357	0.05269	7.38%	25.63%	562	788

Graphics



Analyst: AC QA: 2-10/13/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:48 (p 2 of 2)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	19-5191-4942	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:47	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	677208	1000	Yes	Two-Point Interpolation

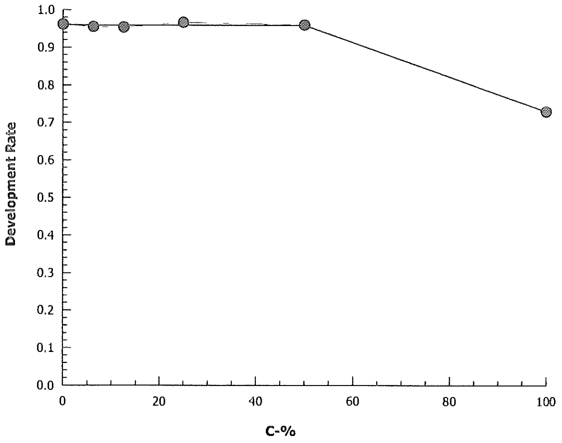
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9603	0.9467	0.9737	0.004906	0.01097	1.14%	0.0%	820	853
6.25		5	0.955	0.9463	0.9673	0.00395	0.008831	0.92%	0.56%	801	839
12.5		5	0.9526	0.9394	0.9742	0.006025	0.01347	1.41%	0.8%	795	834
25		5	0.9663	0.9448	0.9809	0.00592	0.01324	1.37%	-0.62%	802	830
50		5	0.9585	0.9231	0.9748	0.009228	0.02063	2.15%	0.19%	820	855
100		5	0.7341	0.6541	0.8527	0.03659	0.08182	11.15%	23.56%	562	771

Graphics



Analyst: AC QA: 9/10BM

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:49 (p 1 of 1)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	02-7056-0792	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:48	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	0.87%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	22.81	1.895	0.027	7	<0.0001	CDF	Non-Significant Effect
		12.5*	18.04	1.943	0.035	6	<0.0001	CDF	Non-Significant Effect
		25*	19.42	1.943	0.036	6	<0.0001	CDF	Non-Significant Effect
		50*	14.6	2.015	0.047	5	<0.0001	CDF	Non-Significant Effect
		100	-0.7482	2.015	0.056	5	0.7560	CDF	Significant Effect
		101*	14.09	1.943	0.022	6	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6020707	0.1003451	6	72.89	<0.0001	Significant Effect
Error	0.03854876	0.001376742	28			
Total	0.6406195		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.432	16.81	0.2081	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9762	0.9146	0.6319	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
6.25		5	0.9523	0.9405	0.9641	0.9465	0.9452	0.9673	0.00425	1.0%	0.83%
12.5		5	0.9526	0.9359	0.9694	0.9524	0.9394	0.9742	0.006025	1.41%	0.8%
25		5	0.9663	0.9499	0.9827	0.9674	0.9448	0.9809	0.00592	1.37%	-0.62%
50		5	0.9585	0.9328	0.9841	0.9657	0.9231	0.9748	0.009228	2.15%	0.19%
100		5	0.7142	0.6488	0.7797	0.7273	0.6541	0.7718	0.02357	7.38%	25.63%
101		5	0.8607	0.8488	0.8726	0.863	0.8447	0.8701	0.004277	1.11%	10.37%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
6.25		5	1.352	1.323	1.381	1.337	1.335	1.389	0.01044	1.73%	1.47%
12.5		5	1.353	1.311	1.396	1.351	1.322	1.41	0.01525	2.52%	1.34%
25		5	1.389	1.345	1.433	1.389	1.334	1.432	0.01589	2.56%	-1.24%
50		5	1.37	1.311	1.429	1.384	1.29	1.412	0.02131	3.48%	0.15%
100		5	1.008	0.9357	1.08	1.021	0.942	1.073	0.02608	5.79%	26.51%
101		5	1.188	1.172	1.205	1.192	1.166	1.202	0.006102	1.15%	13.37%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:49 (p 1 of 1)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	14-2534-4818	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:48	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.31%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	24.16	1.895	0.026	7	<0.0001	CDF	Non-Significant Effect
		12.5*	18.04	1.943	0.035	6	<0.0001	CDF	Non-Significant Effect
		25*	19.42	1.943	0.036	6	<0.0001	CDF	Non-Significant Effect
		50*	14.6	2.015	0.047	5	<0.0001	CDF	Non-Significant Effect
		100	0.09912	2.132	0.094	4	0.4629	CDF	Significant Effect
		101*	10.25	1.895	0.032	7	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.5258873	0.08764787	6	37.91	<0.0001	Significant Effect
Error	0.06474001	0.002312143	28			
Total	0.5906273		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.66	16.81	0.0488	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9366	0.9146	0.0442	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
6.25		5	0.955	0.944	0.9659	0.9563	0.9463	0.9673	0.00395	0.92%	0.56%
12.5		5	0.9526	0.9359	0.9694	0.9524	0.9394	0.9742	0.006025	1.41%	0.8%
25		5	0.9663	0.9499	0.9827	0.9674	0.9448	0.9809	0.00592	1.37%	-0.62%
50		5	0.9585	0.9328	0.9841	0.9657	0.9231	0.9748	0.009228	2.15%	0.19%
100		5	0.7341	0.6325	0.8357	0.7273	0.6541	0.8527	0.03659	11.15%	23.56%
101		5	0.8681	0.843	0.8932	0.8647	0.8447	0.9	0.009031	2.33%	9.6%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
6.25		5	1.358	1.331	1.385	1.36	1.337	1.389	0.009708	1.6%	1.02%
12.5		5	1.353	1.311	1.396	1.351	1.322	1.41	0.01525	2.52%	1.34%
25		5	1.389	1.345	1.433	1.389	1.334	1.432	0.01589	2.56%	-1.24%
50		5	1.37	1.311	1.429	1.384	1.29	1.412	0.02131	3.48%	0.15%
100		5	1.033	0.9137	1.153	1.021	0.942	1.177	0.04306	9.32%	24.68%
101		5	1.2	1.162	1.238	1.194	1.166	1.249	0.01369	2.55%	12.53%

Analyst: AC QA: [illegible] 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:49 (p 1 of 1)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 04-5304-5090 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:49 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.46%	Fails development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	9.196	1.86	0.035	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.07384486	0.07384486	1	84.57	<0.0001	Significant Effect
Error	0.006985294	0.0008731617	8			
Total	0.08083015		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.157	23.15	0.8913	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.941	0.7411	0.5642	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
101		5	0.8681	0.843	0.8932	0.8647	0.8447	0.9	0.009031	2.33%	9.6%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
101		5	1.2	1.162	1.238	1.194	1.166	1.249	0.01369	2.55%	12.53%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:50 (p 1 of 1)
Test Code: 1708-S189 | 07-1722-0186

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 18-3398-8816 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:49 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.06%	Fails combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	12.99	1.86	0.026	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08403651	0.08403651	1	168.8	<0.0001	Significant Effect
Error	0.003983749	0.0004979686	8			
Total	0.08802026		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.35	23.15	0.1835	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9785	0.7411	0.9569	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9603	0.9467	0.9739	0.96	0.9467	0.9737	0.004906	1.14%	0.0%
101		5	0.8607	0.8488	0.8726	0.863	0.8447	0.8701	0.004277	1.11%	10.37%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.372	1.336	1.407	1.369	1.338	1.408	0.01273	2.07%	0.0%
101		5	1.188	1.172	1.205	1.192	1.166	1.202	0.006102	1.15%	13.37%

Analyst: AC QA: J 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 13:32 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID:	08-7514-8055	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 13:32	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	0.3824	NA			<0.05		Non-Significant Effect
		12.5*	0.3824	NA			<0.05		Non-Significant Effect
		25*	0.3824	NA			<0.05		Non-Significant Effect
		50*	0.3824	NA			<0.05		Non-Significant Effect
		100*	2.416	2.132	0.202	4	0.0366	CDF	Non-Significant Effect
		101*	0.3824	2.132		4	<0.05	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1014199	0.01690332	6	2.644	0.0369	Significant Effect
Error	0.1789773	0.006392047	28			
Total	0.2803972		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.97	3.812	0.0293	Equal Variances
Variances	Levene Equality of Variance	79.32	3.528	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5188	0.9146	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	1	1	1	1	1	1	0	0.0%	0.0%
12.5		5	1	1	1	1	1	1	0	0.0%	0.0%
25		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.9315	0.8137	1	1	0.8082	1	0.04244	10.19%	6.85%
101		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
100		5	1.376	1.113	1.638	1.529	1.118	1.529	0.0946	15.38%	10.06%
101		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%

Analyst: AC QA: 9 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 13:32 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID: 16-8680-1507
Analyzed: 03 Oct-17 13:32
Endpoint: Survival Rate
Analysis: Nonparametric-Control vs Treatments
CETIS Version: CETISv1.8.7
Official Results: Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.88%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		12.5	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		50	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		100	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09860269	0.01972054	5	2.644	0.0485	Significant Effect
Error	0.1789773	0.007457389	24			
Total	0.27758		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.97	4.248	0.0398	Equal Variances
Variances	Levene Equality of Variance	79.32	3.895	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5631	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	1	1	1	1	1	1	0	0.0%	0.0%
12.5		5	1	1	1	1	1	1	0	0.0%	0.0%
25		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.9315	0.8137	1	1	0.8082	1	0.04244	10.19%	6.85%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
100		5	1.376	1.113	1.638	1.529	1.118	1.529	0.0946	15.38%	10.06%

Analyst: AC QA: Z 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 13:33 (p 1 of 1)
Test Code: 1708-S188 | 12-4185-0887

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 06-3515-4261 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 13:33 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Angular (Corrected)	NA	C > T	NA	NA	Passes survival rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	27.5	NA	1	8	1.0000	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	65540	<0.0001	Significant Effect
Error	0	0	8			
Total	0		9			

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
101		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
101		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%

Analyst: AC QA: S 10/3/17

Embryo Larval Bioassay **48-hour Development**

Client: AMEC/POSD
Test Species: *M. galloprovincialis*
Sample ID: SIYB-2
Start Date/Time: 8/24/2017 1600
Test ID: 1708-S189
End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
71	104	1	54	159	RL 8/28/17
72	141	0	8	149	
73	163	0	7	170	
74	154	0	9	163	
75	138	0	6	144	
76	130	10	11	151	
77	142	0	8	150	
78	154	0	3	157	
79	144	0	7	151	
80	155	0	4	159	
81	144	0	12	156	
82	168	0	7	Ⓐ ~~176~~ 175	
83	115	2	32	149	
84	161	0	5	166	
85	167	0	10	177	
86	105	3	50	158	
87	147	7	16	170	
88	185	0	5	190	
89	197	0	9	206	
90	148	0	5	153	
91	134	1	19	154	
92	136	3	22	161	
93	183	0	6	189	
94	155	0	10	165	
95	178	0	6	184	
96	142	0	7	149	
97	189	0	5	194	
98	128	4	44	176	
99	126	6	8	140	
100	168	0	5	173	
101	140	0	7	147	
102	177	1	9	187	
103	148	0	5	153	
104	197	0	7	204	
105	110	4	15	129	

Comments: Ⓐ Q188 10/2/17

QC Check: A2 10/2/17

Final Review: 10/2/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:02 (p 1 of 1)
Test Code: 07-1722-0186/1708-S189

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17- 0933
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-2

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	96					
0	LC	2	82					
0	LC	3	93					
0	LC	4	88					
0	LC	5	77					
6.25		1	89					
6.25		2	72					
6.25		3	75					
6.25		4	103					
6.25		5	102					
12.5		1	97					
12.5		2	94					
12.5		3	85					
12.5		4	79					
12.5		5	101					
25		1	100					
25		2	78					
25		3	90					
25		4	95					
25		5	74					
50		1	73					
50		2	81					
50		3	84					
50		4	104					
50		5	80					
100		1	105			130	112	AC 8/27/17
100		2	71					
100		3	83					
100		4	98					
100		5	86					
~~101~~		1	91					
~~101~~		2	76					
~~101~~ @		3	99					
~~101~~		4	87					
~~101~~		5	92					

100% filtered

AC 1.5

@C18 AC 8/21/17

000-089-187-4 CETIS™ v1.8.7.20 Analyst: AC QA: 10/2/17

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-2
Sample Log No.: 17- 0933
Test No.: 1708-S189

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.8	33.5	33.5	15.3	15.0	14.6	8.4	7.9	8.0	8.08	8.05	8.01
6.25	33.8	33.7	33.7	14.7	14.6	14.5	8.3	7.8	8.0	8.02	8.02	8.00
12.5	33.8	33.7	33.8	14.5	14.6	14.5	8.3	7.8	8.0	8.03	8.03	8.00
25	33.9	33.6	33.7	14.8	14.6	14.5	8.2	7.9	8.0	8.02	8.03	7.99
50	33.8	33.7	33.7	14.8	14.5	14.5	8.2	7.9	8.0	8.03	8.03	8.00
100	34.0	33.9	34.0	14.6	14.5	14.4	8.4	7.8	8.0	8.03	8.05	7.99
100 filtered	33.9	33.4	33.4	15.0	15.0	14.3	7.3	7.7	8.0	8.01	8.01	7.99

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD SIYB-2
Test No.: 1708-S189
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, larg mus
Female 2	2	Good density, Ⓐ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	143	143	100	
TØ D	134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: ⒶCH Q18 8/24/17 X̄ dividing = 146

QC Check: AC 8/27/17

Final Review: 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-3

CETIS Summary Report

Report Date: 03 Oct-17 12:55 (p 1 of 4)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	09-7048-4195	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	06-5181-9973	**Code:**	17-0934	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 12:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	28h (3.5 °C)	**Station:**	SIYB-3		

Batch Note: 101= 100 percent sample filtered to 0.45um

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-1605-8388	Combined Development Ra	100	>100	NA	5.9%	1	Dunnett Multiple Comparison Test
13-8051-6944	Development Rate	100	>100	NA	2.8%	1	Dunnett Multiple Comparison Test
13-5528-7470	Survival Rate	100	>100	NA	3.73%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
02-0434-9028	Combined Development Ra	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
20-7893-4732	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
07-5105-3261	Survival Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-8051-6944	Development Rate	Control Resp	0.9537	0.9 - NL	Yes	Passes Acceptability Criteria
20-7893-4732	Development Rate	Control Resp	0.9537	0.9 - NL	Yes	Passes Acceptability Criteria
07-5105-3261	Survival Rate	Control Resp	0.9767	0.5 - NL	Yes	Passes Acceptability Criteria
13-5528-7470	Survival Rate	Control Resp	0.9767	0.5 - NL	Yes	Passes Acceptability Criteria
18-1605-8388	Combined Development Ra	PMSD	0.05896	NL - 0.25	No	Passes Acceptability Criteria

Analyst: AC QA: 6 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9317	0.8644	0.9989	0.8356	0.9661	0.02423	0.05418	5.82%	2.17%
6.25		5	0.9686	0.954	0.9832	0.9588	0.9824	0.00526	0.01176	1.21%	-1.71%
12.5		5	0.955	0.9141	0.9958	0.8973	0.9761	0.01472	0.03292	3.45%	-0.28%
25		5	0.9592	0.9353	0.9831	0.9371	0.9867	0.008613	0.01926	2.01%	-0.72%
50		5	0.9695	0.9548	0.9841	0.9542	0.9872	0.005273	0.01179	1.22%	-1.8%
100		5	0.8908	0.8091	0.9725	0.8014	0.9548	0.02942	0.06577	7.38%	6.46%
101		5	0.9238	0.8905	0.9571	0.9012	0.9634	0.01199	0.02681	2.9%	2.99%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.913	0.9689	0.01026	0.02294	2.41%	0.0%
0	Lab Control	5	0.9537	0.9432	0.9642	0.9457	0.9661	0.003785	0.008463	0.89%	-0.14%
6.25		5	0.9686	0.954	0.9832	0.9588	0.9824	0.00526	0.01176	1.21%	-1.71%
12.5		5	0.9654	0.9515	0.9792	0.9493	0.9761	0.004989	0.01116	1.16%	-1.37%
25		5	0.9632	0.9413	0.9851	0.9371	0.9867	0.007884	0.01763	1.83%	-1.14%
50		5	0.9695	0.9548	0.9841	0.9542	0.9872	0.005273	0.01179	1.22%	-1.8%
100		5	0.9305	0.8982	0.9629	0.8913	0.9548	0.01167	0.02609	2.8%	2.29%
101		5	0.9327	0.905	0.9605	0.9012	0.9634	0.009987	0.02233	2.39%	2.06%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Filter Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0	Lab Control	5	0.9767	0.9121	1	0.8836	1	0.02329	0.05207	5.33%	2.33%
6.25		5	1	1	1	1	1	0	0	0.0%	0.0%
12.5		5	0.989	0.9586	1	0.9452	1	0.01096	0.0245	2.48%	1.1%
25		5	0.9959	0.9845	1	0.9795	1	0.00411	0.009189	0.92%	0.41%
50		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0.9575	0.8724	1	0.8425	1	0.03066	0.06856	7.16%	4.25%
101		5	0.9904	0.9738	1	0.9726	1	0.005971	0.01335	1.35%	0.96%

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.9509	0.9583	0.9661	0.9474	0.8356
6.25		0.9824	0.9805	0.9588	0.961	0.9602
12.5		0.9761	0.9675	0.8973	0.9594	0.9745
25		0.9615	0.9867	0.9655	0.9452	0.9371
50		0.9689	0.9706	0.9664	0.9872	0.9542
100		0.8425	0.8014	0.9191	0.9363	0.9548
101		0.9634	0.9041	0.911	0.9394	0.9012

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.913	0.9565	0.9686	0.9545	0.9689
0	Lab Control	0.9509	0.9583	0.9661	0.9474	0.9457
6.25		0.9824	0.9805	0.9588	0.961	0.9602
12.5		0.9761	0.9675	0.9493	0.9594	0.9745
25		0.9615	0.9867	0.9655	0.965	0.9371
50		0.9689	0.9706	0.9664	0.9872	0.9542
100		0.8913	0.9512	0.9191	0.9363	0.9548
101		0.9634	0.9296	0.9301	0.9394	0.9012

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	1	1	1	1	1
0	Lab Control	1	1	1	1	0.8836
6.25		1	1	1	1	1
12.5		1	1	0.9452	1	1
25		1	1	1	0.9795	1
50		1	1	1	1	1
100		0.9452	0.8425	1	1	1
101		1	0.9726	0.9795	1	1

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	155/163	184/192	171/177	144/152	122/146
6.25		167/170	201/205	163/170	148/154	169/176
12.5		204/209	149/154	131/146	189/197	153/157
25		150/156	148/150	168/174	138/146	149/159
50		156/161	165/170	144/149	154/156	146/153
100		123/146	117/146	159/173	147/157	148/155
101		158/164	132/146	133/146	155/165	146/162

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	147/161	176/184	185/191	189/198	187/193
0	Lab Control	155/163	184/192	171/177	144/152	122/129
6.25		167/170	201/205	163/170	148/154	169/176
12.5		204/209	149/154	131/138	189/197	153/157
25		150/156	148/150	168/174	138/143	149/159
50		156/161	165/170	144/149	154/156	146/153
100		123/138	117/123	159/173	147/157	148/155
101		158/164	132/142	133/143	155/165	146/162

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	146/146	146/146	146/146	146/146	146/146
0	Lab Control	146/146	146/146	146/146	146/146	129/146
6.25		146/146	146/146	146/146	146/146	146/146
12.5		146/146	146/146	138/146	146/146	146/146
25		146/146	146/146	146/146	143/146	146/146
50		146/146	146/146	146/146	146/146	146/146
100		138/146	123/146	146/146	146/146	146/146
101		146/146	142/146	143/146	146/146	146/146

Analyst: KC QA: 10/3/17

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)
Analysis ID:	18-1605-8388	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	5.9%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-1.718	2.362	0.106	8	0.9981	CDF	Non-Significant Effect
		12.5	-1.055	2.362	0.106	8	0.9857	CDF	Non-Significant Effect
		25	-1.217	2.362	0.106	8	0.9911	CDF	Non-Significant Effect
		50	-1.782	2.362	0.106	8	0.9985	CDF	Non-Significant Effect
		100	1.623	2.362	0.106	8	0.1862	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08568031	0.01713606	5	3.395	0.0185	Significant Effect
Error	0.1211374	0.005047393	24			
Total	0.2068177		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.065	15.09	0.2159	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9447	0.9031	0.1216	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9317	0.8644	0.9989	0.9509	0.8356	0.9661	0.02423	5.82%	0.0%
6.25		5	0.9686	0.954	0.9832	0.961	0.9588	0.9824	0.00526	1.21%	-3.96%
12.5		5	0.955	0.9141	0.9958	0.9675	0.8973	0.9761	0.01472	3.45%	-2.5%
25		5	0.9592	0.9353	0.9831	0.9615	0.9371	0.9867	0.008613	2.01%	-2.96%
50		5	0.9695	0.9548	0.9841	0.9689	0.9542	0.9872	0.005272	1.22%	-4.06%
100		5	0.8908	0.8091	0.9725	0.9191	0.8014	0.9548	0.02942	7.38%	4.39%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.318	1.202	1.435	1.347	1.153	1.386	0.04197	7.12%	0.0%
6.25		5	1.395	1.351	1.439	1.372	1.366	1.438	0.01588	2.55%	-5.86%
12.5		5	1.366	1.278	1.453	1.39	1.245	1.416	0.03143	5.15%	-3.6%
25		5	1.373	1.306	1.439	1.373	1.317	1.455	0.02392	3.9%	-4.15%
50		5	1.398	1.352	1.444	1.394	1.355	1.457	0.01658	2.65%	-6.07%
100		5	1.245	1.115	1.376	1.282	1.109	1.357	0.04699	8.44%	5.53%

Analyst: AC QA: 10/3/17

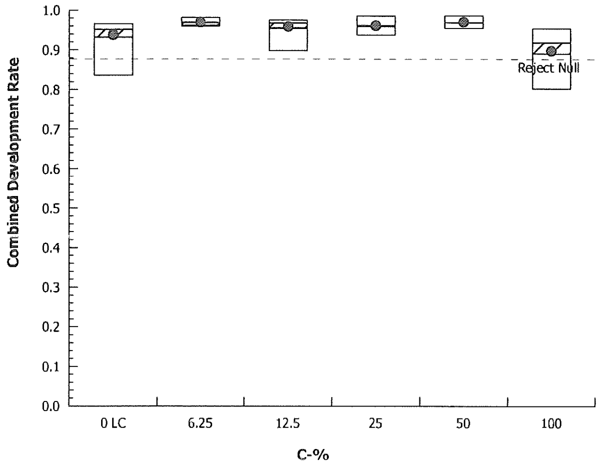
CETIS Analytical Report

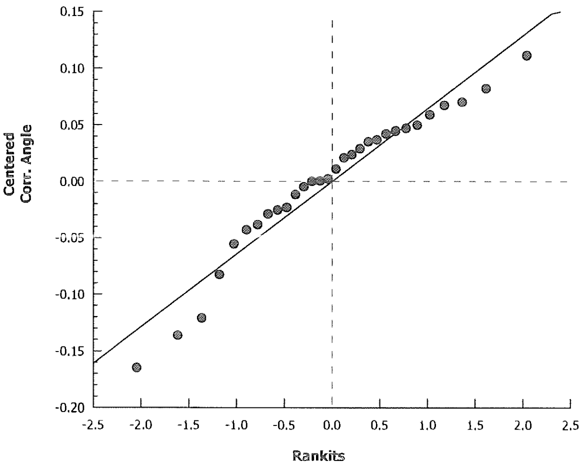
Report Date: 03 Oct-17 12:55 (p 2 of 6)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	18-1605-8388	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 5 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 13-8051-6944 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:54 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.8%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-1.673	2.362	0.057	8	0.9978	CDF	Non-Significant Effect
		12.5	-1.265	2.362	0.057	8	0.9923	CDF	Non-Significant Effect
		25	-1.145	2.362	0.057	8	0.9889	CDF	Non-Significant Effect
		50	-1.792	2.362	0.057	8	0.9985	CDF	Non-Significant Effect
		100	1.938	2.362	0.057	8	0.1110	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02986366	0.005972733	5	4.036	0.0084	Significant Effect
Error	0.03551355	0.001479731	24			
Total	0.06537721		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.476	15.09	0.6271	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9841	0.9031	0.9204	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9537	0.9432	0.9642	0.9509	0.9457	0.9661	0.003785	0.89%	0.0%
6.25		5	0.9686	0.954	0.9832	0.961	0.9588	0.9824	0.00526	1.21%	-1.56%
12.5		5	0.9654	0.9515	0.9792	0.9675	0.9493	0.9761	0.004989	1.16%	-1.22%
25		5	0.9632	0.9413	0.9851	0.965	0.9371	0.9867	0.007884	1.83%	-0.99%
50		5	0.9695	0.9548	0.9841	0.9689	0.9542	0.9872	0.005272	1.22%	-1.66%
100		5	0.9305	0.8982	0.9629	0.9363	0.8913	0.9548	0.01167	2.8%	2.43%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.355	1.329	1.38	1.347	1.336	1.386	0.009269	1.53%	0.0%
6.25		5	1.395	1.351	1.439	1.372	1.366	1.438	0.01588	2.55%	-3.01%
12.5		5	1.385	1.348	1.423	1.39	1.344	1.416	0.01343	2.17%	-2.27%
25		5	1.382	1.322	1.443	1.383	1.317	1.455	0.02191	3.54%	-2.06%
50		5	1.398	1.352	1.444	1.394	1.355	1.457	0.01658	2.65%	-3.22%
100		5	1.308	1.245	1.37	1.316	1.235	1.357	0.02241	3.83%	3.48%

Analyst: AC QA: 10/3/17

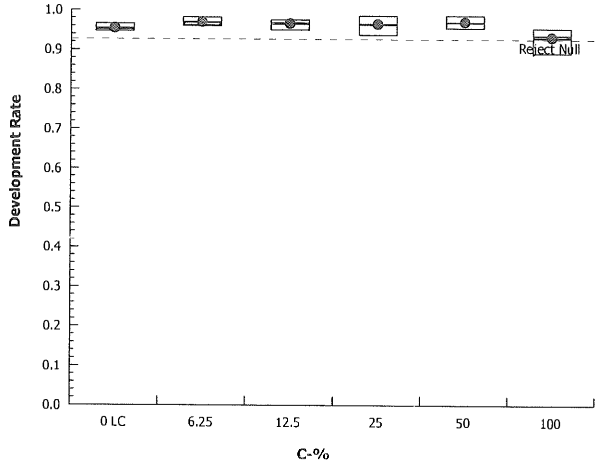
CETIS Analytical Report

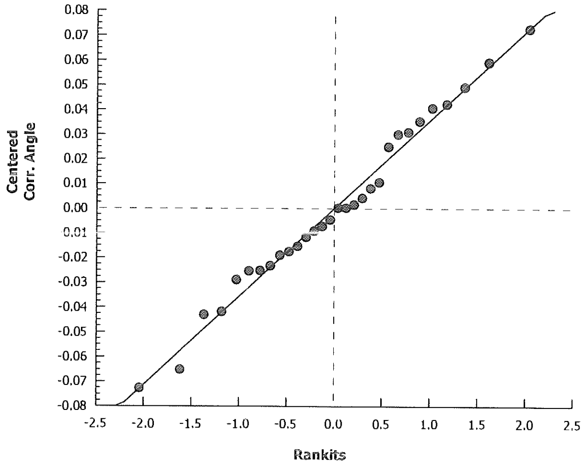
Report Date: 03 Oct-17 12:55 (p 4 of 6)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 13-8051-6944
Analyzed: 03 Oct-17 12:54
Endpoint: Development Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics





Analyst: AC QA: SL 10/13/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:55 (p 5 of 6)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	13-5528-7470	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.73%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	30	16	1	8	0.9446	Asymp	Non-Significant Effect
		12.5	28	16	1	8	0.8627	Asymp	Non-Significant Effect
		25	28	16	1	8	0.8627	Asymp	Non-Significant Effect
		50	30	16	1	8	0.9446	Asymp	Non-Significant Effect
		100	25	16	1	8	0.6353	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04630795	0.00926159	5	0.9945	0.4419	Non-Significant Effect
Error	0.2234966	0.00931236	24			
Total	0.2698046		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.039	4.248	0.4252	Equal Variances
Variances	Levene Equality of Variance	5.968	3.895	0.0010	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7969	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9767	0.9121	1	1	0.8836	1	0.02329	5.33%	0.0%
6.25		5	1	1	1	1	1	1	0	0.0%	-2.38%
12.5		5	0.989	0.9586	1	1	0.9452	1	0.01096	2.48%	-1.26%
25		5	0.9959	0.9845	1	1	0.9795	1	0.00411	0.92%	-1.96%
50		5	1	1	1	1	1	1	0	0.0%	-2.38%
100		5	0.9575	0.8724	1	1	0.8425	1	0.03066	7.16%	1.96%

Angular (Corrected) Transformed Summary

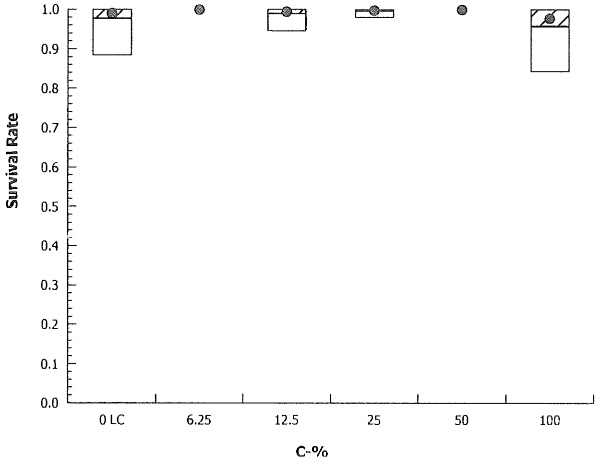
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.468	1.298	1.638	1.529	1.223	1.529	0.06137	9.35%	0.0%
6.25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	-4.18%
12.5		5	1.49	1.382	1.599	1.529	1.335	1.529	0.03898	5.85%	-1.53%
25		5	1.509	1.452	1.566	1.529	1.427	1.529	0.02049	3.04%	-2.78%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	-4.18%
100		5	1.417	1.212	1.622	1.529	1.163	1.529	0.07396	11.67%	3.47%

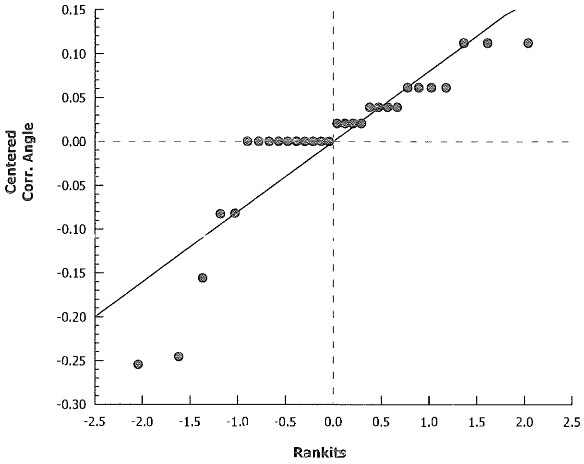
Analyst: AC QA: [illegible]

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	13-5528-7470	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	03 Oct-17 12:55 (p 1 of 3)
Test Code:	1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	02-0434-9028	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1700654	1000	Yes	Two-Point Interpolation

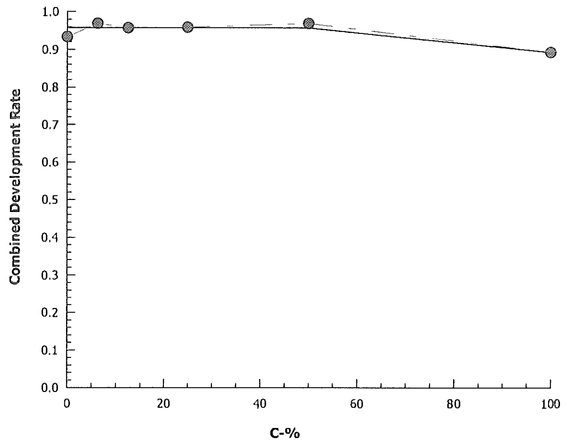
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9317	0.8356	0.9661	0.02423	0.05418	5.82%	0.0%	775	830
6.25		5	0.9686	0.9588	0.9824	0.00526	0.01176	1.21%	-3.96%	848	875
12.5		5	0.955	0.8973	0.9761	0.01472	0.03292	3.45%	-2.5%	826	863
25		5	0.9592	0.9371	0.9867	0.008613	0.01926	2.01%	-2.96%	753	785
50		5	0.9695	0.9542	0.9872	0.005272	0.01179	1.22%	-4.06%	765	789
100		5	0.8908	0.8014	0.9548	0.02942	0.06577	7.38%	4.39%	694	777

Graphics



Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test	Nautilus Environmental (CA)

Analysis ID:	20-7893-4732	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:54	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	742566	1000	Yes	Two-Point Interpolation

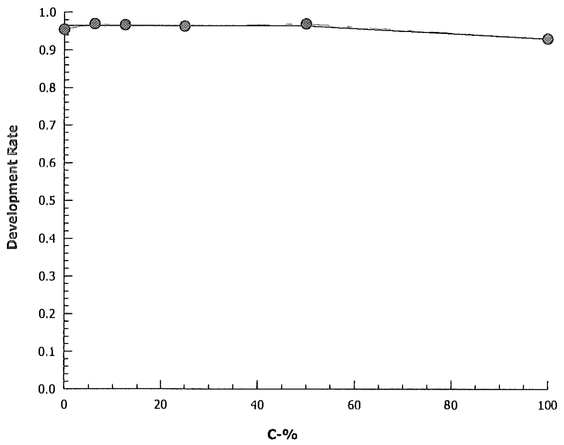
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9537	0.9457	0.9661	0.003785	0.008463	0.89%	0.0%	776	813
6.25		5	0.9686	0.9588	0.9824	0.00526	0.01176	1.21%	-1.56%	848	875
12.5		5	0.9654	0.9493	0.9761	0.004989	0.01116	1.16%	-1.22%	826	855
25		5	0.9632	0.9371	0.9867	0.007884	0.01763	1.83%	-0.99%	753	782
50		5	0.9695	0.9542	0.9872	0.005272	0.01179	1.22%	-1.66%	765	789
100		5	0.9305	0.8913	0.9548	0.01167	0.02609	2.8%	2.43%	694	746

Graphics



Analyst: AC QA: Y 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:55 (p 3 of 3)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 07-5105-3261 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:54 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	994102	1000	Yes	Two-Point Interpolation

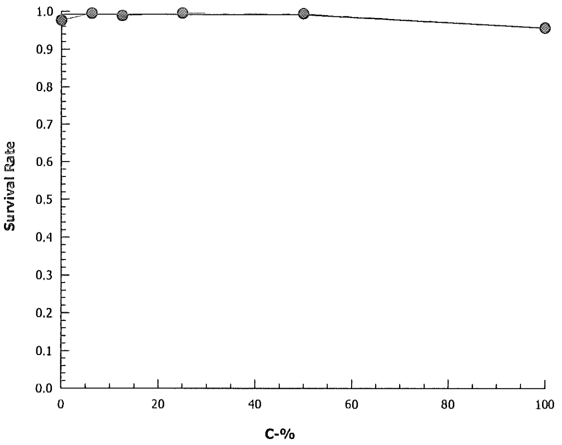
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9767	0.8836	1	0.02329	0.05207	5.33%	0.0%	713	730
6.25		5	1	1	1	0	0	0.0%	-2.38%	730	730
12.5		5	0.989	0.9452	1	0.01096	0.0245	2.48%	-1.26%	722	730
25		5	0.9959	0.9795	1	0.00411	0.00919	0.92%	-1.96%	727	730
50		5	1	1	1	0	0	0.0%	-2.38%	730	730
100		5	0.9575	0.8425	1	0.03066	0.06856	7.16%	1.96%	699	730

Graphics



Analyst: AC QA: 10/3/17

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:55 (p 1 of 2)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 12-5644-3307 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:55 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	3.81%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	11.53	2.015	0.071	5	<0.0001	CDF	Non-Significant Effect
		12.5*	8.475	1.895	0.084	7	<0.0001	CDF	Non-Significant Effect
		25*	9.719	1.895	0.075	7	<0.0001	CDF	Non-Significant Effect
		50*	11.51	1.943	0.069	6	<0.0001	CDF	Non-Significant Effect
		100*	4.536	1.943	0.11	6	0.0020	CDF	Non-Significant Effect
		101*	7.698	1.895	0.075	7	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09826934	0.01637822	6	3.448	0.0112	Significant Effect
Error	0.133006	0.004750213	28			
Total	0.2312753		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.467	16.81	0.2798	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9571	0.9146	0.1868	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9317	0.8644	0.9989	0.9509	0.8356	0.9661	0.02423	5.82%	0.0%
6.25		5	0.9686	0.954	0.9832	0.961	0.9588	0.9824	0.00526	1.21%	-3.96%
12.5		5	0.955	0.9141	0.9958	0.9675	0.8973	0.9761	0.01472	3.45%	-2.5%
25		5	0.9592	0.9353	0.9831	0.9615	0.9371	0.9867	0.008613	2.01%	-2.96%
50		5	0.9695	0.9548	0.9841	0.9689	0.9542	0.9872	0.005272	1.22%	-4.06%
100		5	0.8908	0.8091	0.9725	0.9191	0.8014	0.9548	0.02942	7.38%	4.39%
101		5	0.9238	0.8905	0.9571	0.911	0.9012	0.9634	0.01199	2.9%	0.84%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.318	1.202	1.435	1.347	1.153	1.386	0.04197	7.12%	0.0%
6.25		5	1.395	1.351	1.439	1.372	1.366	1.438	0.01588	2.55%	-5.86%
12.5		5	1.366	1.278	1.453	1.39	1.245	1.416	0.03143	5.15%	-3.6%
25		5	1.373	1.306	1.439	1.373	1.317	1.455	0.02392	3.9%	-4.15%
50		5	1.398	1.352	1.444	1.394	1.355	1.457	0.01658	2.65%	-6.07%
100		5	1.245	1.115	1.376	1.282	1.109	1.357	0.04699	8.44%	5.53%
101		5	1.295	1.227	1.363	1.268	1.251	1.378	0.02436	4.21%	1.76%

Analyst: AC QA: GH10/3/17

CETIS Analytical Report

Report Date:	03 Oct-17 12:56 (p 1 of 2)
Test Code:	1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test TST **Nautilus Environmental (CA)**

Analysis ID:	04-2240-3522	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:55	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	2.25%	101	>101	NA	0.9901

TST-Welch's t Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Filter Control	6.25*	16.46	1.895	0.044	7	<0.0001	CDF	Non-Significant Effect
	12.5*	17.23	1.895	0.041	7	<0.0001	CDF	Non-Significant Effect
	25*	13.3	1.895	0.052	7	<0.0001	CDF	Non-Significant Effect
	50*	16.24	1.895	0.045	7	<0.0001	CDF	Non-Significant Effect
	100*	10.43	1.895	0.053	7	<0.0001	CDF	Non-Significant Effect
	101*	11.18	1.895	0.050	7	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04488821	0.007481369	6	4.021	0.0050	Significant Effect
Error	0.05209015	0.001860362	28			
Total	0.09697837		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.663	16.81	0.9479	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9785	0.9146	0.7109	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	0.9523	0.9238	0.9808	0.9565	0.913	0.9689	0.01026	2.41%	0.0%
6.25		5	0.9686	0.954	0.9832	0.961	0.9588	0.9824	0.00526	1.21%	-1.71%
12.5		5	0.9654	0.9515	0.9792	0.9675	0.9493	0.9761	0.004989	1.16%	-1.37%
25		5	0.9632	0.9413	0.9851	0.965	0.9371	0.9867	0.007884	1.83%	-1.14%
50		5	0.9695	0.9548	0.9841	0.9689	0.9542	0.9872	0.005272	1.22%	-1.8%
100		5	0.9305	0.8982	0.9629	0.9363	0.8913	0.9548	0.01167	2.8%	2.29%
101		5	0.9327	0.905	0.9605	0.9301	0.9012	0.9634	0.009987	2.39%	2.06%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	1.355	1.293	1.417	1.361	1.271	1.394	0.02226	3.67%	0.0%
6.25		5	1.395	1.351	1.439	1.372	1.366	1.438	0.01588	2.55%	-2.99%
12.5		5	1.385	1.348	1.423	1.39	1.344	1.416	0.01343	2.17%	-2.26%
25		5	1.382	1.322	1.443	1.383	1.317	1.455	0.02191	3.54%	-2.04%
50		5	1.398	1.352	1.444	1.394	1.355	1.457	0.01658	2.65%	-3.2%
100		5	1.308	1.245	1.37	1.316	1.235	1.357	0.02241	3.83%	3.5%
101		5	1.311	1.255	1.368	1.303	1.251	1.378	0.02047	3.49%	3.21%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:56 (p 1 of 1)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 04-8378-5783 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:56 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.97%	Fails development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	1.926	1.86	0.042	8	0.0451	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004682327	0.004682327	1	3.709	0.0903	Non-Significant Effect
Error	0.01009975	0.001262469	8			
Total	0.01478208		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.878	23.15	0.1540	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9404	0.7411	0.5579	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9537	0.9432	0.9642	0.9509	0.9457	0.9661	0.003785	0.89%	0.0%
101		5	0.9327	0.905	0.9605	0.9301	0.9012	0.9634	0.009987	2.39%	2.2%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.355	1.329	1.38	1.347	1.336	1.386	0.009269	1.53%	0.0%
101		5	1.311	1.255	1.368	1.303	1.251	1.378	0.02047	3.49%	3.2%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:56 (p 1 of 1)
Test Code: 1708-S190 | 12-9117-2946

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	13-2592-4532	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:56	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.8%	Passes combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	0.4767	1.86	0.090	8	0.3232	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001337805	0.001337805	1	0.2272	0.6464	Non-Significant Effect
Error	0.04710602	0.005888253	8			
Total	0.04844383		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.969	23.15	0.3169	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.889	0.7411	0.1651	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9317	0.8644	0.9989	0.9509	0.8356	0.9661	0.02423	5.82%	0.0%
101		5	0.9238	0.8905	0.9571	0.911	0.9012	0.9634	0.01199	2.9%	0.84%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.318	1.202	1.435	1.347	1.153	1.386	0.04197	7.12%	0.0%
101		5	1.295	1.227	1.363	1.268	1.251	1.378	0.02436	4.21%	1.76%

Analyst: AC QA: 10/3/17

Embryo Larval Bioassay

48-hour Development

Client: AMEC/POSD

Sample ID: SIYB-3

Test ID: 1708-S190

Test Species: *M. galloprovincialis*

Start Date/Time: 8/24/2017 1600

End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
106	184	0	8	192	RL 8/30/17
107	147	4	6	157	
108	167	0	3	170	
109	159	5	9	173	
110	189	0	8	197	
111	146	0	7	153	
112	148	1	6	155	
113	148	0	6	154	
114	171	0	6	177	
115	138	0	5	143	
116	123	9	6	138	
117	117	5	1	123	
118	155	0	8	163	
119	165	0	5	(a) ~~164~~ 170	
120	201	0	4	205	
121	148	0	2	150	
122	153	0	4	157	
123	132	2	8	142	
124	144	0	5	149	
125	168	0	6	174	
126	149	0	~~159~~ 10	159	Q18 RL 8/30/17
127	144	0	8	152	
128	204	0	5	209	
129	122	0	7	129	
130	163	0	7	170	
131	154	0	2	156	
132	158	2	4	164	
133	149	0	5	154	
134	133	0	~~10~~ 10	143	Q18 RL 8/30/17
135	156	0	5	161	
136	155	3	7	165	
137	169	0	7	176	
138	146	2	14	162	
139	150	0	6	156	
140	131	0	7	138	

Comments: (a) Q18 S 10/12/17

QC Check: AC 8/30/17

Final Review: S 10/12/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:04 (p 1 of 1)
Test Code: 12-9117-2946/1708-S190

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17-0934
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-3

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	118					
0	LC	2	106					
0	LC	3	114					
0	LC	4	127					
0	LC	5	129					
6.25		1	108					
6.25		2	120					
6.25		3	130					
6.25		4	113					
6.25		5	137					
12.5		1	128					
12.5		2	133					
12.5		3	140					
12.5		4	110					
12.5		5	122					
25		1	139					
25		2	121					
25		3	125					
25		4	115					
25		5	126					
50		1	135					
50		2	119					
50		3	124					
50		4	131					
50		5	111					
100		1	116			139	128	AC 8/27/17
100		2	117					
100		3	109					
100		4	107					
100		5	112					
101		1	132					
100% 101@		2	123					
filtered 101		3	134					
101		4	136					
101		5	138					

QC'n

@ 0818 AC 8/21/17

Analyst: AC QA: 9/12/17

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-3
Sample Log No.: 17- 0934
Test No.: 1708-S190

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.9	33.6	33.5	15.2	14.9	14.5	8.3	7.9	8.1	8.09	8.06	8.02
6.25	33.9	33.5	33.6	15.1	15.0	14.3	8.2	7.8	8.1	8.04	8.02	8.00
12.5	33.9	33.7	33.6	15.0	15.1	14.3	8.2	7.8	8.1	8.04	8.03	8.00
25	34.0	33.7	33.7	15.3	15.1	14.3	8.2	7.8	8.1	8.05	8.03	8.00
50	34.0	33.7	33.7	15.3	15.1	14.3	8.2	7.7	8.1	8.04	8.03	8.00
100	34.1	33.9	33.9	14.9	15.1	14.2	8.4	7.9	8.1	8.03	8.02	8.00
100 filtered	34.1	33.5	33.6	15.6	15.0	14.3	ⓐ ~~8~~.6.9	7.6	8.0	8.02	8.00	8.00

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG	▨	▨

Comments:

0 hrs: ⓐ Q18 AC 8/24/17
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: G 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEL/POSD SW4B-3
Test No.: 1708-S190
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, larg Mus
Female 2	2	Good density, Ⓐ ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 / Desired Final Density: 300 (to inoculate with 0.5 ml) = 1.68 (dilution factor)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	Ⓐ143	143	100	
TØ D	Ⓐ134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: Ⓐ CH Q18 8/24/17 X̄ dividing = 146

QC Check: AC 8/27/17

Final Review: 9/01/17

Site: SIYB-4

CETIS Summary Report

Report Date: 08 Sep-17 13:40 (p 1 of 4)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	19-4954-8795	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	10-0507-1219	**Code:**	17-0935	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 11:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	29h (3 °C)	**Station:**	SIYB-4		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-4300-8705	Combined Development Ra	100	>100	NA	6.14%	1	Dunnett Multiple Comparison Test
11-7609-2573	Development Rate	100	>100	NA	2.59%	1	Dunnett Multiple Comparison Test
02-8901-1085	Survival Rate	100	>100	NA	4.32%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-0868-5835	Combined Development Ra	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
00-4847-7736	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-4847-7736	Development Rate	Control Resp	0.9692	0.9 - NL	Yes	Passes Acceptability Criteria
11-7609-2573	Development Rate	Control Resp	0.9692	0.9 - NL	Yes	Passes Acceptability Criteria
02-8901-1085	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
09-4300-8705	Combined Development Ra	PMSD	0.06141	NL - 0.25	No	Passes Acceptability Criteria

Batch note: 101 = 100 percent sample filtered to 0.45 µm

Analyst: ______ QA: NC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.9529	0.9781	0.004529	0.01013	1.05%	0.0%
6.25		5	0.9369	0.8993	0.9745	0.8836	0.9589	0.01356	0.03032	3.24%	3.33%
12.5		5	0.963	0.9398	0.9861	0.9412	0.9814	0.008355	0.01868	1.94%	0.64%
25		5	0.9064	0.7984	1	0.7808	0.9752	0.0389	0.08698	9.6%	6.48%
50		5	0.981	0.9596	1	0.9554	1	0.007708	0.01724	1.76%	-1.22%
100		5	0.9472	0.8848	1	0.8699	0.9942	0.02246	0.05021	5.3%	2.27%
101		5	0.9233	0.855	0.9917	0.8493	0.9833	0.02461	0.05503	5.96%	4.73%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.9529	0.9781	0.004529	0.01013	1.05%	0.0%
6.25		5	0.9513	0.9439	0.9587	0.9448	0.9589	0.002678	0.005988	0.63%	1.85%
12.5		5	0.9669	0.9472	0.9866	0.9412	0.9814	0.007096	0.01587	1.64%	0.23%
25		5	0.9753	0.9595	0.9911	0.9597	0.992	0.005691	0.01272	1.31%	-0.63%
50		5	0.981	0.9596	1	0.9554	1	0.007708	0.01724	1.76%	-1.22%
100		5	0.9778	0.9645	0.9912	0.9643	0.9942	0.004816	0.01077	1.1%	-0.89%
101		5	0.9672	0.9505	0.9839	0.9484	0.9833	0.00601	0.01344	1.39%	0.2%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	0	0	0.0%	0.0%
6.25		5	0.9849	0.9431	1	0.9247	1	0.01507	0.03369	3.42%	1.51%
12.5		5	0.9959	0.9845	1	0.9795	1	0.00411	0.009189	0.92%	0.41%
25		5	0.9301	0.8083	1	0.7945	1	0.04388	0.09812	10.55%	6.99%
50		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0.9685	0.9103	1	0.8904	1	0.02095	0.04686	4.84%	3.15%
101		5	0.9548	0.8822	1	0.8699	1	0.02614	0.05844	6.12%	4.52%

Analyst:______ QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.974	0.9748	0.9659	0.9781	0.9529
6.25		0.9589	0.8836	0.9463	0.9509	0.9448
12.5		0.9688	0.9783	0.9814	0.9452	0.9412
25		0.9752	0.9597	0.7808	0.8493	0.9669
50		0.9934	1	0.9769	0.9554	0.9795
100		0.9745	0.8699	0.9942	0.9726	0.9247
101		0.9833	0.8493	0.9484	0.8836	0.9521

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.974	0.9748	0.9659	0.9781	0.9529
6.25		0.9589	0.9556	0.9463	0.9509	0.9448
12.5		0.9688	0.9783	0.9814	0.965	0.9412
25		0.9752	0.9597	0.9828	0.992	0.9669
50		0.9934	1	0.9769	0.9554	0.9795
100		0.9745	0.9769	0.9942	0.9793	0.9643
101		0.9833	0.9764	0.9484	0.9627	0.9653

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1	1	1	1	1
6.25		1	0.9247	1	1	1
12.5		1	1	1	0.9795	1
25		1	1	0.7945	0.8562	1
50		1	1	1	1	1
100		1	0.8904	1	0.9932	0.9589
101		1	0.8699	1	0.9178	0.9863

Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	150/154	155/159	170/176	179/183	162/170
6.25		140/146	129/146	141/149	155/163	154/163
12.5		155/160	180/184	158/161	138/146	144/153
25		157/161	143/149	114/146	124/146	146/151
50		150/151	160/160	169/173	150/157	143/146
100		153/157	127/146	170/171	142/146	135/146
101		177/180	124/146	147/155	129/146	139/146

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	150/154	155/159	170/176	179/183	162/170
6.25		140/146	129/135	141/149	155/163	154/163
12.5		155/160	180/184	158/161	138/143	144/153
25		157/161	143/149	114/116	124/125	146/151
50		150/151	160/160	169/173	150/157	143/146
100		153/157	127/130	170/171	142/145	135/140
101		177/180	124/127	147/155	129/134	139/144

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	146/146	146/146	146/146	146/146	146/146
6.25		146/146	135/146	146/146	146/146	146/146
12.5		146/146	146/146	146/146	143/146	146/146
25		146/146	146/146	116/146	125/146	146/146
50		146/146	146/146	146/146	146/146	146/146
100		146/146	130/146	146/146	145/146	140/146
101		146/146	127/146	146/146	134/146	144/146

Analyst: QA: AC 10/2/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:40 (p 1 of 6)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	09-4300-8705	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.14%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.35	2.362	0.131	8	0.2762	CDF	Non-Significant Effect
		12.5	0.2532	2.362	0.131	8	0.7479	CDF	Non-Significant Effect
		25	2.01	2.362	0.131	8	0.0976	CDF	Non-Significant Effect
		50	-0.8819	2.362	0.131	8	0.9770	CDF	Non-Significant Effect
		100	0.6383	2.362	0.131	8	0.5852	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.07966533	0.01593306	5	2.087	0.1022	Non-Significant Effect
Error	0.1832089	0.007633706	24			
Total	0.2628743		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.69	15.09	0.0393	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9644	0.9031	0.3986	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.974	0.9529	0.9781	0.004529	1.05%	0.0%
6.25		5	0.9369	0.8993	0.9745	0.9463	0.8836	0.9589	0.01356	3.24%	3.33%
12.5		5	0.963	0.9398	0.9862	0.9688	0.9412	0.9814	0.008355	1.94%	0.64%
25		5	0.9064	0.7984	1	0.9597	0.7808	0.9752	0.0389	9.6%	6.48%
50		5	0.981	0.9596	1	0.9795	0.9554	1	0.007708	1.76%	-1.22%
100		5	0.9472	0.8848	1	0.9726	0.8699	0.9942	0.02246	5.3%	2.27%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.396	1.361	1.431	1.409	1.352	1.422	0.01255	2.01%	0.0%
6.25		5	1.321	1.251	1.392	1.337	1.223	1.367	0.02538	4.3%	5.34%
12.5		5	1.382	1.32	1.444	1.393	1.326	1.434	0.02224	3.6%	1.0%
25		5	1.285	1.102	1.468	1.369	1.084	1.413	0.06601	11.49%	7.96%
50		5	1.445	1.361	1.528	1.427	1.358	1.531	0.03001	4.65%	-3.49%
100		5	1.361	1.219	1.502	1.405	1.202	1.494	0.05105	8.39%	2.53%

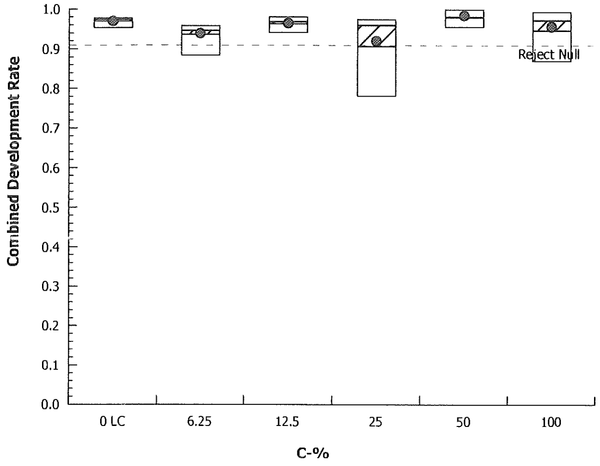
Analyst:

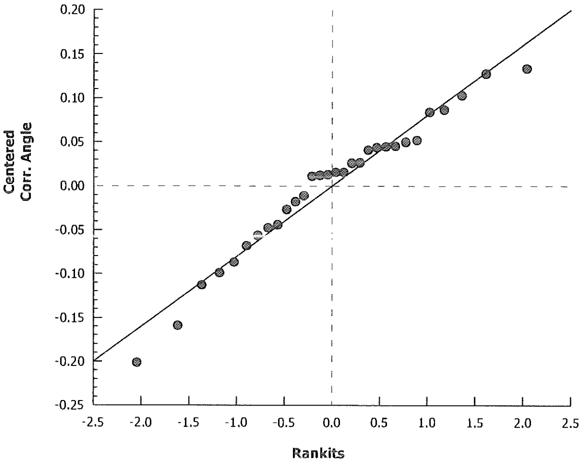
QA: AC 10/2/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	09-4300-8705	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID:	11-7609-2573	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.59%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.752	2.362	0.064	8	0.1519	CDF	Non-Significant Effect
		12.5	0.161	2.362	0.064	8	0.7814	CDF	Non-Significant Effect
		25	-0.8082	2.362	0.064	8	0.9720	CDF	Non-Significant Effect
		50	-1.801	2.362	0.064	8	0.9986	CDF	Non-Significant Effect
		100	-1.109	2.362	0.064	8	0.9878	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02811737	0.005623473	5	3.072	0.0278	Significant Effect
Error	0.04393926	0.001830803	24			
Total	0.07205663		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.942	15.09	0.1595	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9883	0.9031	0.9797	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.974	0.9529	0.9781	0.004529	1.05%	0.0%
6.25		5	0.9513	0.9439	0.9587	0.9509	0.9448	0.9589	0.002678	0.63%	1.85%
12.5		5	0.9669	0.9472	0.9866	0.9688	0.9412	0.9814	0.007096	1.64%	0.23%
25		5	0.9753	0.9595	0.9911	0.9752	0.9597	0.992	0.005691	1.31%	-0.63%
50		5	0.981	0.9596	1	0.9795	0.9554	1	0.007708	1.76%	-1.22%
100		5	0.9778	0.9645	0.9912	0.9769	0.9643	0.9942	0.004816	1.1%	-0.89%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.396	1.361	1.431	1.409	1.352	1.422	0.01255	2.01%	0.0%
6.25		5	1.349	1.331	1.366	1.347	1.334	1.367	0.006261	1.04%	3.4%
12.5		5	1.392	1.339	1.444	1.393	1.326	1.434	0.01893	3.04%	0.31%
25		5	1.418	1.363	1.473	1.413	1.369	1.481	0.01976	3.12%	-1.57%
50		5	1.445	1.361	1.528	1.427	1.358	1.531	0.03001	4.65%	-3.49%
100		5	1.426	1.374	1.478	1.418	1.381	1.494	0.01872	2.94%	-2.15%

Analyst: QA: AC 10/2/17

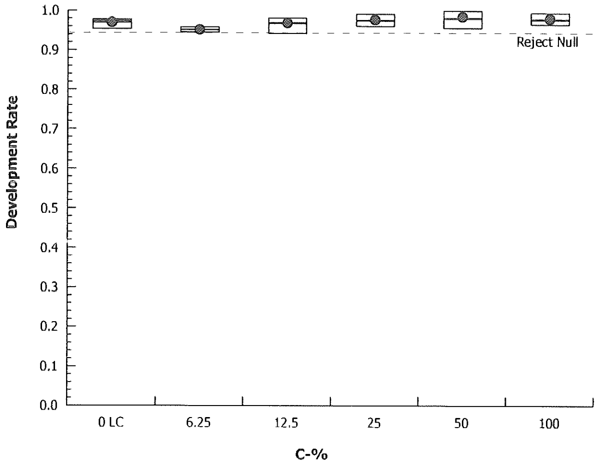
CETIS Analytical Report

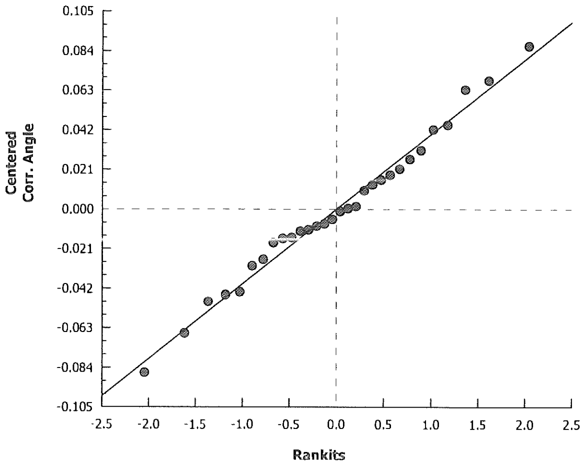
Report Date: 08 Sep-17 13:40 (p 4 of 6)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 11-7609-2573 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:39 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst:

QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	02-8901-1085	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.32%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	25	16	1	8	0.6353	Asymp	Non-Significant Effect
		12.5	25	16	1	8	0.6353	Asymp	Non-Significant Effect
		25	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect
		50	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		100	20	16	1	8	0.1899	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09694003	0.01938801	5	1.534	0.2167	Non-Significant Effect
Error	0.3032736	0.0126364	24			
Total	0.4002136		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.794	4.248	0.1650	Equal Variances
Variances	Levene Equality of Variance	14.76	3.895	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8703	0.9031	0.0017	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	0.9849	0.9431	1	1	0.9247	1	0.01507	3.42%	1.51%
12.5		5	0.9959	0.9845	1	1	0.9795	1	0.00411	0.92%	0.41%
25		5	0.9301	0.8083	1	1	0.7945	1	0.04388	10.55%	6.99%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.9685	0.9103	1	0.9932	0.8904	1	0.02095	4.84%	3.15%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.482	1.351	1.613	1.529	1.293	1.529	0.04733	7.14%	3.1%
12.5		5	1.509	1.452	1.566	1.529	1.427	1.529	0.02049	3.04%	1.34%
25		5	1.374	1.108	1.641	1.529	1.1	1.529	0.09599	15.62%	10.16%
50		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
100		5	1.429	1.27	1.589	1.488	1.233	1.529	0.05735	8.97%	6.54%

Analyst:______ QA: AC 10/2/17

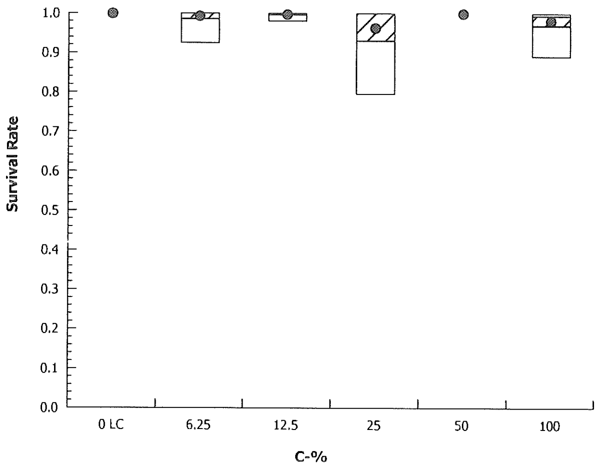
CETIS Analytical Report

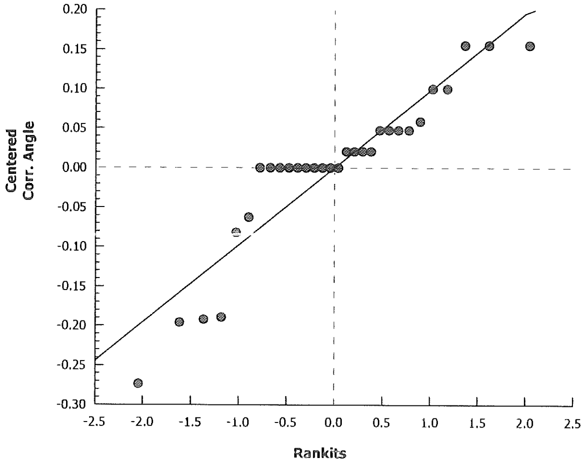
Report Date: 08 Sep-17 13:40 (p 6 of 6)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID:	02-8901-1085	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: QA: AC 10/2/17

CETIS Analytical Report

Report Date:	08 Sep-17 13:40 (p 1 of 2)
Test Code:	1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	12-0868-5835	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1309496	1000	Yes	Two-Point Interpolation

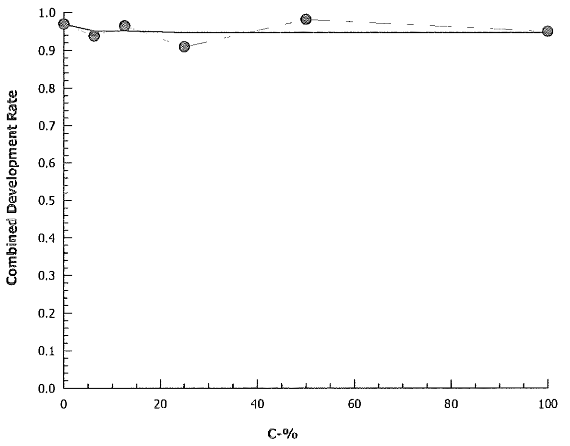
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9692	0.9529	0.9781	0.004529	0.01013	1.05%	0.0%	816	842
6.25		5	0.9369	0.8836	0.9589	0.01356	0.03032	3.24%	3.33%	719	767
12.5		5	0.963	0.9412	0.9814	0.008355	0.01868	1.94%	0.64%	775	804
25		5	0.9064	0.7808	0.9752	0.0389	0.08698	9.6%	6.48%	684	753
50		5	0.981	0.9554	1	0.007708	0.01724	1.76%	-1.22%	772	787
100		5	0.9472	0.8699	0.9942	0.02246	0.05021	5.3%	2.27%	727	766

Graphics



Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test					**Nautilus Environmental (CA)**
Analysis ID:	00-4847-7736	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1899529	1000	Yes	Two-Point Interpolation

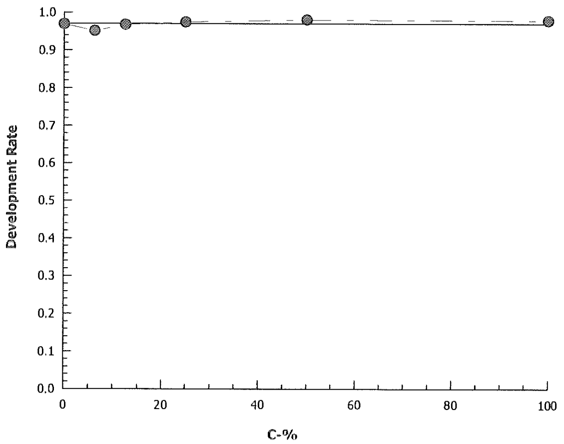
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9692	0.9529	0.9781	0.004529	0.01013	1.05%	0.0%	816	842
6.25		5	0.9513	0.9448	0.9589	0.002678	0.005988	0.63%	1.85%	719	756
12.5		5	0.9669	0.9412	0.9814	0.007096	0.01587	1.64%	0.23%	775	801
25		5	0.9753	0.9597	0.992	0.005691	0.01272	1.31%	-0.63%	684	702
50		5	0.981	0.9554	1	0.007708	0.01724	1.76%	-1.22%	772	787
100		5	0.9778	0.9643	0.9942	0.004816	0.01077	1.1%	-0.89%	727	743

Graphics



Analyst: JD QA: AC 10/3/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 13:42 (p 1 of 2)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 04-8982-0677 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:41 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	4.67%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	10.14	2.015	0.055	5	<0.0001	CDF	Non-Significant Effect
		12.5*	13.87	2.015	0.049	5	<0.0001	CDF	Non-Significant Effect
		25*	3.569	2.132	0.142	4	0.0117	CDF	Non-Significant Effect
		50*	12.65	2.132	0.067	4	0.0001	CDF	Non-Significant Effect
		100*	6.044	2.132	0.111	4	0.0019	CDF	Non-Significant Effect
		101*	5.268	2.132	0.105	4	0.0031	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.094811	0.01580183	6	1.927	0.1113	Non-Significant Effect
Error	0.2296109	0.008200388	28			
Total	0.3244219		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.01	16.81	0.0617	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9654	0.9146	0.3301	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.974	0.9529	0.9781	0.004529	1.05%	0.0%
6.25		5	0.9369	0.8993	0.9745	0.9463	0.8836	0.9589	0.01356	3.24%	3.33%
12.5		5	0.963	0.9398	0.9862	0.9688	0.9412	0.9814	0.008355	1.94%	0.64%
25		5	0.9064	0.7984	1	0.9597	0.7808	0.9752	0.0389	9.6%	6.48%
50		5	0.981	0.9596	1	0.9795	0.9554	1	0.007708	1.76%	-1.22%
100		5	0.9472	0.8848	1	0.9726	0.8699	0.9942	0.02246	5.3%	2.27%
101		5	0.9233	0.855	0.9917	0.9484	0.8493	0.9833	0.02461	5.96%	4.73%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.396	1.361	1.431	1.409	1.352	1.422	0.01255	2.01%	0.0%
6.25		5	1.321	1.251	1.392	1.337	1.223	1.367	0.02538	4.3%	5.34%
12.5		5	1.382	1.32	1.444	1.393	1.326	1.434	0.02224	3.6%	1.0%
25		5	1.285	1.102	1.468	1.369	1.084	1.413	0.06601	11.49%	7.96%
50		5	1.445	1.361	1.528	1.427	1.358	1.531	0.03001	4.65%	-3.49%
100		5	1.361	1.219	1.502	1.405	1.202	1.494	0.05105	8.39%	2.53%
101		5	1.306	1.172	1.439	1.342	1.172	1.441	0.04817	8.25%	6.48%

Analyst:

QA: AL 10/2/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:42 (p 2 of 2)
Test Code: 1708-S191 | 17-8732-6798

TST

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	19-0425-4109	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:41	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.42%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	26.68	1.943	0.022	6	<0.0001	CDF	Non-Significant Effect
		12.5*	16.3	2.015	0.043	5	<0.0001	CDF	Non-Significant Effect
		25*	16.94	2.015	0.044	5	<0.0001	CDF	Non-Significant Effect
		50*	12.65	2.132	0.067	4	0.0001	CDF	Non-Significant Effect
		100*	18.09	2.015	0.042	5	<0.0001	CDF	Non-Significant Effect
		101*	17.62	1.943	0.038	6	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02876729	0.004794548	6	2.694	0.0342	Significant Effect
Error	0.04982974	0.001779634	28			
Total	0.07859702		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.027	16.81	0.2361	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9892	0.9146	0.9769	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.974	0.9529	0.9781	0.004529	1.05%	0.0%
6.25		5	0.9513	0.9439	0.9587	0.9509	0.9448	0.9589	0.002678	0.63%	1.85%
12.5		5	0.9669	0.9472	0.9866	0.9688	0.9412	0.9814	0.007096	1.64%	0.23%
25		5	0.9753	0.9595	0.9911	0.9752	0.9597	0.992	0.005691	1.31%	-0.63%
50		5	0.981	0.9596	1	0.9795	0.9554	1	0.007708	1.76%	-1.22%
100		5	0.9778	0.9645	0.9912	0.9769	0.9643	0.9942	0.004816	1.1%	-0.89%
101		5	0.9672	0.9505	0.9839	0.9653	0.9484	0.9833	0.006011	1.39%	0.2%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.396	1.361	1.431	1.409	1.352	1.422	0.01255	2.01%	0.0%
6.25		5	1.349	1.331	1.366	1.347	1.334	1.367	0.006261	1.04%	3.4%
12.5		5	1.392	1.339	1.444	1.393	1.326	1.434	0.01893	3.04%	0.31%
25		5	1.418	1.363	1.473	1.413	1.369	1.481	0.01976	3.12%	-1.57%
50		5	1.445	1.361	1.528	1.427	1.358	1.531	0.03001	4.65%	-3.49%
100		5	1.426	1.374	1.478	1.418	1.381	1.494	0.01872	2.94%	-2.15%
101		5	1.392	1.344	1.439	1.383	1.342	1.441	0.01716	2.76%	0.3%

Analyst:________ QA: AC 10/2/17

CETIS Analytical Report

Report Date: 02 Oct-17 17:14 (p 1 of 1)
Test Code: 1708-S191 | 17-8732-6798

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 15-1063-9648 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 02 Oct-17 17:14 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.02%	Passes combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	1.818	1.86	0.093	8	0.0533	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02046378	0.02046378	1	3.304	0.1066	Non-Significant Effect
Error	0.04955082	0.006193853	8			
Total	0.0700146		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	14.74	23.15	0.0232	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9609	0.7411	0.7957	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9692	0.9566	0.9817	0.974	0.9529	0.9781	0.004529	1.05%	0.0%
101		5	0.9233	0.855	0.9917	0.9484	0.8493	0.9833	0.02461	5.96%	4.73%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.396	1.361	1.431	1.409	1.352	1.422	0.01255	2.01%	0.0%
101		5	1.306	1.172	1.439	1.342	1.172	1.441	0.04817	8.25%	6.48%

Analyst: AC QA: 10/12/17

Embryo Larval Bioassay **48-hour Development**

Client: AMEC/POSD
Test Species: *M. galloprovincialis*
Sample ID: SIYB-4
Start Date/Time: 8/24/2017 1600
Test ID: 1708-S191
End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
141	155	0	8	163	9/6/17 RL
142	150	0	4	154	
143	158	0	3	161	
144	143	0	6	149	
145	129	0	5	134	
146	143	0	3	146	
147	150	0	7	157	
148	127	~~3~~ 0	3	130	Q18 RL 9/6/17
149	169	0	4	173	
150	129	0	6	135	
151	139	0	5	144	
152	170	0	1	171	
153	157	0	4	161	
154	124	0	1	125	
155	147	0	8	155	
156	179	0	4	183	
157	150	0	1	151	
158	153	0	4	157	
159	142	0	3	145	
160	135	2	3	140	
161	162	0	8	170	
162	114	0	2	116	
163	138	0	5	143	
164	180	0	4	184	
165	160	0	0	160	
166	170	0	6	176	
167	146	0	5	151	
168	141	0	8	149	
169	124	0	3	127	
170	155	0	4	159	
171	155	0	5	160	
172	140	0	6	146	
173	154	0	9	163	
174	177	0	3	180	
175	144	0	9	153	

Comments:

QC Check: AC 10/2/17

Final Review: 10/2/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:05 (p 1 of 1)
Test Code: 17-8732-6798/1708-S191

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17- 0935
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-4

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	142					
0	LC	2	170					
0	LC	3	166					
0	LC	4	156					
0	LC	5	161					
6.25		1	172					
6.25		2	150					
6.25		3	168					
6.25		4	141					
6.25		5	173					
12.5		1	171					
12.5		2	164					
12.5		3	143					
12.5		4	163					
12.5		5	175					
25		1	153					
25		2	144					
25		3	162					
25		4	154					
25		5	167					
50		1	157					
50		2	165					
50		3	149					
50		4	147					
50		5	146					
100		1	158			143	137	AC 8/27/17
100		2	148					
100		3	152					
100		4	159					
100		5	160					
101		1	174					
101@		2	169					
101		3	155					
101		4	145					
101		5	151					

100% filtered

QC'ing

@ Q18 AC 8/21/17

Analyst: AC QA: 3 10/2/17

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-4
Sample Log No.: 17- 0935
Test No.: 1708-S 191

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.9	33.5	33.4	15.1	14.9	14.8	8.4	7.9	7.9	8.08	8.04	7.99
6.25	33.9	33.7	33.6	14.9	14.7	14.7	8.3	7.9	7.9	8.05	8.04	8.00
12.5	34.0	33.7	33.7	14.9	14.6	14.6	8.3	7.8	7.9	8.05	8.04	8.00
25	33.9	33.7	33.7	14.9	14.8	14.6	8.3	7.9	7.9	8.05	8.04	8.00
50	33.9	33.7	33.7	14.9	14.7	14.5	8.3	7.9	7.9	8.03	8.03	8.00
100	34.1	33.9	33.9	14.8	14.7	14.5	8.6	7.8	7.9	8.03	8.03	8.00
100 filtered	33.9	33.5	33.5	14.6	15.1	14.5	6.3	7.4	7.9	8.03	8.02	8.00

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: lg 10/2/17

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD SL4B-4
Test No.: 1708-S191
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, lar Mus
Female 2	2	Good density, Ⓐ ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 / Desired Final Density: 300 (to inoculate with 0.5 ml) = 1.68 (dilution factor)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
T0 A	135	135	100	99.9%
T0 B	162	162	100	
T0 C	Ⓐ ~~7~~ 143	143	100	
T0 D	134	134	100	
T0 E	157	158	99.4	
T0 F	145	145	100	

48-h QC: 134/142 (94%)

Comments: ⒶCH Q18 8/24/17 $\bar{X}$ dividing= 146

QC Check: AC 8/27/17

Final Review: 3 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-5

CETIS Summary Report

Report Date: 08 Sep-17 14:08 (p 1 of 4)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	00-2199-2874	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	18-5536-2887	**Code:**	17-0936	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 10:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (5 °C)	**Station:**	SIYB-5		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
16-0337-2728	Combined Development Ra	100	>100	NA	2.32%	1	Dunnett Multiple Comparison Test
14-1003-2877	Development Rate	100	>100	NA	2.02%	1	Dunnett Multiple Comparison Test
03-4175-1023	Survival Rate	100	>100	NA	0.98%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-7924-2836	Combined Development Ra	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
09-4575-7413	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-4575-7413	Development Rate	Control Resp	0.9745	0.9 - NL	Yes	Passes Acceptability Criteria
14-1003-2877	Development Rate	Control Resp	0.9745	0.9 - NL	Yes	Passes Acceptability Criteria
03-4175-1023	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
16-0337-2728	Combined Development Ra	PMSD	0.02321	NL - 0.25	No	Passes Acceptability Criteria

Batch note: 101 = 100 percent sample filtered to 0.45um

Analyst: ______ QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9532	0.9936	0.008113	0.01814	1.86%	0.0%
6.25		5	0.9371	0.9146	0.9597	0.911	0.9503	0.008134	0.01819	1.94%	3.83%
12.5		5	0.949	0.9385	0.9594	0.9362	0.9565	0.003767	0.008424	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.8836	0.9662	0.01455	0.03253	3.46%	3.62%
50		5	0.9546	0.9321	0.977	0.9315	0.9691	0.008095	0.0181	1.9%	2.05%
100		5	0.9719	0.9545	0.9892	0.9573	0.9867	0.006234	0.01394	1.43%	0.27%
101		5	0.9515	0.8849	1	0.8562	0.9826	0.02399	0.05365	5.64%	2.36%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9532	0.9936	0.008113	0.01814	1.86%	0.0%
6.25		5	0.9436	0.9302	0.957	0.925	0.9503	0.00483	0.0108	1.14%	3.17%
12.5		5	0.949	0.9385	0.9594	0.9362	0.9565	0.003767	0.008424	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.8836	0.9662	0.01455	0.03253	3.46%	3.62%
50		5	0.9651	0.9598	0.9704	0.958	0.9691	0.001912	0.004276	0.44%	0.96%
100		5	0.9719	0.9545	0.9892	0.9573	0.9867	0.006234	0.01394	1.43%	0.27%
101		5	0.9668	0.942	0.9917	0.9328	0.9826	0.008942	0.02	2.07%	0.79%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	0	0	0.0%	0.0%
6.25		5	0.9932	0.9741	1	0.9658	1	0.006849	0.01532	1.54%	0.68%
12.5		5	1	1	1	1	1	0	0	0.0%	0.0%
25		5	1	1	1	1	1	0	0	0.0%	0.0%
50		5	0.989	0.9695	1	0.9658	1	0.007052	0.01577	1.59%	1.1%
100		5	1	1	1	1	1	0	0	0.0%	0.0%
101		5	0.9836	0.9379	1	0.9178	1	0.01644	0.03676	3.74%	1.64%

Analyst: QA: AC 10/2/17

CETIS Summary Report

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9934	0.9671	0.9936	0.9532	0.9651
6.25		0.9503	0.925	0.9492	0.911	0.9503
12.5		0.9362	0.9451	0.9518	0.9553	0.9565
25		0.9412	0.9662	0.9471	0.9578	0.8836
50		0.9384	0.9315	0.9673	0.9691	0.9664
100		0.9573	0.9669	0.9867	0.9617	0.9867
101		0.8562	0.9728	0.9795	0.9664	0.9826

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9934	0.9671	0.9936	0.9532	0.9651
6.25		0.9503	0.925	0.9492	0.9433	0.9503
12.5		0.9362	0.9451	0.9518	0.9553	0.9565
25		0.9412	0.9662	0.9471	0.9578	0.8836
50		0.958	0.9645	0.9673	0.9691	0.9664
100		0.9573	0.9669	0.9867	0.9617	0.9867
101		0.9328	0.9728	0.9795	0.9664	0.9826

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1	1	1	1	1
6.25		1	1	1	0.9658	1
12.5		1	1	1	1	1
25		1	1	1	1	1
50		0.9795	0.9658	1	1	1
100		1	1	1	1	1
101		0.9178	1	1	1	1

Analyst:

QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	150/151	147/152	155/156	163/171	166/172
6.25		153/161	148/160	168/177	133/146	172/181
12.5		176/188	155/164	158/166	171/179	154/161
25		144/153	200/207	161/170	159/166	167/189
50		137/146	136/146	148/153	157/162	144/149
100		157/164	175/181	148/150	176/183	148/150
101		125/146	179/184	191/195	144/149	169/172

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	150/151	147/152	155/156	163/171	166/172
6.25		153/161	148/160	168/177	133/141	172/181
12.5		176/188	155/164	158/166	171/179	154/161
25		144/153	200/207	161/170	159/166	167/189
50		137/143	136/141	148/153	157/162	144/149
100		157/164	175/181	148/150	176/183	148/150
101		125/134	179/184	191/195	144/149	169/172

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	146/146	146/146	146/146	146/146	146/146
6.25		146/146	146/146	146/146	141/146	146/146
12.5		146/146	146/146	146/146	146/146	146/146
25		146/146	146/146	146/146	146/146	146/146
50		143/146	141/146	146/146	146/146	146/146
100		146/146	146/146	146/146	146/146	146/146
101		134/146	146/146	146/146	146/146	146/146

CETIS Analytical Report

Report Date: 08 Sep-17 14:08 (p 1 of 6)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	16-0337-2728	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.32%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	3.367	2.362	0.071	8	0.0055	CDF	Significant Effect
		12.5*	2.562	2.362	0.071	8	0.0332	CDF	Significant Effect
		25*	3.098	2.362	0.071	8	0.0102	CDF	Significant Effect
		50	2.045	2.362	0.071	8	0.0915	CDF	Non-Significant Effect
		100	0.4616	2.362	0.071	8	0.6636	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04421513	0.008843026	5	3.889	0.0101	Significant Effect
Error	0.05456813	0.002273672	24			
Total	0.09878326		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.782	15.09	0.3280	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9678	0.9031	0.4818	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9671	0.9532	0.9936	0.008113	1.86%	0.0%
6.25		5	0.9371	0.9146	0.9597	0.9492	0.911	0.9503	0.008134	1.94%	3.83%
12.5		5	0.949	0.9385	0.9594	0.9518	0.9362	0.9565	0.003767	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.9471	0.8836	0.9662	0.01455	3.46%	3.62%
50		5	0.9546	0.9321	0.977	0.9664	0.9315	0.9691	0.008095	1.9%	2.05%
100		5	0.9719	0.9545	0.9892	0.9669	0.9573	0.9867	0.006234	1.43%	0.27%

Angular (Corrected) Transformed Summary

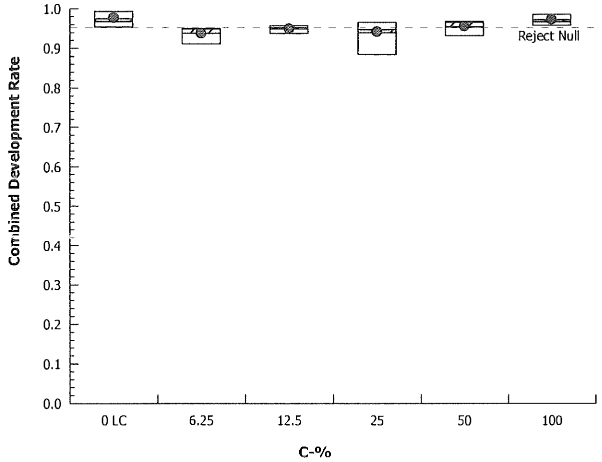
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.421	1.341	1.501	1.388	1.353	1.491	0.02888	4.55%	0.0%
6.25		5	1.319	1.274	1.365	1.343	1.268	1.346	0.01632	2.77%	7.15%
12.5		5	1.344	1.32	1.367	1.349	1.315	1.361	0.0084	1.4%	5.44%
25		5	1.327	1.249	1.406	1.339	1.223	1.386	0.02816	4.74%	6.58%
50		5	1.359	1.306	1.412	1.387	1.306	1.394	0.01902	3.13%	4.34%
100		5	1.407	1.351	1.463	1.388	1.363	1.455	0.02006	3.19%	0.98%

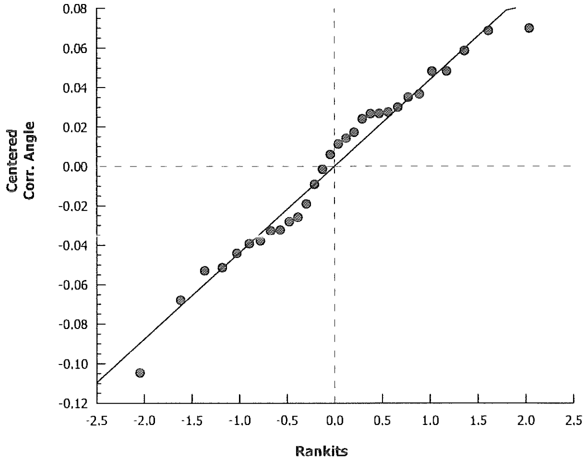
Analyst:_____ QA: AL 10/2/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	16-0337-2728	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: QA: AL 10/2/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	14-1003-2877	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.02%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	3.268	2.362	0.064	8	0.0069	CDF	Significant Effect
		12.5*	2.836	2.362	0.064	8	0.0184	CDF	Significant Effect
		25*	3.43	2.362	0.064	8	0.0047	CDF	Significant Effect
		50	1.383	2.362	0.064	8	0.2639	CDF	Non-Significant Effect
		100	0.5109	2.362	0.064	8	0.6422	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04043045	0.008086089	5	4.358	0.0058	Significant Effect
Error	0.04453574	0.001855656	24			
Total	0.08496618		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.49	15.09	0.0128	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9655	0.9031	0.4236	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9671	0.9532	0.9936	0.008113	1.86%	0.0%
6.25		5	0.9436	0.9302	0.957	0.9492	0.925	0.9503	0.00483	1.15%	3.17%
12.5		5	0.949	0.9385	0.9594	0.9518	0.9362	0.9565	0.003767	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.9471	0.8836	0.9662	0.01455	3.46%	3.62%
50		5	0.9651	0.9598	0.9704	0.9664	0.958	0.9691	0.001912	0.44%	0.96%
100		5	0.9719	0.9545	0.9892	0.9669	0.9573	0.9867	0.006234	1.43%	0.27%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.421	1.341	1.501	1.388	1.353	1.491	0.02888	4.55%	0.0%
6.25		5	1.332	1.304	1.36	1.343	1.293	1.346	0.01003	1.68%	6.27%
12.5		5	1.344	1.32	1.367	1.349	1.315	1.361	0.0084	1.4%	5.44%
25		5	1.327	1.249	1.406	1.339	1.223	1.386	0.02816	4.74%	6.58%
50		5	1.383	1.369	1.397	1.387	1.364	1.394	0.005095	0.82%	2.65%
100		5	1.407	1.351	1.463	1.388	1.363	1.455	0.02006	3.19%	0.98%

Analyst:______ QA: Ac 10/2/17

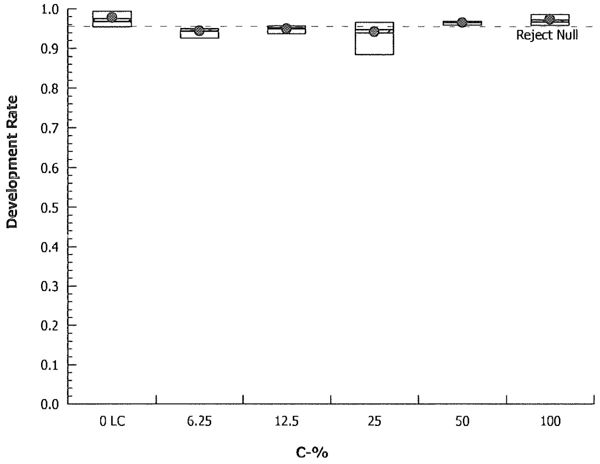
CETIS Analytical Report

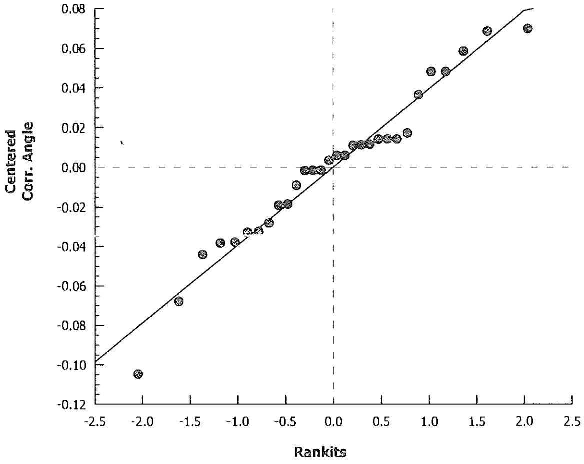
Report Date: 08 Sep-17 14:08 (p 4 of 6)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	14-1003-2877	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test				**Nautilus Environmental (CA)**	
Analysis ID:	03-4175-1023	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	0.98%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	25	16	1	8	0.6353	Asymp	Non-Significant Effect
		12.5	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		25	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		50	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect
		100	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01129003	0.002258007	5	1.506	0.2251	Non-Significant Effect
Error	0.03598432	0.001499347	24			
Total	0.04727436		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.594	4.248	0.2124	Equal Variances
Variances	Levene Equality of Variance	11.92	3.895	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.699	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
6.25		5	0.9932	0.9741	1	1	0.9658	1	0.006849	1.54%	0.68%
12.5		5	1	1	1	1	1	1	0	0.0%	0.0%
25		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	0.989	0.9695	1	1	0.9658	1	0.007052	1.59%	1.1%
100		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
6.25		5	1.5	1.42	1.581	1.529	1.385	1.529	0.02895	4.31%	1.89%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
25		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
50		5	1.48	1.394	1.566	1.529	1.385	1.529	0.031	4.68%	3.23%
100		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%

Analyst:______ QA: AC 10/3/17

CETIS Analytical Report

Report Date: 08 Sep-17 14:08 (p 1 of 2)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	12-7924-2836	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:07	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1906706	1000	Yes	Two-Point Interpolation

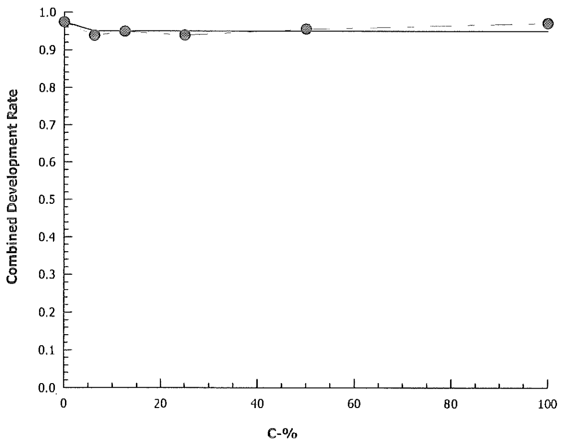
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9745	0.9532	0.9936	0.008113	0.01814	1.86%	0.0%	781	802
6.25		5	0.9371	0.911	0.9503	0.008134	0.01819	1.94%	3.83%	774	825
12.5		5	0.949	0.9362	0.9565	0.003767	0.008424	0.89%	2.62%	814	858
25		5	0.9392	0.8836	0.9662	0.01455	0.03253	3.46%	3.62%	831	885
50		5	0.9546	0.9315	0.9691	0.008095	0.0181	1.9%	2.05%	722	756
100		5	0.9719	0.9573	0.9867	0.006234	0.01394	1.43%	0.27%	804	828

Graphics



Analyst:_____ QA: AC 10/2/17

CETIS Analytical Report

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 09-4575-7413 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 14:08 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	712352	1000	Yes	Two-Point Interpolation

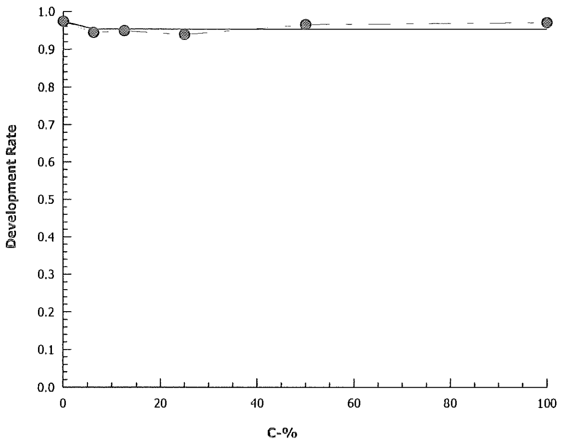
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9745	0.9532	0.9936	0.008113	0.01814	1.86%	0.0%	781	802
6.25		5	0.9436	0.925	0.9503	0.00483	0.0108	1.15%	3.17%	774	820
12.5		5	0.949	0.9362	0.9565	0.003767	0.008424	0.89%	2.62%	814	858
25		5	0.9392	0.8836	0.9662	0.01455	0.03253	3.46%	3.62%	831	885
50		5	0.9651	0.958	0.9691	0.001912	0.004275	0.44%	0.96%	722	748
100		5	0.9719	0.9573	0.9867	0.006234	0.01394	1.43%	0.27%	804	828

Graphics



Analyst:______ QA: AC 10/2/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 14:09 (p 1 of 2)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	07-2165-1543	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:09	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	3.91%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	9.354	1.895	0.051	7	<0.0001	CDF	Non-Significant Effect
		12.5*	11.96	2.015	0.047	5	<0.0001	CDF	Non-Significant Effect
		25*	7.368	1.895	0.067	7	<0.0001	CDF	Non-Significant Effect
		50*	10.18	1.895	0.055	7	<0.0001	CDF	Non-Significant Effect
		100*	11.56	1.895	0.056	7	<0.0001	CDF	Non-Significant Effect
		101*	5.804	2.015	0.105	5	0.0011	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04432034	0.007386723	6	2.081	0.0877	Non-Significant Effect
Error	0.0994037	0.003550132	28			
Total	0.143724		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.36	16.81	0.0779	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9064	0.9146	0.0059	Non-normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9671	0.9532	0.9936	0.008113	1.86%	0.0%
6.25		5	0.9371	0.9146	0.9597	0.9492	0.911	0.9503	0.008134	1.94%	3.83%
12.5		5	0.949	0.9385	0.9594	0.9518	0.9362	0.9565	0.003767	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.9471	0.8836	0.9662	0.01455	3.46%	3.62%
50		5	0.9546	0.9321	0.977	0.9664	0.9315	0.9691	0.008095	1.9%	2.05%
100		5	0.9719	0.9545	0.9892	0.9669	0.9573	0.9867	0.006234	1.43%	0.27%
101		5	0.9515	0.8849	1	0.9728	0.8562	0.9826	0.02399	5.64%	2.36%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.421	1.341	1.501	1.388	1.353	1.491	0.02888	4.55%	0.0%
6.25		5	1.319	1.274	1.365	1.343	1.268	1.346	0.01632	2.77%	7.15%
12.5		5	1.344	1.32	1.367	1.349	1.315	1.361	0.0084	1.4%	5.44%
25		5	1.327	1.249	1.406	1.339	1.223	1.386	0.02816	4.74%	6.58%
50		5	1.359	1.306	1.412	1.387	1.306	1.394	0.01902	3.13%	4.34%
100		5	1.407	1.351	1.463	1.388	1.363	1.455	0.02006	3.19%	0.98%
101		5	1.368	1.236	1.499	1.405	1.182	1.438	0.04735	7.74%	3.73%

Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID: 19-2643-5934 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 14:09 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.83%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	11.15	2.015	0.048	5	<0.0001	CDF	Non-Significant Effect
		12.5*	11.96	2.015	0.047	5	<0.0001	CDF	Non-Significant Effect
		25*	7.368	1.895	0.067	7	<0.0001	CDF	Non-Significant Effect
		50*	14.27	2.132	0.047	4	<0.0001	CDF	Non-Significant Effect
		100*	11.56	1.895	0.056	7	<0.0001	CDF	Non-Significant Effect
		101*	10.38	1.895	0.06	7	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0429487	0.007158116	6	3.64	0.0085	Significant Effect
Error	0.05505897	0.001966392	28			
Total	0.09800766		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.73	16.81	0.0225	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9657	0.9146	0.3357	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9671	0.9532	0.9936	0.008113	1.86%	0.0%
6.25		5	0.9436	0.9302	0.957	0.9492	0.925	0.9503	0.00483	1.15%	3.17%
12.5		5	0.949	0.9385	0.9594	0.9518	0.9362	0.9565	0.003767	0.89%	2.62%
25		5	0.9392	0.8988	0.9796	0.9471	0.8836	0.9662	0.01455	3.46%	3.62%
50		5	0.9651	0.9598	0.9704	0.9664	0.958	0.9691	0.001912	0.44%	0.96%
100		5	0.9719	0.9545	0.9892	0.9669	0.9573	0.9867	0.006234	1.43%	0.27%
101		5	0.9668	0.942	0.9917	0.9728	0.9328	0.9826	0.008942	2.07%	0.79%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.421	1.341	1.501	1.388	1.353	1.491	0.02888	4.55%	0.0%
6.25		5	1.332	1.304	1.36	1.343	1.293	1.346	0.01003	1.68%	6.27%
12.5		5	1.344	1.32	1.367	1.349	1.315	1.361	0.0084	1.4%	5.44%
25		5	1.327	1.249	1.406	1.339	1.223	1.386	0.02816	4.74%	6.58%
50		5	1.383	1.369	1.397	1.387	1.364	1.394	0.005095	0.82%	2.65%
100		5	1.407	1.351	1.463	1.388	1.363	1.455	0.02006	3.19%	0.98%
101		5	1.393	1.329	1.457	1.405	1.309	1.438	0.02294	3.68%	1.95%

Analyst: QA: AC 10/2/17

CETIS Analytical Report

Report Date: 02 Oct-17 17:15 (p 1 of 1)
Test Code: 1708-S192 | 19-4414-5458

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 11-5346-6867 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 02 Oct-17 17:15 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	3.82%	Passes combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	0.956	1.86	0.103	8	0.1835	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00702786	0.00702786	1	0.9139	0.3671	Non-Significant Effect
Error	0.06152049	0.007690061	8			
Total	0.06854835		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.687	23.15	0.3615	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8402	0.7411	0.0443	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9745	0.952	0.997	0.9671	0.9532	0.9936	0.008113	1.86%	0.0%
101		5	0.9515	0.8849	1	0.9728	0.8562	0.9826	0.02399	5.64%	2.36%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.421	1.341	1.501	1.388	1.353	1.491	0.02888	4.55%	0.0%
101		5	1.368	1.236	1.499	1.405	1.182	1.438	0.04735	7.74%	3.73%

Analyst: AC QA: 10/4/17

Embryo Larval Bioassay

48-hour Development

Client: AMEC/POSD

Test Species: *M. galloprovincialis*

Sample ID: SIYB-5

Start Date/Time: 8/24/2017 1600

Test ID: 1708-S192

End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
176	159	0	7	166	9/6/17 RL
177	155	0	9	164	
178	169	0	3	172	
179	148	0	12	160	
180	168	0	9	177	
181	144	0	5	149	
182	148	0	2	150	
183	133	0	8	141	
184	166	0	6	172	
185	157	0	5	162	
186	161	0	9	170	
187	191	0	4	195	
188	154	0	7	161	
189	125	0	9	134	
190	200	0	7	207	
191	150	0	1	151	
192	171	0	8	179	
193	163	0	8	171	
194	176	0	12	188	
195	176	0	7	~~173~~ 183	Q18 RL 9/8/17
196	172	0	9	181	
197	144	0	9	153	
198	148	0	5	153	
199	137	0	6	143	
200	157	0	7	164	
201	148	0	2	150	
202	158	0	8	~~164~~ 166	Q18 RL 9/6/17
203	136	0	5	141	
204	153	0	8	161	
205	167	0	12	189	
206	144	0	5	149	
207	155	0	1	156	
208	175	0	6	181	
209	147	0	5	152	
210	179	0	5	184	

Comments:

QC Check: AC 10/20/17

Final Review: 10/2/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:06 (p 1 of 1)
Test Code: 19-4414-5458/1708-S192

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17-0936
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-5

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	191					
0	LC	2	209					
0	LC	3	207					
0	LC	4	193					
0	LC	5	184					
6.25		1	204					
6.25		2	179					
6.25		3	180					
6.25		4	183					
6.25		5	196					
12.5		1	194					
12.5		2	177					
12.5		3	202					
12.5		4	192					
12.5		5	188					
25		1	197					
25		2	190					
25		3	186					
25		4	176					
25		5	205					
50		1	199					
50		2	203					
50		3	198					
50		4	185					
50		5	206					
100		1	200			157	147	AC 8/27/17
100		2	208					
100		3	182					
100		4	195					
100		5	201					
101		1	189					
101 ⓐ		2	210					
101		3	187					
101		4	181					
101		5	178					

100% filtered

QC 1/8

ⓐ Q18 AC 8/21/17

Analyst: AC QA: JT 10/12/17

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-5
Sample Log No.: 17- 0936
Test No.: 1708-S192

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	34.0	33.5	33.4	15.0	15.0	14.6	8.3	7.9	7.9	8.09	8.06	8.01
6.25	33.9	33.6	33.6	15.1	15.0	14.4	8.0	7.9	7.9	8.05	8.05	8.01
12.5	33.9	33.6	33.5	15.1	14.8	14.3	8.2	7.9	7.9	8.05	8.04	8.00
25	33.9	33.7	33.6	15.1	14.8	14.3	8.2	7.9	7.9	8.05	8.03	8.00
50	33.9	33.6	33.6	15.0	14.8	14.2	8.2	7.9	7.9	8.05	8.04	8.00
100	34.1	33.9	33.9	14.9	15.0	14.2	8.4	7.8	7.9	8.03	8.02	8.00
100 filtered	34.0	33.5	33.4	15.1	15.1	14.2	7.1	7.5	7.8	8.02	8.02	8.00

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	PM
Dilutions made by:	AC/EG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD SIYB-5
Test No.: 1708-S192
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, large Mus
Female 2	2	Good density, ~~white~~ pale orange Ⓐ color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	143	143	100	
TØ D	134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: Ⓐ CH Q18 8/24/17 X̄ dividing = 146

QC Check: AC 8/27/17

Final Review: 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-6

CETIS Summary Report

Report Date:	08 Sep-17 14:00 (p 1 of 4)
Test Code:	1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Batch ID:	15-2521-8076	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	11-4284-6280	**Code:**	17-0937	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 09:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	31h (13 °C)	**Station:**	SIYB-6		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-1895-8129	Combined Development Ra	100	>100	NA	4.93%	1	Dunnett Multiple Comparison Test
05-5049-1896	Development Rate	100	>100	NA	3.28%	1	Dunnett Multiple Comparison Test
14-0071-4930	Survival Rate	100	>100	NA	3.31%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
20-9707-7511	Combined Development Ra	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
13-2445-7596	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-5049-1896	Development Rate	Control Resp	0.9807	0.9 - NL	Yes	Passes Acceptability Criteria
13-2445-7596	Development Rate	Control Resp	0.9807	0.9 - NL	Yes	Passes Acceptability Criteria
14-0071-4930	Survival Rate	Control Resp	0.9959	0.5 - NL	Yes	Passes Acceptability Criteria
07-1895-8129	Combined Development Ra	PMSD	0.04932	NL - 0.25	No	Passes Acceptability Criteria

Batch note: 101 = 100 percent sample filtered to 0.45 um

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9767	0.9579	0.9954	0.9521	0.9888	0.006746	0.01508	1.54%	0.0%
6.25		5	0.9539	0.9318	0.976	0.9333	0.9769	0.007963	0.01781	1.87%	2.34%
12.5		5	0.9622	0.919	1	0.9079	1	0.01556	0.0348	3.62%	1.48%
25		5	0.9422	0.8858	0.9987	0.8904	0.9875	0.02034	0.04547	4.83%	3.53%
50		5	0.9475	0.8994	0.9956	0.8904	0.9937	0.01734	0.03876	4.09%	2.99%
100		5	0.9665	0.9306	1	0.9315	0.9944	0.01293	0.02891	2.99%	1.04%
101		5	0.956	0.9254	0.9865	0.9247	0.981	0.011	0.0246	2.57%	2.12%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9807	0.9709	0.9904	0.972	0.9888	0.003505	0.007837	0.8%	0.0%
6.25		5	0.9592	0.9362	0.9822	0.9333	0.9769	0.008288	0.01853	1.93%	2.19%
12.5		5	0.9622	0.919	1	0.9079	1	0.01556	0.0348	3.62%	1.88%
25		5	0.9772	0.963	0.9914	0.9583	0.9875	0.005112	0.01143	1.17%	0.36%
50		5	0.9731	0.9505	0.9958	0.9577	0.9937	0.008159	0.01824	1.88%	0.77%
100		5	0.9745	0.948	1	0.9394	0.9944	0.009547	0.02135	2.19%	0.63%
101		5	0.9696	0.9428	0.9964	0.9387	0.9926	0.009638	0.02155	2.22%	1.13%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9959	0.9845	1	0.9795	1	0.00411	0.009189	0.92%	0.0%
6.25		5	0.9945	0.9793	1	0.9726	1	0.005479	0.01225	1.23%	0.14%
12.5		5	1	1	1	1	1	0	0	0.0%	-0.41%
25		5	0.9644	0.9038	1	0.911	1	0.02181	0.04877	5.06%	3.16%
50		5	0.974	0.9187	1	0.8973	1	0.0199	0.04449	4.57%	2.2%
100		5	0.9918	0.969	1	0.9589	1	0.008219	0.01838	1.85%	0.41%
101		5	0.9863	0.9483	1	0.9315	1	0.0137	0.03063	3.11%	0.96%

Analyst: QA: AC10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9872	0.9521	0.973	0.9824	0.9888
6.25		0.9452	0.9464	0.9769	0.9333	0.9675
12.5		0.9079	1	0.9636	0.9565	0.983
25		0.9875	0.9583	0.8973	0.9777	0.8904
50		0.96	0.8904	0.9937	0.9618	0.9315
100		0.9806	0.9315	0.9867	0.9394	0.9944
101		0.9247	0.981	0.9571	0.9387	0.9786

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9872	0.972	0.973	0.9824	0.9888
6.25		0.9718	0.9464	0.9769	0.9333	0.9675
12.5		0.9079	1	0.9636	0.9565	0.983
25		0.9875	0.9583	0.985	0.9777	0.9774
50		0.96	0.9924	0.9937	0.9618	0.9577
100		0.9806	0.9714	0.9867	0.9394	0.9944
101		0.9926	0.981	0.9571	0.9387	0.9786

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1	0.9795	1	1	1
6.25		0.9726	1	1	1	1
12.5		1	1	1	1	1
25		1	1	0.911	1	0.911
50		1	0.8973	1	1	0.9726
100		1	0.9589	1	1	1
101		0.9315	1	1	1	1

Analyst:______ QA: AC 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	154/156	139/146	144/148	167/170	177/179
6.25		138/146	159/168	169/173	168/180	149/154
12.5		138/152	169/169	159/165	154/161	173/176
25		158/160	161/168	131/146	175/179	130/146
50		168/175	130/146	158/159	151/157	136/146
100		152/155	136/146	148/150	155/165	177/178
101		135/146	155/158	156/163	153/163	183/187

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	154/156	139/143	144/148	167/170	177/179
6.25		138/142	159/168	169/173	168/180	149/154
12.5		138/152	169/169	159/165	154/161	173/176
25		158/160	161/168	131/133	175/179	130/133
50		168/175	130/131	158/159	151/157	136/142
100		152/155	136/140	148/150	155/165	177/178
101		135/136	155/158	156/163	153/163	183/187

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	146/146	143/146	146/146	146/146	146/146
6.25		142/146	146/146	146/146	146/146	146/146
12.5		146/146	146/146	146/146	146/146	146/146
25		146/146	146/146	133/146	146/146	133/146
50		146/146	131/146	146/146	146/146	142/146
100		146/146	140/146	146/146	146/146	146/146
101		136/146	146/146	146/146	146/146	146/146

Analyst:____ QA: AC 10/2/17

CETIS Analytical Report

Report Date:	08 Sep-17 14:00 (p 1 of 6)
Test Code:	1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	07-1895-8129	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:59	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.93%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.253	2.362	0.123	8	0.3129	CDF	Non-Significant Effect
		12.5	0.5422	2.362	0.123	8	0.6284	CDF	Non-Significant Effect
		25	1.509	2.362	0.123	8	0.2211	CDF	Non-Significant Effect
		50	1.311	2.362	0.123	8	0.2908	CDF	Non-Significant Effect
		100	0.4047	2.362	0.123	8	0.6876	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02471964	0.004943928	5	0.7294	0.6083	Non-Significant Effect
Error	0.1626632	0.006777633	24			
Total	0.1873828		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.423	15.09	0.4902	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9721	0.9031	0.5980	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9767	0.9579	0.9954	0.9824	0.9521	0.9888	0.006746	1.54%	0.0%
6.25		5	0.9539	0.9318	0.976	0.9464	0.9333	0.9769	0.007963	1.87%	2.34%
12.5		5	0.9622	0.919	1	0.9636	0.9079	1	0.01556	3.62%	1.48%
25		5	0.9422	0.8858	0.9987	0.9583	0.8904	0.9875	0.02034	4.83%	3.53%
50		5	0.9475	0.8994	0.9956	0.96	0.8904	0.9937	0.01734	4.09%	2.99%
100		5	0.9665	0.9306	1	0.9806	0.9315	0.9944	0.01293	2.99%	1.04%

Angular (Corrected) Transformed Summary

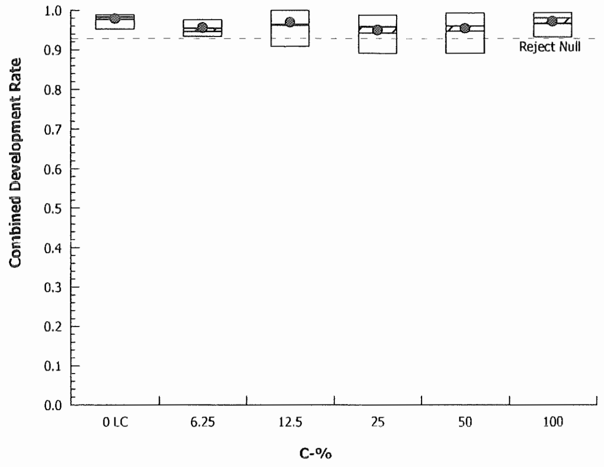
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.423	1.365	1.481	1.438	1.35	1.465	0.02094	3.29%	0.0%
6.25		5	1.358	1.303	1.413	1.337	1.31	1.418	0.01992	3.28%	4.59%
12.5		5	1.395	1.271	1.519	1.379	1.262	1.532	0.04465	7.16%	1.98%
25		5	1.345	1.218	1.471	1.365	1.233	1.459	0.04563	7.59%	5.52%
50		5	1.355	1.236	1.473	1.369	1.233	1.491	0.04264	7.04%	4.8%
100		5	1.402	1.298	1.506	1.431	1.306	1.496	0.03746	5.98%	1.48%

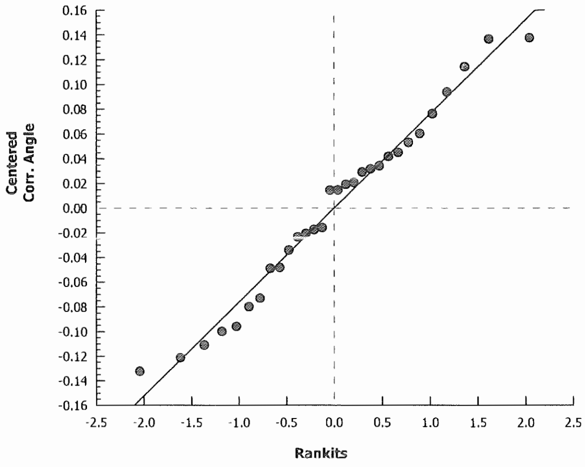
Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 07-1895-8129 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:59 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: QA: AC 10/2/17

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID: 05-5049-1896 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:59 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.28%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.601	2.362	0.092	8	0.1927	CDF	Non-Significant Effect
		12.5	0.9969	2.362	0.092	8	0.4213	CDF	Non-Significant Effect
		25	0.2857	2.362	0.092	8	0.7355	CDF	Non-Significant Effect
		50	0.4433	2.362	0.092	8	0.6714	CDF	Non-Significant Effect
		100	0.3245	2.362	0.092	8	0.7203	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01300091	0.002600183	5	0.6874	0.6376	Non-Significant Effect
Error	0.09077951	0.00378248	24			
Total	0.1037804		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.182	15.09	0.2074	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9863	0.9031	0.9578	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9807	0.9709	0.9904	0.9824	0.972	0.9888	0.003505	0.8%	0.0%
6.25		5	0.9592	0.9362	0.9822	0.9675	0.9333	0.9769	0.008288	1.93%	2.19%
12.5		5	0.9622	0.919	1	0.9636	0.9079	1	0.01556	3.62%	1.88%
25		5	0.9772	0.963	0.9914	0.9777	0.9583	0.9875	0.005111	1.17%	0.36%
50		5	0.9731	0.9505	0.9958	0.9618	0.9577	0.9937	0.008159	1.88%	0.77%
100		5	0.9745	0.948	1	0.9806	0.9394	0.9944	0.009547	2.19%	0.63%

Angular (Corrected) Transformed Summary

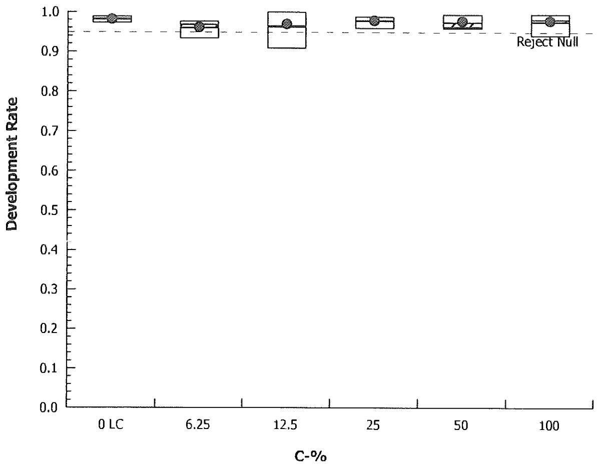
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.434	1.398	1.469	1.438	1.403	1.465	0.01283	2.0%	0.0%
6.25		5	1.371	1.314	1.428	1.39	1.31	1.418	0.02055	3.35%	4.34%
12.5		5	1.395	1.271	1.519	1.379	1.262	1.532	0.04465	7.16%	2.71%
25		5	1.423	1.378	1.467	1.421	1.365	1.459	0.0162	2.55%	0.78%
50		5	1.416	1.336	1.497	1.374	1.364	1.491	0.02905	4.59%	1.2%
100		5	1.421	1.34	1.502	1.431	1.322	1.496	0.0292	4.59%	0.88%

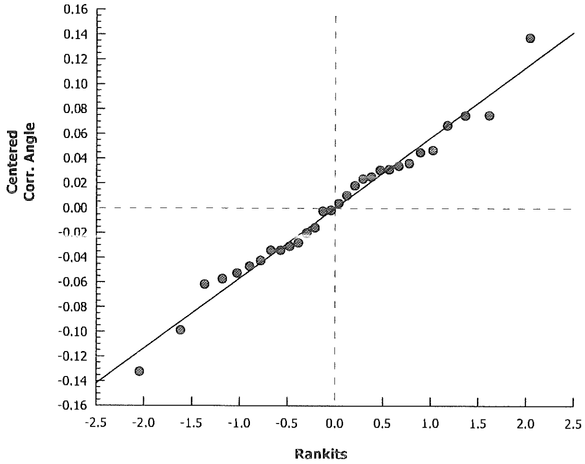
Analyst:______ QA: AC 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	05-5049-1896	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:59	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst:

QA: AC 10/3/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	14-0071-4930	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:59	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.31%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	27	16	1	8	0.8003	Asymp	Non-Significant Effect
		12.5	30	16	1	8	0.9446	Asymp	Non-Significant Effect
		25	24	16	1	8	0.5394	Asymp	Non-Significant Effect
		50	24	16	1	8	0.5394	Asymp	Non-Significant Effect
		100	27	16	1	8	0.8003	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04050335	0.008100669	5	1.038	0.4185	Non-Significant Effect
Error	0.1873779	0.007807414	24			
Total	0.2278813		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.121	4.248	0.3847	Equal Variances
Variances	Levene Equality of Variance	7.62	3.895	0.0002	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8704	0.9031	0.0017	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9959	0.9845	1	1	0.9795	1	0.00411	0.92%	0.0%
6.25		5	0.9945	0.9793	1	1	0.9726	1	0.005479	1.23%	0.14%
12.5		5	1	1	1	1	1	1	0	0.0%	-0.41%
25		5	0.9644	0.9038	1	1	0.911	1	0.02181	5.06%	3.16%
50		5	0.974	0.9187	1	1	0.8973	1	0.0199	4.57%	2.2%
100		5	0.9918	0.969	1	1	0.9589	1	0.008219	1.85%	0.41%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.509	1.452	1.566	1.529	1.427	1.529	0.02049	3.04%	0.0%
6.25		5	1.504	1.435	1.574	1.529	1.405	1.529	0.02498	3.71%	0.3%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	-1.36%
25		5	1.425	1.247	1.603	1.529	1.268	1.529	0.06408	10.06%	5.58%
50		5	1.447	1.291	1.603	1.529	1.245	1.529	0.0562	8.68%	4.07%
100		5	1.497	1.406	1.587	1.529	1.367	1.529	0.03255	4.86%	0.8%

Analyst: QA: AC 10/2/17

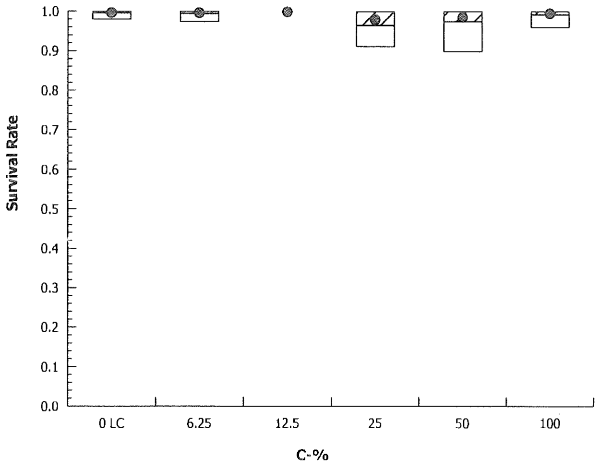
CETIS Analytical Report

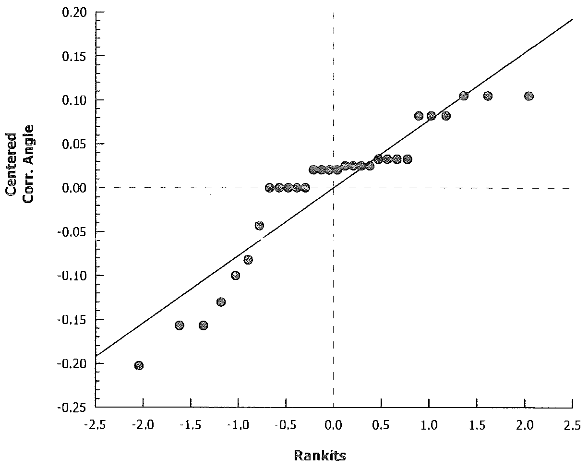
Report Date: 08 Sep-17 14:00 (p 6 of 6)
Test Code: 1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 14-0071-4930 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:59 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst:______ QA: ACW 9/11/17

CETIS Analytical Report

Report Date: 08 Sep-17 14:01 (p 1 of 2)
Test Code: 1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	20-9707-7511	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:00	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	120677	1000	Yes	Two-Point Interpolation

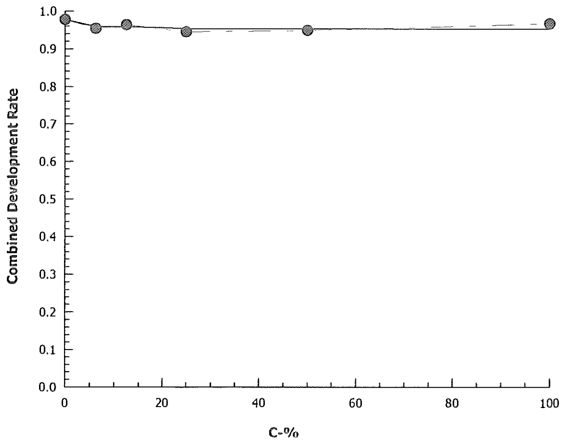
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9767	0.9521	0.9888	0.006746	0.01508	1.54%	0.0%	781	799
6.25		5	0.9539	0.9333	0.9769	0.007963	0.01781	1.87%	2.34%	783	821
12.5		5	0.9622	0.9079	1	0.01556	0.0348	3.62%	1.48%	793	823
25		5	0.9422	0.8904	0.9875	0.02034	0.04547	4.83%	3.53%	755	799
50		5	0.9475	0.8904	0.9937	0.01734	0.03876	4.09%	2.99%	743	783
100		5	0.9665	0.9315	0.9944	0.01293	0.02891	2.99%	1.04%	768	794

Graphics



Analyst: QA: KL 10/2/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	13-2445-7596	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:00	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	113256	1000	Yes	Two-Point Interpolation

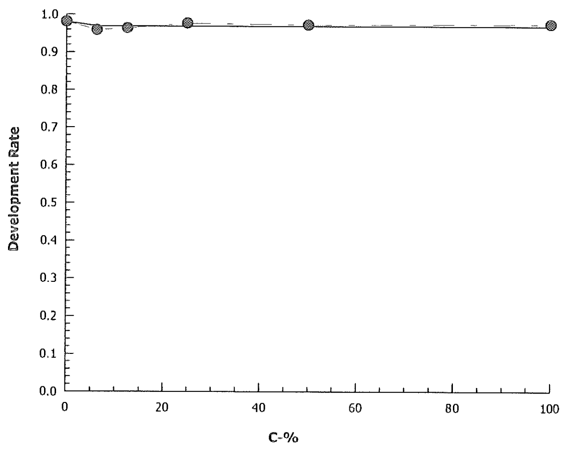
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Lab Control	5	0.9807	0.972	0.9888	0.003505	0.007837	0.8%	0.0%	781	796
6.25		5	0.9592	0.9333	0.9769	0.008288	0.01853	1.93%	2.19%	783	817
12.5		5	0.9622	0.9079	1	0.01556	0.0348	3.62%	1.88%	793	823
25		5	0.9772	0.9583	0.9875	0.005111	0.01143	1.17%	0.36%	755	773
50		5	0.9731	0.9577	0.9937	0.008159	0.01824	1.88%	0.77%	743	764
100		5	0.9745	0.9394	0.9944	0.009547	0.02135	2.19%	0.63%	768	788

Graphics



Analyst:

QA: AC 10/3/17

CETIS Analytical Report

T51

Report Date:	08 Sep-17 14:02 (p 1 of 2)
Test Code:	1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID:	12-7233-7266	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:01	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	2.04%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	11.45	1.895	0.048	7	<0.0001	CDF	Non-Significant Effect
		12.5*	6.92	2.132	0.101	4	0.0011	CDF	Non-Significant Effect
		25*	5.744	2.132	0.103	4	0.0023	CDF	Non-Significant Effect
		50*	6.327	2.015	0.092	5	0.0007	CDF	Non-Significant Effect
		100*	8.239	2.015	0.082	5	0.0002	CDF	Non-Significant Effect
		101*	9.414	1.943	0.062	6	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02546152	0.004243586	6	0.6679	0.6762	Non-Significant Effect
Error	0.1779112	0.006353972	28			
Total	0.2033727		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.883	16.81	0.5590	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9777	0.9146	0.6845	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9767	0.9579	0.9954	0.9824	0.9521	0.9888	0.006746	1.54%	0.0%
6.25		5	0.9539	0.9318	0.976	0.9464	0.9333	0.9769	0.007963	1.87%	2.34%
12.5		5	0.9622	0.919	1	0.9636	0.9079	1	0.01556	3.62%	1.48%
25		5	0.9422	0.8858	0.9987	0.9583	0.8904	0.9875	0.02034	4.83%	3.53%
50		5	0.9475	0.8994	0.9956	0.96	0.8904	0.9937	0.01734	4.09%	2.99%
100		5	0.9665	0.9306	1	0.9806	0.9315	0.9944	0.01293	2.99%	1.04%
101		5	0.956	0.9254	0.9865	0.9571	0.9247	0.981	0.011	2.57%	2.12%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.423	1.365	1.481	1.438	1.35	1.465	0.02094	3.29%	0.0%
6.25		5	1.358	1.303	1.413	1.337	1.31	1.418	0.01992	3.28%	4.59%
12.5		5	1.395	1.271	1.519	1.379	1.262	1.532	0.04465	7.16%	1.98%
25		5	1.345	1.218	1.471	1.365	1.233	1.459	0.04563	7.59%	5.52%
50		5	1.355	1.236	1.473	1.369	1.233	1.491	0.04264	7.04%	4.8%
100		5	1.402	1.298	1.506	1.431	1.306	1.496	0.03746	5.98%	1.48%
101		5	1.366	1.29	1.443	1.362	1.293	1.433	0.02761	4.52%	3.99%

Analyst:______ QA: AC 10/3/17

TST

Bivalve Larval Survival and Development Test			**Nautilus Environmental (CA)**

Analysis ID:	06-7833-1964	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:01	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	2.12%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	13.05	2.015	0.046	5	<0.0001	CDF	Non-Significant Effect
		12.5*	6.998	2.132	0.097	4	0.0011	CDF	Non-Significant Effect
		25*	18.44	1.943	0.037	6	<0.0001	CDF	Non-Significant Effect
		50*	11.15	2.132	0.065	4	0.0002	CDF	Non-Significant Effect
		100*	11.25	2.132	0.066	4	0.0002	CDF	Non-Significant Effect
		101*	10.88	2.132	0.065	4	0.0002	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01311458	0.002185764	6	0.5705	0.7502	Non-Significant Effect
Error	0.1072756	0.00383127	28			
Total	0.1203902		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.207	16.81	0.3021	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9888	0.9146	0.9722	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9807	0.9709	0.9904	0.9824	0.972	0.9888	0.003505	0.8%	0.0%
6.25		5	0.9592	0.9362	0.9822	0.9675	0.9333	0.9769	0.008288	1.93%	2.19%
12.5		5	0.9622	0.919	1	0.9636	0.9079	1	0.01556	3.62%	1.88%
25		5	0.9772	0.963	0.9914	0.9777	0.9583	0.9875	0.005111	1.17%	0.36%
50		5	0.9731	0.9505	0.9958	0.9618	0.9577	0.9937	0.008159	1.88%	0.77%
100		5	0.9745	0.948	1	0.9806	0.9394	0.9944	0.009547	2.19%	0.63%
101		5	0.9696	0.9428	0.9964	0.9786	0.9387	0.9926	0.009638	2.22%	1.13%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.434	1.398	1.469	1.438	1.403	1.465	0.01283	2.0%	0.0%
6.25		5	1.371	1.314	1.428	1.39	1.31	1.418	0.02055	3.35%	4.34%
12.5		5	1.395	1.271	1.519	1.379	1.262	1.532	0.04465	7.16%	2.71%
25		5	1.423	1.378	1.467	1.421	1.365	1.459	0.0162	2.55%	0.78%
50		5	1.416	1.336	1.497	1.374	1.364	1.491	0.02905	4.59%	1.2%
100		5	1.421	1.34	1.502	1.431	1.322	1.496	0.0292	4.59%	0.88%
101		5	1.405	1.325	1.485	1.424	1.321	1.485	0.02872	4.57%	2.01%

Analyst: ______ QA: AC 10/2/17

CETIS Analytical Report

Report Date: 02 Oct-17 17:16 (p 1 of 1)
Test Code: 1708-S193 | 21-3901-2250

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 17-5308-7798
Analyzed: 02 Oct-17 17:15
Endpoint: Combined Development Rate
Analysis: Parametric-Two Sample
CETIS Version: CETISv1.8.7
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.15%	Passes combined development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	1.637	1.86	0.064	8	0.0702	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00804282	0.00804282	1	2.679	0.1403	Non-Significant Effect
Error	0.0240171	0.003002138	8			
Total	0.03205992		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.739	23.15	0.6052	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9256	0.7411	0.4065	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9767	0.9579	0.9954	0.9824	0.9521	0.9888	0.006746	1.54%	0.0%
101		5	0.956	0.9254	0.9865	0.9571	0.9247	0.981	0.011	2.57%	2.12%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.423	1.365	1.481	1.438	1.35	1.465	0.02094	3.29%	0.0%
101		5	1.366	1.29	1.443	1.362	1.293	1.433	0.02761	4.52%	3.99%

Analyst: AC QA: B10/12/17

Embryo Larval Bioassay

48-hour Development

Client: AMEC/POSD

Sample ID: SIYB-6

Test ID: 1708-S193

Test Species: *M. galloprovincialis*

Start Date/Time: 8/24/2017 1600

End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
211	155	0	3	158	RL 9/6/17
212	139	0	4	143	
213	159	0	9	168	
214	169	0	4	173	
215	167	0	3	~~176~~ 170	Q18 RL 9/6/17
216	154	0	2	156	
217	151	0	6	157	
218	158	0	2	160	
219	144	0	4	148	
220	177	0	1	178	
221	136	0	6	142	
222	161	0	7	168	
223	148	0	2	150	
224	130	0	1	131	
225	152	0	3	155	
226	138	0	4	142	
227	175	0	4	179	
228	183	0	4	187	
229	155	0	10	165	
230	173	0	3	176	
231	130	0	3	133	
232	169	0	0	169	
233	168	0	7	175	
234	177	0	2	179	
235	154	0	7	161	RL 9/7/17
236	131	0	2	133	
237	156	0	7	163	
238	135	0	1	136	
239	138	0	14	152	
240	158	0	1	159	
241	153	1	9	163	
242	149	0	5	154	
243	159	0	6	165	
244	168	0	12	180	
245	136	0	4	140	

Comments:

QC Check: AC 10/2/17

Final Review: Z 10/12/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:07 (p 1 of 1)
Test Code: 21-3901-2250/1708-S193

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 23 Aug-17
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 17- 0937
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-6

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	216					
0	LC	2	212					
0	LC	3	219					
0	LC	4	215					
0	LC	5	234					
6.25		1	226					
6.25		2	213					
6.25		3	214					
6.25		4	244					
6.25		5	242					
12.5		1	239					
12.5		2	232					
12.5		3	243					
12.5		4	235					
12.5		5	230					
25		1	218					
25		2	222					
25		3	236					
25		4	227					
25		5	231					
50		1	233					
50		2	224					
50		3	240					
50		4	217					
50		5	221					
100		1	225			156	151	AC 8/27/17
100		2	245					
100		3	223					
100		4	229					
100		5	220					
~~101~~		1	238					
~~101~~ 100/ @ filtered		2	211					
~~101~~		3	237					
~~101~~		4	241					
~~101~~		5	228					

a l'ng
@ Q18 AC 8/21/17

Analyst: AC   QA: 11/2/17

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-6
Sample Log No.: 17- 0937
Test No.: 1708-S 193

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	34.0	33.6	33.6	14.8	14.9	14.9	8.5	7.9	7.8	8.09	8.06	8.02
6.25	34.0	33.6	33.7	14.7	14.7	14.8	8.4	7.9	7.8	8.06	8.05	8.00
12.5	34.0	33.7	33.8	14.6	14.7	14.6	8.4	7.9	7.8	8.05	8.03	7.99
25	34.0	33.7	33.7	14.7	14.8	14.6	8.3	7.9	7.8	8.04	8.03	8.00
50	34.0	33.8	33.8	14.7	14.7	14.7	8.3	7.8	7.8	8.02	8.03	7.99
100	34.1	33.9	34.0	14.5	14.7	14.6	8.4	7.9	7.8	8.02	8.02	7.99
100 filtered	34.0	33.4	33.6	15.4	14.9	14.6	~~8~~ ⓐ 7.0	7.6	7.8	8.00	8.00	7.99

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG		

Comments:
0 hrs: ⓐ Q18 AC 8/24/17
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: S 10/2/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD SIYB-6
Test No.: 1708-S193
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, large Mus
Female 2	2	Good density, Ⓐ ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	143	143	100	
TØ D	134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: ⒶCH Q18 8/24/17 $\bar{X}$ dividing = 146

QC Check: AC 8/27/17

Final Review: 9/12/17

Site: SIYB-REF

CETIS Summary Report

Report Date: 03 Oct-17 12:27 (p 1 of 4)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	10-7890-3308	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	19-9549-3992	**Code:**	17-0938	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 08:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	32h (11.5 °C)	**Station:**	SIYB-REF		

Batch Note: 101= 100 percent sample filtered to 0.45um

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-8314-2358	Combined Development Ra	100	>100	NA	3.87%	1	Dunnett Multiple Comparison Test
06-2689-4439	Development Rate	100	>100	NA	4.06%	1	Dunnett Multiple Comparison Test
01-3399-6185	Survival Rate	100	>100	NA	2.1%	1	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
04-9273-7903	Combined Development Ra	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	
10-2372-1220	Development Rate	EC25	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
06-2689-4439	Development Rate	Control Resp	0.9608	0.9 - NL	Yes	Passes Acceptability Criteria
10-2372-1220	Development Rate	Control Resp	0.9608	0.9 - NL	Yes	Passes Acceptability Criteria
01-3399-6185	Survival Rate	Control Resp	0.9986	0.5 - NL	Yes	Passes Acceptability Criteria
00-8314-2358	Combined Development Ra	PMSD	0.03874	NL - 0.25	No	Passes Acceptability Criteria

Analyst: AC QA: b 10/3/17

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9595	0.949	0.97	0.9497	0.9701	0.003787	0.008467	0.88%	0.0%
6.25		5	0.9449	0.9178	0.972	0.9178	0.9655	0.009773	0.02185	2.31%	1.52%
12.5		5	0.9478	0.9202	0.9754	0.9247	0.9835	0.009942	0.02223	2.35%	1.22%
25		5	0.9553	0.9281	0.9825	0.9178	0.9747	0.009798	0.02191	2.29%	0.44%
50		5	0.9465	0.9047	0.9883	0.9041	0.9811	0.01506	0.03367	3.56%	1.36%
100		5	0.9671	0.9461	0.9881	0.9489	0.9938	0.007573	0.01693	1.75%	-0.79%
101		5	0.9537	0.9354	0.972	0.9349	0.9706	0.006597	0.01475	1.55%	0.61%

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9608	0.9499	0.9718	0.9497	0.9701	0.00396	0.008854	0.92%	0.0%
6.25		5	0.9584	0.9314	0.9854	0.925	0.9853	0.009733	0.02176	2.27%	0.25%
12.5		5	0.9478	0.9202	0.9754	0.9247	0.9835	0.009942	0.02223	2.35%	1.36%
25		5	0.9647	0.9332	0.9962	0.9306	1	0.01134	0.02537	2.63%	-0.4%
50		5	0.9679	0.947	0.9887	0.9437	0.9851	0.007506	0.01678	1.73%	-0.73%
100		5	0.9671	0.9461	0.9881	0.9489	0.9938	0.007573	0.01693	1.75%	-0.65%
101		5	0.9537	0.9354	0.972	0.9349	0.9706	0.006597	0.01475	1.55%	0.74%

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9986	0.9948	1	0.9932	1	0.00137	0.003063	0.31%	0.0%
6.25		5	0.9863	0.9483	1	0.9315	1	0.0137	0.03063	3.11%	1.24%
12.5		5	1	1	1	1	1	0	0	0.0%	-0.14%
25		5	0.9904	0.9718	1	0.9658	1	0.006711	0.01501	1.52%	0.82%
50		5	0.9781	0.9337	1	0.9178	1	0.01598	0.03572	3.65%	2.06%
100		5	1	1	1	1	1	0	0	0.0%	-0.14%
101		5	1	1	1	1	1	0	0	0.0%	-0.14%

Analyst: AC QA: lg 10/3/17

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9532	0.9701	0.9589	0.9658	0.9497
6.25		0.9565	0.9178	0.9597	0.9655	0.925
12.5		0.9379	0.9408	0.9521	0.9835	0.9247
25		0.9592	0.9591	0.9658	0.9747	0.9178
50		0.9697	0.9041	0.9178	0.9598	0.9811
100		0.9938	0.9608	0.9716	0.9605	0.9489
101		0.9451	0.9706	0.9518	0.9349	0.9661

Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9532	0.9701	0.9655	0.9658	0.9497
6.25		0.9565	0.9853	0.9597	0.9655	0.925
12.5		0.9379	0.9408	0.9521	0.9835	0.9247
25		0.9592	0.9591	1	0.9747	0.9306
50		0.9697	0.9851	0.9437	0.9598	0.9811
100		0.9938	0.9608	0.9716	0.9605	0.9489
101		0.9451	0.9706	0.9518	0.9349	0.9661

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1	1	0.9932	1	1
6.25		1	0.9315	1	1	1
12.5		1	1	1	1	1
25		1	1	0.9658	1	0.9863
50		1	0.9178	0.9726	1	1
100		1	1	1	1	1
101		1	1	1	1	1

Analyst: AC QA: 10/3/17

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	163/171	162/167	140/146	141/146	151/159
6.25		154/161	134/146	143/149	168/174	148/160
12.5		151/161	143/152	139/146	179/182	135/146
25		141/147	164/171	141/146	154/158	134/146
50		160/165	132/146	134/146	167/174	156/159
100		159/160	147/153	171/176	170/177	167/176
101		172/182	165/170	158/166	158/169	171/177

Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	163/171	162/167	140/145	141/146	151/159
6.25		154/161	134/136	143/149	168/174	148/160
12.5		151/161	143/152	139/146	179/182	135/146
25		141/147	164/171	141/141	154/158	134/144
50		160/165	132/134	134/142	167/174	156/159
100		159/160	147/153	171/176	170/177	167/176
101		172/182	165/170	158/166	158/169	171/177

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	146/146	146/146	145/146	146/146	146/146
6.25		146/146	136/146	146/146	146/146	146/146
12.5		146/146	146/146	146/146	146/146	146/146
25		146/146	146/146	141/146	146/146	144/146
50		146/146	134/146	142/146	146/146	146/146
100		146/146	146/146	146/146	146/146	146/146
101		146/146	146/146	146/146	146/146	146/146

Analyst: AC QA: 10/13/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:27 (p 1 of 6)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	00-8314-2358	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.87%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.9284	2.362	0.081	8	0.4521	CDF	Non-Significant Effect
		12.5	0.6836	2.362	0.081	8	0.5645	CDF	Non-Significant Effect
		25	0.2074	2.362	0.081	8	0.7649	CDF	Non-Significant Effect
		50	0.6549	2.362	0.081	8	0.5777	CDF	Non-Significant Effect
		100	-0.7742	2.362	0.081	8	0.9694	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0112027	0.00224054	5	0.7675	0.5823	Non-Significant Effect
Error	0.07006179	0.002919241	24			
Total	0.08126449		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.895	15.09	0.4288	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9745	0.9031	0.6672	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9595	0.949	0.97	0.9589	0.9497	0.9701	0.003787	0.88%	0.0%
6.25		5	0.9449	0.9178	0.972	0.9565	0.9178	0.9655	0.009773	2.31%	1.52%
12.5		5	0.9478	0.9202	0.9754	0.9408	0.9247	0.9835	0.009941	2.35%	1.22%
25		5	0.9553	0.9281	0.9825	0.9592	0.9178	0.9747	0.009798	2.29%	0.44%
50		5	0.9465	0.9047	0.9883	0.9598	0.9041	0.9811	0.01506	3.56%	1.36%
100		5	0.9671	0.9461	0.9881	0.9608	0.9489	0.9938	0.007573	1.75%	-0.79%

Angular (Corrected) Transformed Summary

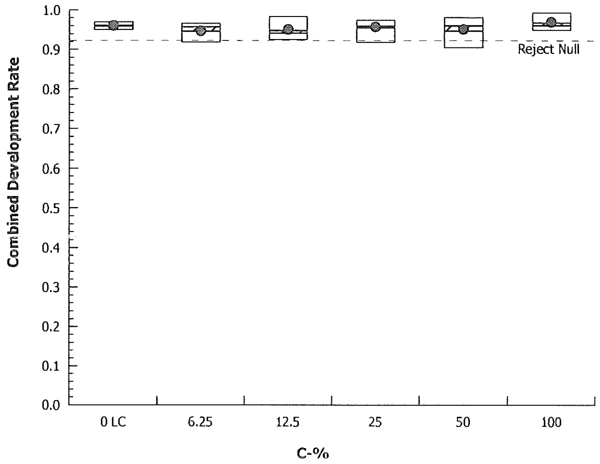
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.369	1.342	1.396	1.367	1.345	1.397	0.009718	1.59%	0.0%
6.25		5	1.337	1.279	1.396	1.361	1.28	1.384	0.02113	3.53%	2.32%
12.5		5	1.346	1.274	1.417	1.325	1.293	1.442	0.02574	4.28%	1.71%
25		5	1.362	1.301	1.423	1.367	1.28	1.411	0.02201	3.61%	0.52%
50		5	1.347	1.253	1.441	1.369	1.256	1.433	0.03393	5.63%	1.63%
100		5	1.396	1.324	1.467	1.371	1.343	1.492	0.02576	4.13%	-1.93%

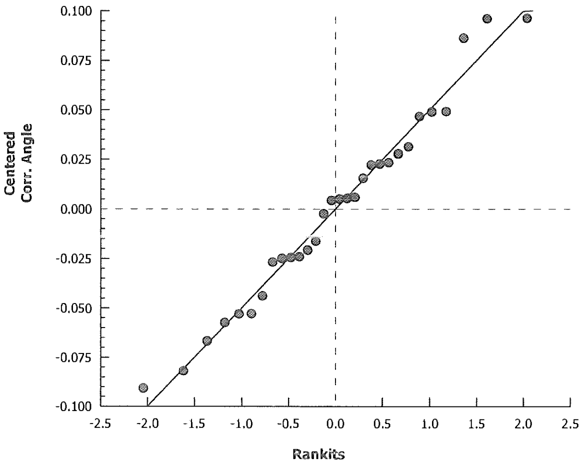
Analyst: AC QA: G 10/3/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	00-8314-2358	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA:

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	06-2689-4439	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.06%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.03761	2.362	0.085	8	0.8220	CDF	Non-Significant Effect
		12.5	0.7444	2.362	0.085	8	0.5366	CDF	Non-Significant Effect
		25	-0.6399	2.362	0.085	8	0.9571	CDF	Non-Significant Effect
		50	-0.6339	2.362	0.085	8	0.9564	CDF	Non-Significant Effect
		100	-0.6376	2.362	0.085	8	0.9568	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01013919	0.002027838	5	0.6242	0.6828	Non-Significant Effect
Error	0.07796258	0.003248441	24			
Total	0.08810177		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.287	15.09	0.3818	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9437	0.9031	0.1146	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9608	0.9499	0.9718	0.9655	0.9497	0.9701	0.003959	0.92%	0.0%
6.25		5	0.9584	0.9314	0.9854	0.9597	0.925	0.9853	0.009733	2.27%	0.25%
12.5		5	0.9478	0.9202	0.9754	0.9408	0.9247	0.9835	0.009941	2.35%	1.36%
25		5	0.9647	0.9332	0.9962	0.9592	0.9306	1	0.01134	2.63%	-0.4%
50		5	0.9679	0.947	0.9887	0.9697	0.9437	0.9851	0.007506	1.73%	-0.73%
100		5	0.9671	0.9461	0.9881	0.9608	0.9489	0.9938	0.007573	1.75%	-0.65%

Angular (Corrected) Transformed Summary

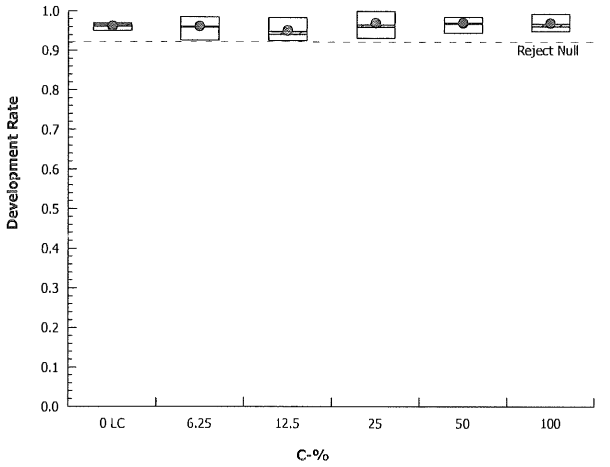
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.373	1.345	1.401	1.384	1.345	1.397	0.01011	1.65%	0.0%
6.25		5	1.371	1.302	1.44	1.369	1.293	1.449	0.02492	4.06%	0.1%
12.5		5	1.346	1.274	1.417	1.325	1.293	1.442	0.02574	4.28%	1.96%
25		5	1.396	1.292	1.499	1.367	1.304	1.529	0.03737	5.99%	-1.68%
50		5	1.395	1.336	1.454	1.396	1.331	1.448	0.02127	3.41%	-1.67%
100		5	1.396	1.324	1.467	1.371	1.343	1.492	0.02576	4.13%	-1.67%

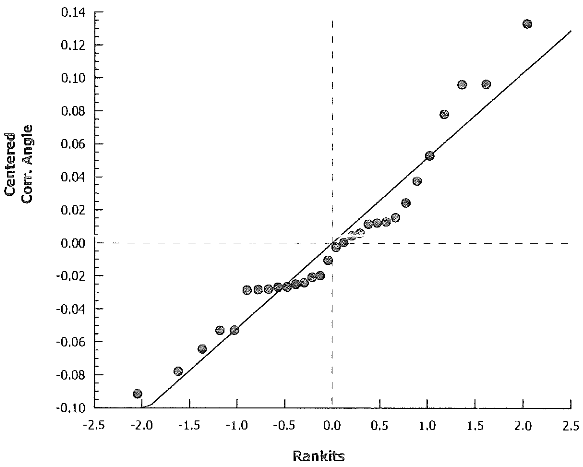
Analyst: AC QA:

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	06-2689-4439	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 10/3/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	01-3399-6185	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.1%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control	6.25	27	16	1	8	0.8003	Asymp	Non-Significant Effect
	12.5	30	16	1	8	0.9446	Asymp	Non-Significant Effect
	25	24	16	1	8	0.5394	Asymp	Non-Significant Effect
	50	24	16	1	8	0.5394	Asymp	Non-Significant Effect
	100	30	16	1	8	0.9446	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02343797	0.004687595	5	1.041	0.4165	Non-Significant Effect
Error	0.1080501	0.004502086	24			
Total	0.131488		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.098	4.248	0.3953	Equal Variances
Variances	Levene Equality of Variance	6.632	3.895	0.0005	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8004	0.9031	<0.0001	Non-normal Distribution

Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9986	0.9948	1	1	0.9932	1	0.00137	0.31%	0.0%
6.25		5	0.9863	0.9483	1	1	0.9315	1	0.0137	3.11%	1.24%
12.5		5	1	1	1	1	1	1	0	0.0%	-0.14%
25		5	0.9904	0.9718	1	1	0.9658	1	0.006711	1.52%	0.82%
50		5	0.9781	0.9337	1	1	0.9178	1	0.01598	3.65%	2.06%
100		5	1	1	1	1	1	1	0	0.0%	-0.14%

Angular (Corrected) Transformed Summary

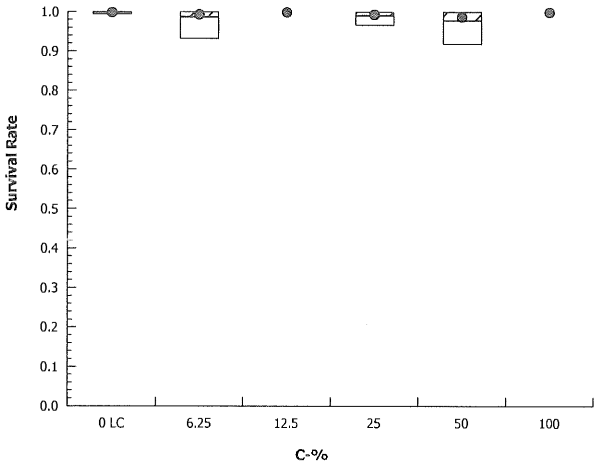
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.521	1.498	1.544	1.529	1.488	1.529	0.008291	1.22%	0.0%
6.25		5	1.485	1.361	1.609	1.529	1.306	1.529	0.04468	6.73%	2.39%
12.5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	-0.55%
25		5	1.485	1.404	1.566	1.529	1.385	1.529	0.02913	4.39%	2.36%
50		5	1.455	1.316	1.593	1.529	1.28	1.529	0.04989	7.67%	4.38%
100		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	-0.55%

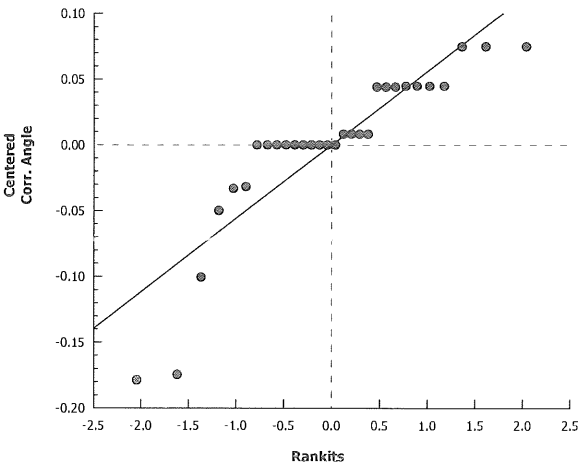
Analyst: AC QA: S 10/3/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 01-3399-6185 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:26 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: AC QA: 10/13

CETIS Analytical Report

Report Date: 03 Oct-17 12:27 (p 1 of 2)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 04-9273-7903 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:26 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	504782	1000	Yes	Two-Point Interpolation

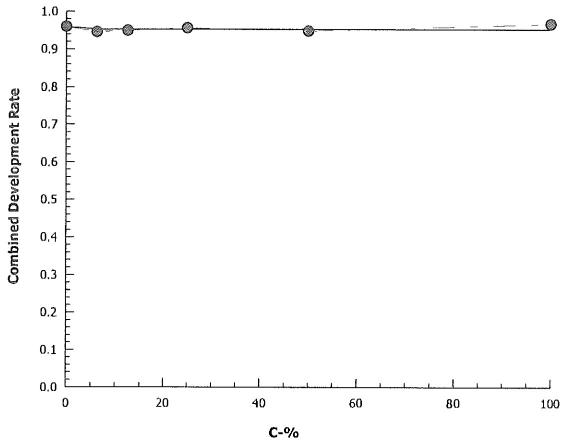
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9595	0.9497	0.9701	0.003787	0.008467	0.88%	0.0%	757	789
6.25		5	0.9449	0.9178	0.9655	0.009773	0.02185	2.31%	1.52%	747	790
12.5		5	0.9478	0.9247	0.9835	0.009941	0.02223	2.35%	1.22%	747	787
25		5	0.9553	0.9178	0.9747	0.009798	0.02191	2.29%	0.44%	734	768
50		5	0.9465	0.9041	0.9811	0.01506	0.03367	3.56%	1.36%	749	790
100		5	0.9671	0.9489	0.9938	0.007573	0.01693	1.75%	-0.79%	814	842

Graphics



Analyst: AC QA:

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	10-2372-1220	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:26	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	779934	1000	Yes	Two-Point Interpolation

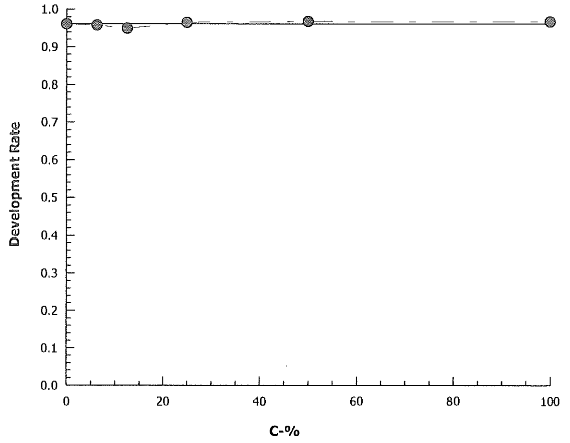
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Development Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9608	0.9497	0.9701	0.003959	0.008853	0.92%	0.0%	757	788
6.25		5	0.9584	0.925	0.9853	0.009733	0.02176	2.27%	0.25%	747	780
12.5		5	0.9478	0.9247	0.9835	0.009941	0.02223	2.35%	1.36%	747	787
25		5	0.9647	0.9306	1	0.01134	0.02537	2.63%	-0.4%	734	761
50		5	0.9679	0.9437	0.9851	0.007506	0.01678	1.73%	-0.73%	749	774
100		5	0.9671	0.9489	0.9938	0.007573	0.01693	1.75%	-0.65%	814	842

Graphics



Analyst: AC QA:

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:31 (p 1 of 1)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 15-2611-7165 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Oct-17 12:30 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.52%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	13.89	2.132	0.048	4	<0.0001	CDF	Non-Significant Effect
		12.5*	11.92	2.132	0.057	4	0.0001	CDF	Non-Significant Effect
		25*	14.46	2.132	0.049	4	<0.0001	CDF	Non-Significant Effect
		50*	9.217	2.132	0.074	4	0.0004	CDF	Non-Significant Effect
		100*	13.77	2.132	0.057	4	<0.0001	CDF	Non-Significant Effect
		101*	18.82	2.015	0.035	5	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01124992	0.001874986	6	0.6988	0.6527	Non-Significant Effect
Error	0.07512391	0.002682996	28			
Total	0.08637382		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.799	16.81	0.4461	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9789	0.9146	0.7243	Normal Distribution

Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9595	0.949	0.97	0.9589	0.9497	0.9701	0.003787	0.88%	0.0%
6.25		5	0.9449	0.9178	0.972	0.9565	0.9178	0.9655	0.009773	2.31%	1.52%
12.5		5	0.9478	0.9202	0.9754	0.9408	0.9247	0.9835	0.009941	2.35%	1.22%
25		5	0.9553	0.9281	0.9825	0.9592	0.9178	0.9747	0.009798	2.29%	0.44%
50		5	0.9465	0.9047	0.9883	0.9598	0.9041	0.9811	0.01506	3.56%	1.36%
100		5	0.9671	0.9461	0.9881	0.9608	0.9489	0.9938	0.007573	1.75%	-0.79%
101		5	0.9537	0.9354	0.972	0.9518	0.9349	0.9706	0.006597	1.55%	0.61%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.369	1.342	1.396	1.367	1.345	1.397	0.009718	1.59%	0.0%
6.25		5	1.337	1.279	1.396	1.361	1.28	1.384	0.02113	3.53%	2.32%
12.5		5	1.346	1.274	1.417	1.325	1.293	1.442	0.02574	4.28%	1.71%
25		5	1.362	1.301	1.423	1.367	1.28	1.411	0.02201	3.61%	0.52%
50		5	1.347	1.253	1.441	1.369	1.256	1.433	0.03393	5.63%	1.63%
100		5	1.396	1.324	1.467	1.371	1.343	1.492	0.02576	4.13%	-1.93%
101		5	1.356	1.312	1.4	1.349	1.313	1.398	0.01591	2.62%	0.95%

Analyst: AC QA: 10/13/17

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:31 (p 1 of 1)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	04-7999-0521	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:30	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.51%	101	>101	NA	0.9901

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25*	13.12	2.132	0.056	4	<0.0001	CDF	Non-Significant Effect
		12.5*	11.79	2.132	0.057	4	0.0001	CDF	Non-Significant Effect
		25*	9.605	2.132	0.081	4	0.0003	CDF	Non-Significant Effect
		50*	16.21	2.015	0.046	5	<0.0001	CDF	Non-Significant Effect
		100*	13.64	2.132	0.057	4	<0.0001	CDF	Non-Significant Effect
		101*	18.54	2.015	0.036	5	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01245745	0.002076242	6	0.7002	0.6517	Non-Significant Effect
Error	0.0830247	0.002965168	28			
Total	0.09548215		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.407	16.81	0.3792	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9537	0.9146	0.1467	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9608	0.9499	0.9718	0.9655	0.9497	0.9701	0.003959	0.92%	0.0%
6.25		5	0.9584	0.9314	0.9854	0.9597	0.925	0.9853	0.009733	2.27%	0.25%
12.5		5	0.9478	0.9202	0.9754	0.9408	0.9247	0.9835	0.009941	2.35%	1.36%
25		5	0.9647	0.9332	0.9962	0.9592	0.9306	1	0.01134	2.63%	-0.4%
50		5	0.9679	0.947	0.9887	0.9697	0.9437	0.9851	0.007506	1.73%	-0.73%
100		5	0.9671	0.9461	0.9881	0.9608	0.9489	0.9938	0.007573	1.75%	-0.65%
101		5	0.9537	0.9354	0.972	0.9518	0.9349	0.9706	0.006597	1.55%	0.74%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.373	1.345	1.401	1.384	1.345	1.397	0.01011	1.65%	0.0%
6.25		5	1.371	1.302	1.44	1.369	1.293	1.449	0.02492	4.06%	0.1%
12.5		5	1.346	1.274	1.417	1.325	1.293	1.442	0.02574	4.28%	1.96%
25		5	1.396	1.292	1.499	1.367	1.304	1.529	0.03737	5.99%	-1.68%
50		5	1.395	1.336	1.454	1.396	1.331	1.448	0.02127	3.41%	-1.67%
100		5	1.396	1.324	1.467	1.371	1.343	1.492	0.02576	4.13%	-1.67%
101		5	1.356	1.312	1.4	1.349	1.313	1.398	0.01591	2.62%	1.2%

Analyst: AC QA: 10/13/17

CETIS Analytical Report

Report Date: 03 Oct-17 12:32 (p 1 of 1)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	20-9724-8216	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.49%	Passes development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	0.8739	1.86	0.035	8	0.2038	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006783992	0.0006783992	1	0.7636	0.4077	Non-Significant Effect
Error	0.007106984	0.0008883729	8			
Total	0.007785383		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.476	23.15	0.4014	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.96	0.7411	0.7862	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9608	0.9499	0.9718	0.9655	0.9497	0.9701	0.003959	0.92%	0.0%
101		5	0.9537	0.9354	0.972	0.9518	0.9349	0.9706	0.006597	1.55%	0.74%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.373	1.345	1.401	1.384	1.345	1.397	0.01011	1.65%	0.0%
101		5	1.356	1.312	1.4	1.349	1.313	1.398	0.01591	2.62%	1.2%

Analyst: AC QA: 10/3/17

CETIS Analytical Report

TST

Report Date: 03 Oct-17 12:32 (p 1 of 1)
Test Code: 1708-S194 | 08-6843-4483

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	21-1961-4019	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Oct-17 12:31	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101= 100 percent sample filtered to 0.45um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.51%	Passes development rate

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	18.54	2.015	0.036	5	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006783992	0.0006783992	1	0.7636	0.4077	Non-Significant Effect
Error	0.007106984	0.0008883729	8			
Total	0.007785383		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.476	23.15	0.4014	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.96	0.7411	0.7862	Normal Distribution

Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9608	0.9499	0.9718	0.9655	0.9497	0.9701	0.003959	0.92%	0.0%
101		5	0.9537	0.9354	0.972	0.9518	0.9349	0.9706	0.006597	1.55%	0.74%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.373	1.345	1.401	1.384	1.345	1.397	0.01011	1.65%	0.0%
101		5	1.356	1.312	1.4	1.349	1.313	1.398	0.01591	2.62%	1.2%

Analyst: AC QA: 10/13/17

Embryo Larval Bioassay **48-hour Development**

Client: AMEC/POSD
Test Species: *M. galloprovincialis*
Sample ID: SIYB-REF
Start Date/Time: 8/24/2017 1600
Test ID: 1708-S194
End Date/Time: 8/26/2017 1600

Random #	Number Normal	Number Abnormal		Total Number Counted	Intials/Date
		Number Curved Shell	All other abnormal		
246	167	0	9	176	RL 9/7/17
247	141	0	0	141	
248	156	0	3	159	
249	171	0	5	176	
250	165	0	5	170	
251	160	0	5	165	
252	134	0	2	136	
253	132	0	2	134	
254	134	0	10	144	
255	143	0	9	152	
256	172	0	10	182	
257	151	0	8	159	
258	164	0	7	171	
259	143	0	6	149	
260	159	0	1	160	
261	158	0	8	166	
262	141	0	6	147	
263	151	0	10	161	
264	134	0	8	142	
265	162	0	5	167	
266	167	0	7	174	
267	158	0	11	169	
268	148	0	12	160	
269	154	0	7	161	
270	141	0	5	146	
271	135	0	11	146	
272	154	0	4	σ 9/18 wick ~~159~~ 158	
273	140	0	5	145	
274	179	0	3	182	
275	170	0	7	177	
276	139	0	7	146	
277	163	0	8	171	
278	147	0	6	153	
279	168	0	6	174	
280	171	0	6	177	

Comments:

QC Check: AC 9/8/17
Final Review: σ 11/2/17

CETIS Test Data Worksheet

Report Date: 21 Aug-17 18:08 (p 1 of 1)
Test Code: 08-6843-4483/1708-S194

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date:	24 Aug-17	**Species:**	Mytilus galloprovincialis	**Sample Code:**	17- 0938
End Date:	26 Aug-17	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Shelter Island Yacht Basin
Sample Date:	23 Aug-17	**Material:**	Ambient Water	**Sample Station:**	SIYB-REF

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	277			158	147	AC 8/27/17
0	LC	2	265					
0	LC	3	273					
0	LC	4	270					
0	LC	5	257					
6.25		1	269					
6.25		2	252					
6.25		3	259					
6.25		4	279					
6.25		5	268					
12.5		1	263					
12.5		2	255					
12.5		3	276					
12.5		4	274					
12.5		5	271					
25		1	262					
25		2	258					
25		3	247					
25		4	272					
25		5	254					
50		1	251					
50		2	253					
50		3	264					
50		4	266					
50		5	248					
100		1	260			162	159	
100		2	278					
100		3	249					
100		4	275					
100		5	246					
101		1	256					
100% 101 @		2	250					
filtered 101		3	261					
101		4	267					
101		5	280					

QC'ing

@ Q18 AC 8/21/17

Analyst: AC QA: lk W12/17

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-REF
Sample Log No.: 17- 0938
Test No.: 1708-S 194

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	34.0	33.5	33.3	15.0	15.0	14.8	8.2	7.9	7.8	8.09	8.06	8.01
6.25	33.9	33.6	33.7	15.0	14.8	14.7	8.2	7.9	7.8	8.05	8.03	8.00
12.5	33.8	33.6	33.7	14.9	14.8	14.6	8.2	7.9	7.8	8.04	8.03	8.00
25	33.8	33.7	33.7	15.0	14.8	14.6	8.3	7.8	7.8	8.03	8.03	7.99
50	33.9	33.6	33.7	15.0	14.8	14.6	8.3	7.9	7.8	8.03	8.03	7.99
100	34.0	33.8	33.9	15.0	14.9	14.5	8.4	7.8	7.8	8.03	8.02	7.99
100 filtered	33.9	33.4	33.6	15.5	15.3	14.4	7.1	7.5	7.7	8.03	8.01	8.00

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	AC/EG	▨	▨

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: 2 10/12/17

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC/POSD SWB - REF
Test No.: 1708-S194
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, larg Mus
Female 2	2	Good density, Ⓐ ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
T0 A	135	135	1.00	99.9%
T0 B	162	162	100	
T0 C	Ⓐ 143	143	100	
T0 D	134	134	1.00	
T0 E	157	158	99.4	
T0 F	145	145	100	

48-h QC: 134/142 (94%)

Comments: Ⓐ CH Q18 8/24/17 X dividing = 146

QC Check: AC 8/27/17

Final Review: [illegible]

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Pacific Topsmelt 96-hr Survival

All Sites

CETIS Summary Report

Report Date: 08 Sep-17 11:13 (p 1 of 1)
Test Code: 1708-S181 | 06-2918-2911

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	12-4309-9993	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 13:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 13:40	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	04-1881-2844	**Code:**	17-0932	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 14:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	23h (8 °C)	**Station:**	SIYB-1		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
11-3022-3251	96h Survival Rate	100	>100	NA	13.2%	~~1~~ 0.49	Steel Many-One Rank Sum Test

Q18 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
33		6	1	1	1	1	1	0	0	0.0%	-3.45%
100		6	0.9333	0.762	1	0.6	1	0.06667	0.1633	17.5%	3.45%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	1	1	1	1	0.8	1
25		1	1	1	1	0.8	1
33		1	1	1	1	1	1
100		1	1	1	0.6	1	1

Analyst: QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:12 (p 1 of 1)
Test Code: 1708-S181 | 06-2918-2911

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 11-3022-3251 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 11:12 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	13.2%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		33	42	26	1	10	0.8900	Asymp	Non-Significant Effect
		100	38.5	26	1	10	0.7200	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01758463	0.005861543	3	0.4338	0.7311	Non-Significant Effect
Error	0.2702381	0.01351191	20			
Total	0.2878228		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.4338	4.938	0.7311	Equal Variances
Variances	Levene Equality of Variance	2.711	4.938	0.0723	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.6216	0.884	<0.0001	Non-normal Distribution

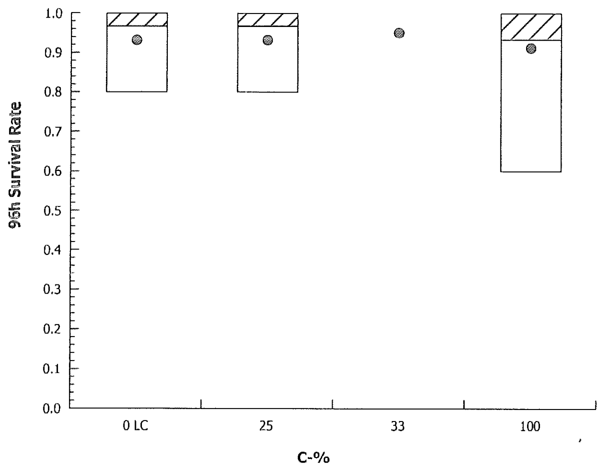
96h Survival Rate Summary

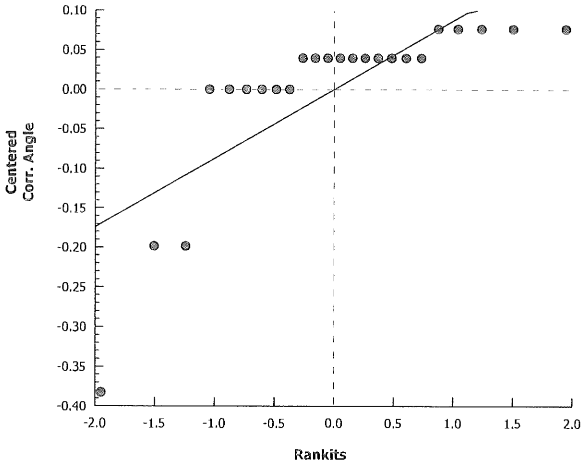
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	1	1	1	1	1	1	0	0.0%	-3.45%
100		6	0.9333	0.762	1	1	0.6	1	0.06667	17.5%	3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
100		6	1.269	1.072	1.465	1.345	0.8861	1.345	0.07653	14.78%	2.82%

Graphics





Analyst: QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 11:13 (p 1 of 1)
Test Code: 1708-S181 | 06-2918-2911

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	05-4448-6447	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:12	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	11.1%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		33*	9.474	1.476	0.047	5	0.0001	CDF	Non-Significant Effect
		100*	2.707	1.44	0.119	6	0.0176	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01758463	0.005861543	3	0.4338	0.7311	Non-Significant Effect
Error	0.2702381	0.01351191	20			
Total	0.2878228		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.4338	4.938	0.7311	Equal Variances
Variances	Levene Equality of Variance	2.711	4.938	0.0723	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.6216	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	1	1	1	1	1	1	0	0.0%	-3.45%
100		6	0.9333	0.762	1	1	0.6	1	0.06667	17.5%	3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
100		6	1.269	1.072	1.465	1.345	0.8861	1.345	0.07653	14.78%	2.82%

Analyst: QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:21 (p 1 of 1)
Test Code: 1708-S181 | 06-2918-2911

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 20-2723-9738 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:20 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1651919	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Lab Control	6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
25		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
33		6	1	1	1	0	0	0.0%	-3.45%	30	30
100		6	0.9333	0.6	1	0.06667	0.1633	17.5%	3.45%	28	30

Analyst:________ QA: 9/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-1 17-0932
Test No.: 1708-S 181

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1340
End Date/Time: 8/28/2017 1340

	Tech Initials				
	0	24	48	72	96
Counts:	AD/CG	CG	RH	RH	RH
Readings:	AS	CG	PA	ACS	AI
Dilutions made by:	AD		PA		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	33.9	33.8	i33.6	33.6	34.1	20.6	20.0	i20.2	20.6	20.3	7.1	6.4	i6.8	7.3	6.3	7.92	7.90	i7.98	7.90	7.93
#1	B	5	5	5	5	5			f34.0					f20.3					f6.1					f7.93		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	34.0	33.8	i33.7	33.9	34.1	20.7	20.0	i20.3	20.5	20.3	7.1	6.3	i7.2	7.4	6.2	7.93	7.91	i8.02	7.12	7.92
	B	5	5	5	5	5			f34.0					f20.1					f6.1					f7.93		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
Φ20 ~~50~~	A	5	5	5	5	5	34.0	33.9	i33.6	34.0	34.3	20.8	20.0	i20.4	20.5	20.4	7.1	6.2	i7.3	7.4	6.1	7.94	7.90	i8.03	7.91	7.92
33	B	5	5	5	5	5			f34.1					f20.1					f6.1					f7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.1	33.8	i33.8	34.0	34.2	21.3	20.1	i20.5	20.4	20.4	7.3	6.3	i7.6	7.3	6.1	7.97	7.92	i7.99	7.91	7.92
	B	5	5	5	5	5			f34.0					f20.3					f6.1					f7.92		
	C	5	5	5	5	5																				
	D	5	5	4	3	3																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: ACS
Initiated by: AD/CG

Animal Source/Date Received: ABS 8/22/17

Age at Initiation: 11 d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

	Feeding Times				
	0	24	48	72	96
AM:		0900	0810	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:21 (p 1 of 1)
Test Code: 1708-S182 | 21-3632-0109

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	04-9688-6766	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 13:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 13:40	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	10-4048-3862	**Code:**	17-0933	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 13:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	24h (2.5 °C)	**Station:**	SIYB-2		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
05-6270-0406	96h Survival Rate	100	>100	NA	14.1%	~~1~~ 0.49	Steel Many-One Rank Sum Test

918 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
33		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
100		6	0.9333	0.762	1	0.6	1	0.06667	0.1633	17.5%	3.45%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	1	1	1	1	0.8	1
25		1	1	1	1	0.8	1
33		1	1	1	1	0.8	1
100		1	1	1	1	0.6	1

Analyst: ______ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:21 (p 1 of 1)
Test Code: 1708-S182 | 21-3632-0109

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	05-6270-0406	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	14.1%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		33	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		100	38.5	26	1	10	0.7200	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006109081	0.00203636	3	0.1283	0.9422	Non-Significant Effect
Error	0.3174947	0.01587474	20			
Total	0.3236038		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.512	11.34	0.3192	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.5751	0.884	<0.0001	Non-normal Distribution

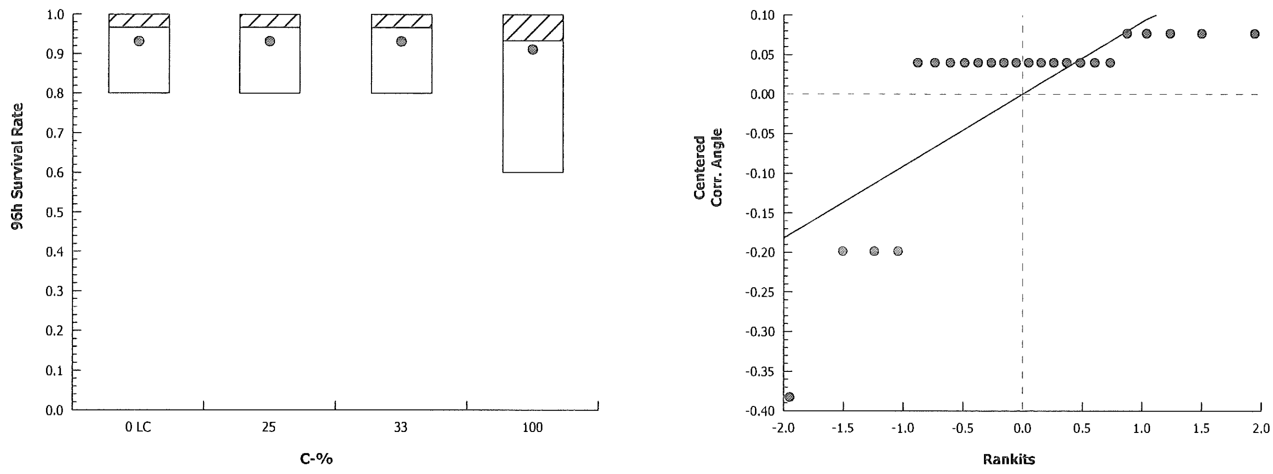
96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9333	0.762	1	1	0.6	1	0.06667	17.5%	3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.269	1.072	1.465	1.345	0.8861	1.345	0.07653	14.78%	2.82%

Graphics



Analyst: QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date:	08 Sep-17 11:21 (p 1 of 1)
Test Code:	1708-S182 | 21-3632-0109

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	14-8054-2473	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:20	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	11.1%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		33*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		100*	2.707	1.44	0.119	6	0.0176	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006109081	0.00203636	3	0.1283	0.9422	Non-Significant Effect
Error	0.3174947	0.01587474	20			
Total	0.3236038		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.512	11.34	0.3192	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.5751	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9333	0.762	1	1	0.6	1	0.06667	17.5%	3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.269	1.072	1.465	1.345	0.8861	1.345	0.07653	14.78%	2.82%

Analyst: QA: AC 9/8/17

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	20-4840-0360	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	62151	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
25		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
33		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
100		6	0.9333	0.6	1	0.06667	0.1633	17.5%	3.45%	28	30

Analyst: AC QA: 9/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-2 17-0933
Test No.: 1708-S182

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1340
End Date/Time: 8/28/2017 1340

	Tech Initials				
	0	24	48	72	96
Counts:	AD/CG	CG	RH	RH	RH
Readings:	ACS	CG	PA	ACS	RH
Dilutions made by:	AD		PA	/	

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	33.9	33.8	i 33.6	33.6	~~33.0~~	20.6	20.0	i 20.2	20.6	~~20.6~~	7.1	6.4	i 6.8	7.3	~~6.1~~	7.92	7.90	i 7.98	7.90	~~7.90~~
#1	B	5	5	5	5	5			f 34.0		34.1			f 20.3		20.3			f 6.1		6.3			f 7.93		7.93
	C	5	5	5	5	5					(R)					(R)					(R)					(R)
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	34.0	33.6	i 33.6	33.5	33.6	20.7	20.2	i 20.1	20.5	20.6	7.2	6.5	i 7.2	7.4	6.1	7.94	7.90	i 8.05	7.93	7.90
	B	5	5	5	5	5			f 33.6					f 20.3					f 6.1					f 7.93		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
Q20 ~~50~~ 33	A	5	5	5	5	5	34.0	33.8	i 33.6	34.0	34.2	20.8	20.1	i 20.2	20.3	20.4	7.2	6.4	i 7.2	7.4	6.2	7.94	7.88	i 8.04	7.93	7.93
	B	5	5	5	5	5			f 33.9					f 20.4					f 6.1					f 7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	4	4																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.2	33.9	i 33.8	34.0	34.1	21.2	20.3	i 20.4	20.4	20.4	7.3	6.3	i 8.0	7.5	6.2	7.96	7.88	i 7.99	7.92	7.92
	B	5	5	5	5	5			f 33.9					f 20.4					f 6.1					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	4	3																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: ACS
Initiated by: AD/CG

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 11 d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

	Feeding Times				
	0	24	48	72	96
AM:		0900	0800	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one [✓ y] / n)

(R) RH 8/28/17

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:26 (p 1 of 1)
Test Code: 1708-S183 | 10-4327-8680

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	08-3249-6770	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 13:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 13:40	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	10-5702-9791	**Code:**	17-0934	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 12:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	25h (3.5 °C)	**Station:**	SIYB-3		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
12-9459-3484	96h Survival Rate	100	>100	NA	8.86%	~~1~~ 0.0	Steel Many-One Rank Sum Test

Q18 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	-3.45%
33		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	-3.45%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	1	1	1	1	0.8	1
25		1	1	1	1	1	1
33		0.8	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: ____ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:25 (p 1 of 1)
Test Code: 1708-S183 | 10-4327-8680

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	12-9459-3484	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:25	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	8.86%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	42	26	1	10	0.8900	Asymp	Non-Significant Effect
		33	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		100	42	26	1	10	0.8900	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009451317	0.003150439	3	0.6667	0.5823	Non-Significant Effect
Error	0.09451316	0.004725658	20			
Total	0.1039645		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.6667	4.938	0.5823	Equal Variances
Variances	Levene Equality of Variance	4.167	4.938	0.0191	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.5451	0.884	<0.0001	Non-normal Distribution

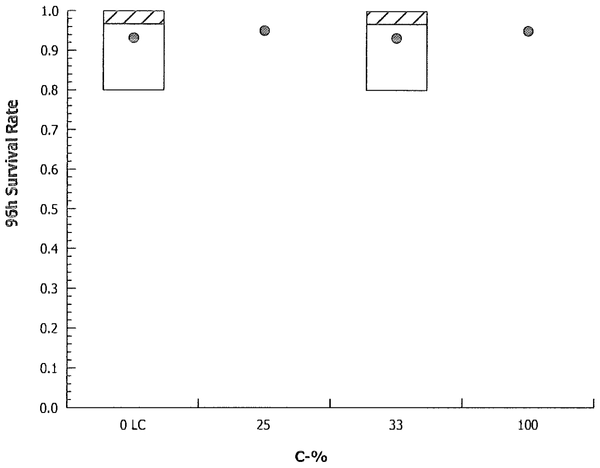
96h Survival Rate Summary

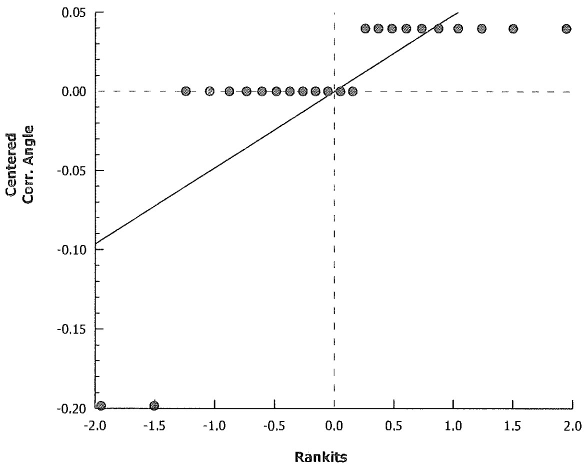
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	-3.45%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	-3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%

Graphics





Analyst: QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 11:26 (p 1 of 1)
Test Code: 1708-S183 | 10-4327-8680

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 10-0548-4241 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 11:25 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	6.3%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	9.474	1.476	0.047	5	0.0001	CDF	Non-Significant Effect
		33*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		100*	9.474	1.476	0.047	5	0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009451317	0.003150439	3	0.6667	0.5823	Non-Significant Effect
Error	0.09451316	0.004725658	20			
Total	0.1039645		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.6667	4.938	0.5823	Equal Variances
Variances	Levene Equality of Variance	4.167	4.938	0.0191	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.5451	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	-3.45%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	-3.45%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%

Analyst: QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:22 (p 1 of 1)
Test Code: 1708-S183 | 10-4327-8680

Pacific Topsmelt 96-h Acute Survival Test | **Nautilus Environmental (CA)**

Analysis ID: 18-9732-1925 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 13:21 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	61078	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
25		6	1	1	1	0	0	0.0%	-3.45%	30	30
33		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
100		6	1	1	1	0	0	0.0%	-3.45%	30	30

Analyst: QA: 9/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-3 17-0934
Test No.: 1708-S183

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1340
End Date/Time: 8/28/2017 1340

	Tech Initials				
	0	24	48	72	96
Counts:	AD/CG	CG	RH	RH	RH
Readings:	ACS	CG	PA	ACS	RH
Dilutions made by:	AD		PA		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	33.9	33.8	i 33.6	33.6	34.1	20.6	20.0	i 20.7	~~20.4~~ 20.6 Ⓒ	20.3	7.1	6.4	i 6.8	7.3	6.3	7.92	7.90	i 7.98	7.90	7.93
#1	B	5	5	5	5	5			f 34.0					f 20.3					f 6.1					f 7.93		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	Ⓐ ~~5~~ 4	4	4	4																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	33.9	33.6	i 33.5	33.6	33.6	20.8	20.3	i 20.4	20.5	20.6	7.1	6.2	i 7.1	7.2	6.1	7.94	7.84	i 8.02	7.92	7.90
	B	5	5	5	5	5			f 33.6					f 20.5					f 6.0					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
Q20 ~~50~~ 33	A	5	4	4	4	4	34.1	33.7	i 33.6	33.8	33.8	21.0	20.2	i 20.5	20.5	20.5	7.1	6.4	i 7.2	7.5	6.2	7.95	7.89	i 8.02	7.95	7.91
	B	5	5	5	5	5			f 33.6					f 20.5				Ⓒ	f ~~7~~ 6.1					f 7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.2	33.9	i 33.8	34.0	34.0	21.7	20.2	i 20.6	20.4	20.6	7.4	6.2	i 7.9	7.6	6.2	7.97	7.89	i 8.00	7.93	7.90
	B	5	5	5	5	5			f 33.8					f 20.5					f 6.3					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: ACS
Initiated by: AD/CG

Animal Source/Date Received: ABS 8/22/17

Age at Initiation: 11d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

	Feeding Times				
	0	24	48	72	96
AM:		0900	0810	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n) Ⓐ CG Q24 8/25/17 Ⓑ Q18 8/26/17

Ⓒ Q19 ACS 8/27/17

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:32 (p 1 of 1)
Test Code: 1708-S184 | 07-0584-1714

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	08-1528-4396	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 14:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	17-1645-0419	**Code:**	17-0935	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 11:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	27h (3 °C)	**Station:**	SIYB-4		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
14-4778-8074	96h Survival Rate	100	>100	NA	11.6%	~~1~~ 0.49	Steel Many-One Rank Sum Test

GI8 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	0.8	1	0.04216	0.1033	11.07%	0.0%
25		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	-3.57%
33		6	1	1	1	1	1	0	0	0.0%	-7.14%
100		6	0.9333	0.8249	1	0.8	1	0.04216	0.1033	11.07%	0.0%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	0.8	1	1	1	1	0.8
25		1	1	1	1	0.8	1
33		1	1	1	1	1	1
100		1	1	0.8	1	1	0.8

Analyst:______ QA: AC 9/8/17

CETIS Analytical Report

Report Date:	08 Sep-17 11:32 (p 1 of 1)
Test Code:	1708-S184 | 07-0584-1714

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	14-4778-8074	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:32	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	11.6%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	42	26	2	10	0.8900	Asymp	Non-Significant Effect
		33	45	26	1	10	0.9626	Asymp	Non-Significant Effect
		100	39	26	2	10	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02599112	0.008663706	3	0.873	0.4715	Non-Significant Effect
Error	0.1984776	0.009923882	20			
Total	0.2244688		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.873	4.938	0.4715	Equal Variances
Variances	Levene Equality of Variance	7.917	4.938	0.0011	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7659	0.884	<0.0001	Non-normal Distribution

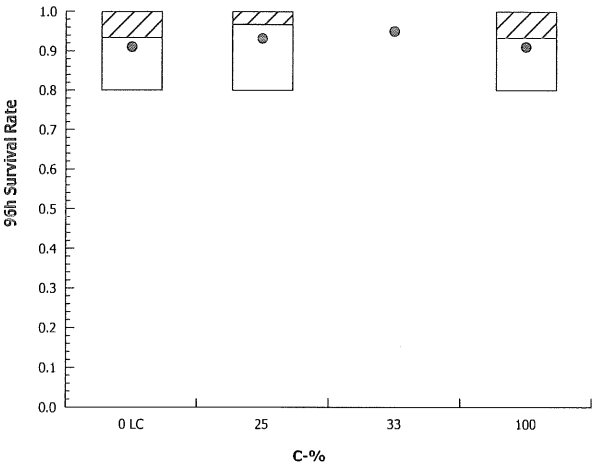
96h Survival Rate Summary

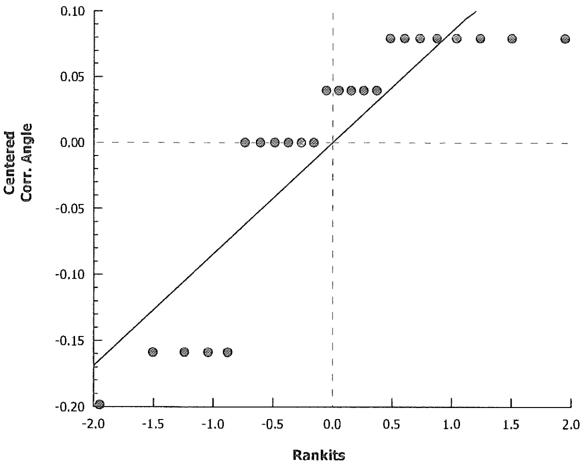
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	-3.57%
33		6	1	1	1	1	1	1	0	0.0%	-7.14%
100		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	-3.14%
33		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-6.27%
100		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%

Graphics





Analyst: QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 11:32 (p 1 of 1)
Test Code: 1708-S184 | 07-0584-1714

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	10-5041-2600	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:32	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	8.63%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	5.187	1.383	0.078	9	0.0003	CDF	Non-Significant Effect
		33*	8.28	1.476	0.059	5	0.0002	CDF	Non-Significant Effect
		100*	3.938	1.383	0.089	9	0.0017	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02599112	0.008663706	3	0.873	0.4715	Non-Significant Effect
Error	0.1984776	0.009923882	20			
Total	0.2244688		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.873	4.938	0.4715	Equal Variances
Variances	Levene Equality of Variance	7.917	4.938	0.0011	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7659	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	-3.57%
33		6	1	1	1	1	1	1	0	0.0%	-7.14%
100		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	-3.14%
33		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-6.27%
100		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%

Analyst: JJ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:20 (p 1 of 1)
Test Code: 1708-S184 | 07-0584-1714

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	00-7339-4803	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	538479	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9333	0.8	1	0.04216	0.1033	11.07%	0.0%	28	30
25		6	0.9667	0.8	1	0.03333	0.08165	8.45%	-3.57%	29	30
33		6	1	1	1	0	0	0.0%	-7.14%	30	30
100		6	0.9333	0.8	1	0.04216	0.1033	11.07%	0.0%	28	30

Analyst: AC QA: KA 9/18/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-4 17-0935
Test No.: 1708-S 184

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1400
End Date/Time: 8/28/2017 1400

Tech Initials	0	24	48	72	96
Counts:	AP	CG	PA	PA	PA
Readings:	ACG	CG	PA	ACG	PA
Dilutions made by:	AD		PA		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	4	4	4	4	33.8	33.6	~~i 20.3~~ 33.6 i	33.7	33.6	20.3	20.2	i 20.3	20.5	20.5	7.4	6.4	i 6.8	7.4	6.4	7.98	7.89	i 8.07	7.92	7.90
#2	B	5	5	5	5	5			f 33.9					f 20.2					f 6.1					f 7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	4	4	4	4																				
25	A	5	5	5	5	5	34.0	33.8	i 33.6	34.0	34.3	20.8	20.1	i 20.6	20.2	20.3	7.1	6.2	i 7.2	7.4	6.2	7.95	7.88	i 8.05	7.92	7.89
	B	5	5	5	5	5			f 33.9					f 20.3					f 6.0					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	4	4	4																				
	F	5	5	5	5	5																				
Q20 ~~50~~ 33	A	5	5	5	5	5	34.1	33.7	i 33.6	34.2	34.5	20.9	20.0	i 20.8	20.2	20.3	7.1	6.5	i 7.3	7.5	6.3	7.96	7.91	i 8.04	7.95	7.93
	B	5	5	5	5	5			f 33.9					f 20.4					f 6.2					f 7.94		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.2	33.9	i 33.8	34.3	34.6	21.6	20.1	i 21.2	20.1	20.3	7.3	6.5	i 7.8	7.4	6.1	7.96	7.91	i 7.99	7.93	7.92
	B	5	5	5	5	5			f 34.0					f 20.3					f 6.2					f 7.92		
	C	5	5	5	5	4																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	4	4	4	4																				

Initial Counts QC'd by: CG
Initiated by: AD

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 11d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

Feeding Times	0	24	48	72	96
AM:		0900	0910	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n) (A) Q48 8/26/17

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:36 (p 1 of 1)
Test Code: 1708-S185 | 07-6123-5784

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	20-4712-3233	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 14:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	17-2048-3742	**Code:**	17-0936	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 10:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	28h (5 °C)	**Station:**	SIYB-5		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
19-2393-0925	96h Survival Rate	100	>100	NA	12.3%	~~1~~ 0.49	Steel Many-One Rank Sum Test

Ø18 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	0.8	1	0.04216	0.1033	11.07%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	-7.14%
33		6	0.9333	0.8249	1	0.8	1	0.04216	0.1033	11.07%	0.0%
100		6	0.9333	0.8249	1	0.8	1	0.04216	0.1033	11.07%	0.0%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	0.8	1	1	1	1	0.8
25		1	1	1	1	1	1
33		1	0.8	0.8	1	1	1
100		1	1	1	1	0.8	0.8

Analyst: ______ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:36 (p 1 of 1)
Test Code: 1708-S185 | 07-6123-5784

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	19-2393-0925	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:36	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	12.3%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	45	26	1	10	0.9626	Asymp	Non-Significant Effect
		33	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	2	10	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02835395	0.009451317	3	0.8333	0.4913	Non-Significant Effect
Error	0.2268316	0.01134158	20			
Total	0.2551855		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.8333	4.938	0.4913	Equal Variances
Variances	Levene Equality of Variance	13.33	4.938	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7174	0.884	<0.0001	Non-normal Distribution

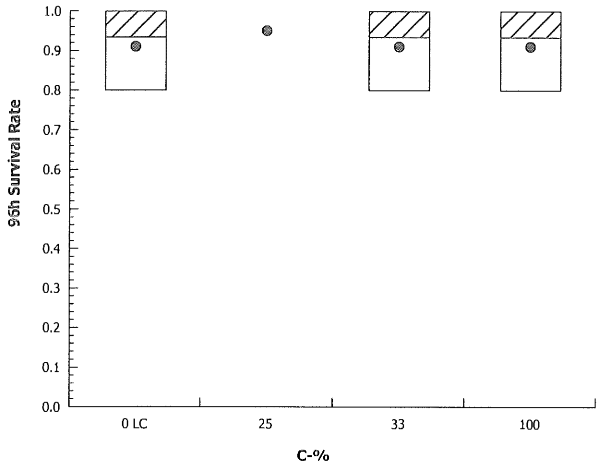
96h Survival Rate Summary

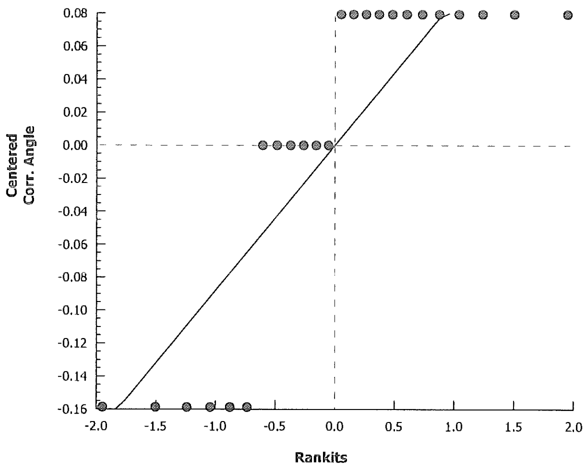
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	-7.14%
33		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
100		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-6.27%
33		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
100		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%

Graphics





Analyst:______ QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date:	08 Sep-17 11:36 (p 1 of 1)
Test Code:	1708-S185 | 07-6123-5784

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	12-8591-8681	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:36	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	8.63%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	8.28	1.476	0.059	5	0.0002	CDF	Non-Significant Effect
		33*	3.938	1.383	0.089	9	0.0017	CDF	Non-Significant Effect
		100*	3.938	1.383	0.089	9	0.0017	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02835395	0.009451317	3	0.8333	0.4913	Non-Significant Effect
Error	0.2268316	0.01134158	20			
Total	0.2551855		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.8333	4.938	0.4913	Equal Variances
Variances	Levene Equality of Variance	13.33	4.938	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7174	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	-7.14%
33		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%
100		6	0.9333	0.8249	1	1	0.8	1	0.04216	11.07%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-6.27%
33		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%
100		6	1.266	1.137	1.395	1.345	1.107	1.345	0.0502	9.71%	0.0%

Analyst: ________ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:20 (p 1 of 1)
Test Code: 1708-S185 | 07-6123-5784

Pacific Topsmelt 96-h Acute Survival Test					**Nautilus Environmental (CA)**
Analysis ID:	10-2513-5968	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1625683	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9333	0.8	1	0.04216	0.1033	11.07%	0.0%	28	30
25		6	1	1	1	0	0	0.0%	-7.14%	30	30
33		6	0.9333	0.8	1	0.04216	0.1033	11.07%	0.0%	28	30
100		6	0.9333	0.8	1	0.04216	0.1033	11.07%	0.0%	28	30

Analyst: AC QA: 9/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-5 17-0936
Test No.: 1708-S185

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1400
End Date/Time: 8/28/2017 1400

	Tech Initials				
	0	24	48	72	96
Counts:	AD	CG	RH	RH	RH
Readings:	AES	CG	PA	AES	RH
Dilutions made by:	AD		PA		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	4	4	4	4	33.8	33.0	i 33.6	33.7	33.6	20.3	20.2	i 20.3	20.5	20.5	7.4	6.4	i 6.8	7.4	6.4	7.98	7.89	i 8.07	7.92	7.90
#2	B	5	5	5	5	5			f 33.9					f 20.2					f 6.1					f 7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	~~4~~ 5	5	5	5																				
	F	5	4	4	4	4																				
25	A	5	5	5	5	5	34.0	33.6	i 33.6	33.6	33.6	20.7	20.1	i 20.5	20.4	20.5	7.2	6.3	i 7.1	7.2	6.1	7.96	7.88	i 8.03	7.94	7.90
	B	5	5	5	5	5			f 33.7					f 20.3					f 6.1					f 7.92		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
Q20 ~~50~~ 33	A	5	5	5	5	5	34.1	33.8	i 33.7	33.9	34.1	20.6	20.0	i 20.6	20.3	20.2	7.4	6.3	i 7.2	7.1	6.0	7.99	7.88	i 8.02	7.92	7.90
	B	5	5	4	4	4			f 33.8					f 20.2					f 6.2					f 7.90		
	C	5	5	4	4	4																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.2	34.0	i 33.8	34.1	34.3	21.3	20.1	i 20.5	20.3	20.2	7.3	6.3	i 8.0	7.2	5.9	7.97	7.88	i 8.01	7.91	7.89
	B	5	5	5	5	5			f 34.1					f 20.2					f 6.0					f 7.90		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	4																				
	F	5	4	4	4	4																				

Initial Counts QC'd by: CG
Initiated by: AD

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 1d
Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

	Feeding Times				
	0	24	48	72	96
AM:		0900	0810	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one ([✓ y] / n) ⓇCG Q14 8/25/17

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:40 (p 1 of 1)
Test Code: 1708-S186 | 09-9579-0031

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	14-5089-9384	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 14:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 14:05	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	15-1738-6194	**Code:**	17-0937	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 09:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	29h (13 °C)	**Station:**	SIYB-6		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU a	Method
10-7991-7688	96h Survival Rate	100	>100	NA	11.4%	~~1~~ 0.31	Steel Many-One Rank Sum Test

Q18 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
33		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
100		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	1	1	1	1	0.8	1
25		1	1	1	1	0.8	1
33		1	0.8	1	1	1	1
100		1	1	0.8	1	1	1

Analyst: QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:40 (p 1 of 1)
Test Code: 1708-S186 | 09-9579-0031

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	10-7991-7688	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	11.4%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		33	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	2	10	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	0	1.0000	Non-Significant Effect
Error	0.1890263	0.009451317	20			
Total	0.1890263		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Variances	Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4538	0.884	<0.0001	Non-normal Distribution

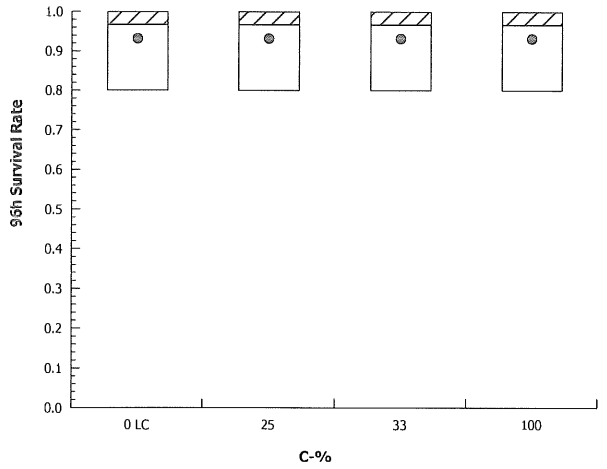
96h Survival Rate Summary

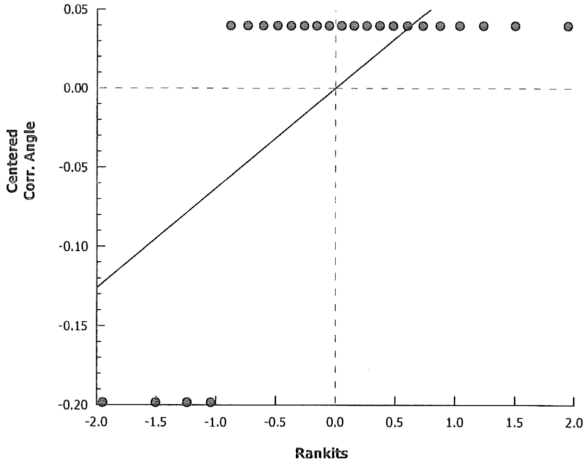
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%

Graphics





Analyst: ______ QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date:	08 Sep-17 11:40 (p 1 of 1)
Test Code:	1708-S186 | 09-9579-0031

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	12-2966-7869	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:40	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	7.77%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		33*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		100*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	0	1.0000	Non-Significant Effect
Error	0.1890263	0.009451317	20			
Total	0.1890263		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Variances	Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4538	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%

Analyst: QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 13:18 (p 1 of 1)
Test Code: 1708-S186 | 09-9579-0031

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 15-1267-4793
Endpoint: 96h Survival Rate
CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-17 13:18
Analysis: Linear Interpolation (ICPIN)
Official Results: Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1391381	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
25		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
33		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
100		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30

Analyst: AC QA: 9/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-6 17-0937
Test No.: 1708-S186

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1430
End Date/Time: 8/28/2017 1405

Tech Initials	0	24	48	72	96
Counts:	CG	CG	RH	RH	RH
Readings:	AC	CG	~~AC~~ PA	ACS	RH
Dilutions made by:	AO		PA	R	

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	33.6	33.5	i 33.6	33.6	33.8	20.2	20.0	i 20.3	20.3	20.3	7.4	6.3	i 7.0	7.5	6.1	8.00	7.84	i 8.07	7.94	7.90
#3	B	5	5	5	5	5			f 33.6					f 20.2					f 6.2					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	33.9	33.8	i 33.7	34.0	34.3	20.4	20.0	i 20.7	20.2	20.2	7.4	6.4	i 6.9	7.6	6.3	7.99	7.92	i 8.03	7.94	7.93
	B	5	5	5	5	5			f 33.8					f 20.3					f 6.3					f 7.93		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
Q20 ~~50~~ 33	A	5	5	5	5	5	34.0	33.7	i 33.7	34.0	34.2	20.5	20.0	i 20.9	20.2	20.2	7.5	6.3	i 7.1	7.4	6.2	7.98	7.88	i 8.02	7.93	7.91
	B	5	5	5	5	4			f 33.6					f 20.2					f 6.3					f 7.90		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
100	A	5	5	5	5	5	34.3	34.0	i 33.8	34.1	34.2	21.4	20.1	i 20.9	20.3	20.3	7.2	6.3	i 7.9	6.2	6.2	7.96	7.88	i 7.97	7.81	7.92
	B	5	5	5	5	5			f 34.1					f 20.2					f 6.3					f 7.91		
	C	5	4	4	4	4																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: AO
Initiated by: CG

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 11d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

Feeding Times	0	24	48	72	96
AM:		0900	0840	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one ([✓ y] / n) ⓡ pH Q18 8/26/17

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 08 Sep-17 11:43 (p 1 of 1)
Test Code: 1708-S187 | 06-6676-6511

Pacific Topsmelt 96-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	15-0080-3621	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 14:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	28 Aug-17 14:05	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	08-1545-0123	**Code:**	17-0938	**Client:**	Amec Foster Wheeler
Sample Date:	23 Aug-17 08:15	**Material:**	Ambient Sample	**Project:**	
Receive Date:	23 Aug-17 17:15	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (11.5 °C)	**Station:**	SIYB-REF		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU~~c~~a	Method
09-1117-6949	96h Survival Rate	100	>100	NA	11.4%	~~1~~ 0.31	Steel Many-One Rank Sum Test

Q18 AC 9/8/17

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
33		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%
100		6	0.9667	0.881	1	0.8	1	0.03333	0.08165	8.45%	0.0%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
0	Lab Control	1	1	1	1	0.8	1
25		1	1	1	1	1	0.8
33		1	1	1	1	1	0.8
100		0.8	1	1	1	1	1

Analyst:______ QA: AC 9/8/17

CETIS Analytical Report

Report Date: 08 Sep-17 11:43 (p 1 of 1)
Test Code: 1708-S187 | 06-6676-6511

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	09-1117-6949	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:43	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	11.4%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		33	39	26	2	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	2	10	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	0	1.0000	Non-Significant Effect
Error	0.1890263	0.009451317	20			
Total	0.1890263		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Variances	Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4538	0.884	<0.0001	Non-normal Distribution

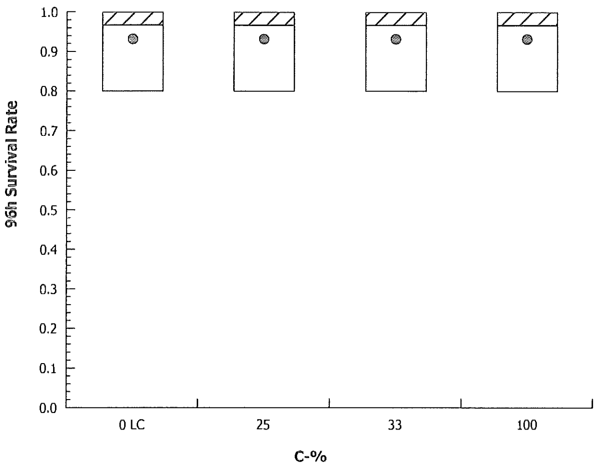
96h Survival Rate Summary

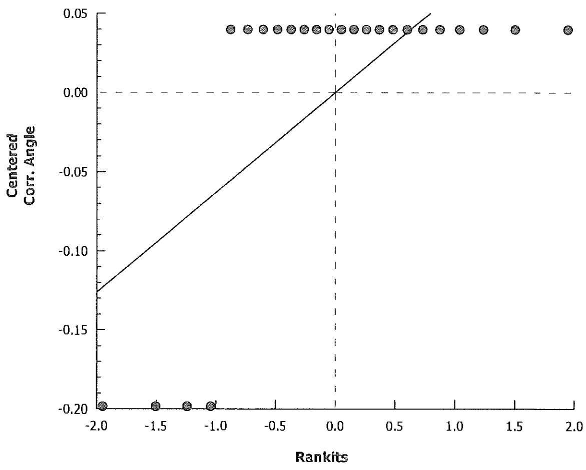
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%

Graphics





Analyst:______ QA: AC 9/8/17

CETIS Analytical Report

TST

Report Date: 08 Sep-17 11:43 (p 1 of 1)
Test Code: 1708-S187 | 06-6676-6511

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	11-5855-5801	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 11:43	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.8	7.77%	100	>100	NA	1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:10%)
Lab Control		25*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		33*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect
		100*	5.137	1.383	0.070	9	0.0003	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	0	1.0000	Non-Significant Effect
Error	0.1890263	0.009451317	20			
Total	0.1890263		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Variances	Levene Equality of Variance	0	4.938	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4538	0.884	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
33		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
33		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%
100		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%

Analyst:______ QA: AC 9/8/17

CETIS Analytical Report

Report Date:	08 Sep-17 15:09 (p 1 of 1)
Test Code:	1708-S187 | 06-6676-6511

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	00-5501-9416	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 13:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1563566	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
25		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
33		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30
100		6	0.9667	0.8	1	0.03333	0.08165	8.45%	0.0%	29	30

Analyst: AC QA: 29/8/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-REF 17-0938
Test No.: 1708-S 187

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1430
End Date/Time: 8/28/2017 1405

	Tech Initials				
	0	24	48	72	96
Counts:	CG	CG	RH	RH	RH
Readings:	ACS	CG	PA	ACS	RH
Dilutions made by:	AD		PA		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	33.6	33.5	i 33.6	33.6	33.8	20.2	20.0	i 20.3	20.3	20.3	7.4	6.3	i 7.0	7.5	6.1	8.00	7.89	i 8.07	7.94	7.90
#3	B	5	5	5	5	5			f 33.6					f 20.2					f 6.2					f 7.91		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	34.0	33.5	i 33.6	33.7	33.7	20.4	20.1	i 20.5	20.3	20.5	7.6	6.3	i 7.2	7.4	6.2	8.00	7.91	i 8.05	7.93	7.87
	B	5	5	5	5	5			33.6					20.3					6.3					7.89		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	4																				
Q20 ~~50~~ 33	A	5	5	5	5	5	34.0	33.7	i 33.6	33.8	34.1	20.6	20.0	i 20.6	20.3	20.4	7.4	6.2	i 7.1	7.5	6.2	8.00	7.88	i 8.05	7.94	7.89
	B	5	5	5	5	5			33.7					f 20.4					f ~~8.0~~ A					f 7.90		
	C	5	5	5	5	5													6.0							
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	4																				
100	A	5	5	5	5	4	34.2	33.9	i 33.6	34.1	34.3	21.4	20.0	i 20.4	20.3	20.4	7.3	6.2	i 7.6	7.4	6.2	7.98	7.87	i 8.00	7.93	7.89
	B	5	5	5	5	5			f 34.1					f 20.3					6.1					f 7.90		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: AD
Initiated by: CG

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 11d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

	Feeding Times				
	0	24	48	72	96
AM:		0900	0810	0855	0900
PM:	1630				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: CH 8/30/17

Final Review: AC 9/8/17

Appendix B

Sample Receipt Information

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Sample Check-In Information

Client: Amec Foster Wheeler/POSD

Tests Performed: Acute Topsmelt, Chronic Mussel Development

Project: SIYB Annual Monitoring

Test ID No.(s) : 1708-S181 to S194

Sample ID:	1) SIYB-1	2) SIYB-2	3) SIYB-3	4) SIYB-4	5) SIYB-5	6) SIYB-6	7) SIYB-REF
Log-in No. (17-xxxx):	0932	0933	0934	0935	0936	0937	0938
Sample Collection Date & Time:	8/23/17 1415	8/23/17 1315	8/23/17 1215	8/23/17 1115	8/23/17 1015	8/23/17 0915	8/23/17 0815
Sample Receipt Date & Time:	8/23/17 1715						→
Number of Containers & Container Type:	2, 10L cubi						→
Approx. Total Volume Received (L):	~16						→
Check-in Temp (°C)	9.0	2.5	3.5	3.0	5.0	13.0	11.5
Temperature OK? [1]	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N
DO (mg/L)	8.2	9.2	9.1	9.0	8.8	7.3	8.1
pH (units)	8.02	8.05	8.09	8.09	8.06	8.00	8.04
Conductivity (µS/cm)	–	–	–	–	–	–	–
Salinity (ppt)	33.7	33.9	33.7	33.7	33.8	34.1	33.9
Alkalinity (mg/L) [2]	117	107	110	112	112	109	111
Hardness (mg/L) [2, 3]	–	–	–	–	–	–	–
Total Chlorine (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
Technician Initials	CH/AC	CH/AC	CH/AC	CH/AC	CH/AC	CH/AC	CH/AC

Sample Descriptions:
1) odorless, clear, no odor, no debris
2) ↓
3)
4)
5)
6)
7)

COC Complete? [✓ Y] N

Filtration for Organisms? [✓ Y] N

Pore Size: 0.45 um Ⓐ

pH Adjustment? Y [✓ N]

Cl_2 Adjustment? Y [✓ N]

Sample Aeration? Y [✓ N]

Subsamples For Additional Chemistry Required? Y [✓ N]

NH3 **Other** ____________

Tech Initials ________

Marine Tests:

Control/Dilution Water Source: [✓ LAB SW] ART SW Other: __________ Alkalinity: 125 Salinity: 34 ppt

Additional Control? Y N = ____________________ Alkalinity: ________ Salinity: ________

Sample Salted w/ artificial salt? Y N If yes, target ppt and source? __________

Sample salted w/brine? Y N If yes, target ppt? __________

Notes [1] Temperature for sample must be 0-6°C if received >24 hours past collection time.

[2] mg/L as CaCO3, [3] Measured for freshwater samples only, NA = Not Applicable

Additional Comments Ⓐ All samples were tested un-filtered for the dilution series. Additionally, the undiluted sample was filtered to 0.45 µm and tested for comparison

QC Check: AC 8/30/17

Final Review: 10/2/17

Appendix C

Chain of Custody Form

Nautilus Environmental **Chain of Custody (electronic)**

4340 Vandever Ave. San Diego, CA 92120

Date 08/23/17 Page 1 of 1

Sample Collection By:	Amec Foster Wheeler Environment & Infrastructure	
	Report to: Barry Snyder / Chris Stransky barry.snyder@amecfw.com / chris.stransky@amecfw.com	Invoice to: Barry Snyder / Chris Stransky barry.snyder@amecfw.com / chris.stransky@amecfw.com
Company	Amec Foster Wheeler Environment & Infrastructure	Amec Foster Wheeler Environment & Infrastructure
Address	9210 Sky Park Ct. Ste 200	9210 Sky Park Ct. Ste 200
City/State/Zip	San Diego, CA 92123	San Diego, CA 92123
Contact	Chris Stransky	Chris Stransky
Phone	858-300-4350 / 858-775-5547 cell	858-300-4350 / 858-775-5547 cell
Email	chris.stransky@amec.com	chris.stransky@amec.com

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	Topsmelt 96-hr Acute Survival	Mussel 48-hr Survival and Dev.							Receipt Temperature (°C)
SIYB-1	8/23/2017	1415	SW	10-L Poly	2		X	X							8.0
SIYB-2	8/23/2017	1315	SW	10-L Poly	2		X	X							2.5
SIYB-3	8/23/2017	1215	SW	10-L Poly	2		X	X							3.5
SIYB-4	8/23/2017	1115	SW	10-L Poly	2		X	X							3.0
SIYB-5	8/23/2017	1015	SW	10-L Poly	2		X	X							5.0
SIYB-6	8/23/2017	0915	SW	10-L Poly	2		X	X							13.0
SIYB-REF	8/23/2017	0815	SW	10-L Poly	2		X	X							11.5

PROJECT INFORMATION		SAMPLE RECEIPT	
Client:		**Total # Containers:**	14
P.O. No.:		**Good Condition?**	Y
Shipped Via:		**Matches Test Schedule?**	Y

Relinquished By:

Signature: Date 8/23/17

Print Name: Tyler Huff Time 1715

Company: AMEC FW.

Received By (courier):

Signature: Date

Print Name: Time

Company:

Relinquished By (courier):

Signature: Date

Print Name: Time

Company:

Received By Lab:

Signature: Caitlin Date 8/23/17

Print Name: Caitlin Harvey Time 1715

Company: Nautilus

Comments:
Concurrent ref. tox. test for both species (Topsmelt 0,50,100,200,400,800 ug/L)
(Bivalve ref. tox. test copper conc. of 0, 2.5, 5.0, 10, 20 and 40 µg/L)
Topsmelt at 3 concentrations (25,50, 100 percent) and a control. 6 reps.
Bivalve testing 5 concentrations (6.25, 12.5, 25, 50, and 100 percent), and
a control. Also a 100% filtered undiluted sample.5 reps. Look for *Noctiluca* sp.)

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus ID's = 170932 – 170938

Appendix D

Reference Toxicant Tests

Test Data and Statistical Analyses

Bivalve Survival and Development Test

CETIS Summary Report

Report Date: 08 Sep-17 14:28 (p 1 of 3)
Test Code: 170824msdv | 21-2285-7954

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	13-7718-8642	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	24 Aug-17 16:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Diluted Natural Seawater
Ending Date:	26 Aug-17 16:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Mission Bay	**Age:**	

Sample ID:	09-2106-3729	**Code:**	170824msdv	**Client:**	Internal
Sample Date:	24 Aug-17	**Material:**	Copper chloride	**Project:**	
Receive Date:	24 Aug-17	**Source:**	Reference Toxicant		
Sample Age:	16h	**Station:**	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-5939-3672	Combined Development Ra	5	10	7.071	4.46%		Dunnett Multiple Comparison Test
11-0947-9271	Development Rate	5	10	7.071	4.43%		Dunnett Multiple Comparison Test
21-1959-9972	Survival Rate	10	20	14.14	1.98%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
11-9849-6620	Combined Development Ra	EC25	6.187	5.861	6.298		Linear Interpolation (ICPIN)
		EC50	7.468	7.252	7.549		
18-4397-7467	Development Rate	EC25	6.187	5.892	6.299		Linear Interpolation (ICPIN)
		EC50	7.468	7.269	7.551		
04-8243-0487	Survival Rate	EC25	22.34	19.55	24.64		Linear Interpolation (ICPIN)
		EC50	28.23	26.37	29.76		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
11-0947-9271	Development Rate	Control Resp	0.9588	0.9 - NL	Yes	Passes Acceptability Criteria
18-4397-7467	Development Rate	Control Resp	0.9588	0.9 - NL	Yes	Passes Acceptability Criteria
04-8243-0487	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
21-1959-9972	Survival Rate	Control Resp	1	0.5 - NL	Yes	Passes Acceptability Criteria
14-5939-3672	Combined Development Ra	PMSD	0.04465	NL - 0.25	No	Passes Acceptability Criteria

Analyst:______ QA: 9/11/17

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Combined Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9588	0.9326	0.9851	0.9427	0.9942	0.00946	0.02115	2.21%	0.0%
2.5		5	0.9584	0.9391	0.9777	0.9447	0.9784	0.006951	0.01554	1.62%	0.04%
5		5	0.9377	0.869	1	0.8477	0.9841	0.02477	0.05538	5.91%	2.2%
10		5	0.005757	0	0.01423	0	0.01667	0.003051	0.006821	118.5%	99.4%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0	0	0	0	0	0	0		100.0%

Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9588	0.9326	0.9851	0.9427	0.9942	0.00946	0.02115	2.21%	0.0%
2.5		5	0.9597	0.9419	0.9776	0.9447	0.9784	0.006434	0.01439	1.5%	-0.09%
5		5	0.9377	0.869	1	0.8477	0.9841	0.02477	0.05538	5.91%	2.2%
10		5	0.005757	0	0.01423	0	0.01667	0.003051	0.006821	118.5%	99.4%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0	0	0	0	0	0	0		100.0%

Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	0	0	0.0%	0.0%
2.5		5	0.9986	0.9948	1	0.9932	1	0.00137	0.003063	0.31%	0.14%
5		5	1	1	1	1	1	0	0	0.0%	0.0%
10		5	1	1	1	1	1	0	0	0.0%	0.0%
20		5	0.8493	0.7159	0.9827	0.7329	0.9521	0.04804	0.1074	12.65%	15.07%
40		5	0	0	0	0	0	0	0		100.0%

Combined Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9487	0.9624	0.9461	0.9942	0.9427
2.5		0.9784	0.9714	0.9452	0.9447	0.9524
5		0.9841	0.9694	0.8477	0.9222	0.9653
10		0.005495	0	0.006623	0.01667	0
20		0	0	0	0	0
40		0	0	0	0	0

Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9487	0.9624	0.9461	0.9942	0.9427
2.5		0.9784	0.9714	0.9517	0.9447	0.9524
5		0.9841	0.9694	0.8477	0.9222	0.9653
10		0.005495	0	0.006623	0.01667	0
20		0	0	0	0	0
40		0	0	0	0	0

Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1	1	1	1	1
2.5		1	1	0.9932	1	1
5		1	1	1	1	1
10		1	1	1	1	1
20		0.9521	0.7329	0.9178	0.7329	0.911
40		0	0	0	0	0

Analyst:______ QA: 9/10/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Combined Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	148/156	179/186	158/167	172/173	148/157
2.5		181/185	170/175	138/146	188/199	200/210
5		186/189	190/196	128/151	154/167	167/173
10		1/182	0/158	1/151	3/180	0/189
20		0/146	0/146	0/146	0/146	0/146
40		0/146	0/146	0/146	0/146	0/146

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	148/156	179/186	158/167	172/173	148/157
2.5		181/185	170/175	138/145	188/199	200/210
5		186/189	190/196	128/151	154/167	167/173
10		1/182	0/158	1/151	3/180	0/189
20		0/139	0/107	0/134	0/107	0/133
40		0/1	0/1	0/1	0/1	0/1

Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	146/146	146/146	146/146	146/146	146/146
2.5		146/146	146/146	145/146	146/146	146/146
5		146/146	146/146	146/146	146/146	146/146
10		146/146	146/146	146/146	146/146	146/146
20		139/146	107/146	134/146	107/146	133/146
40		0/146	0/146	0/146	0/146	0/146

Analyst: QA: 9/11/17

CETIS Analytical Report

Report Date: 08 Sep-17 14:29 (p 1 of 4)
Test Code: 170824msdv | 21-2285-7954

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID:	14-5939-3672	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.46%	5	10	7.071	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		2.5	0.1585	2.227	0.099	8	0.6900	CDF	Non-Significant Effect
		5	0.8893	2.227	0.099	8	0.3760	CDF	Non-Significant Effect
		10*	29.36	2.227	0.099	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.224197	2.074732	3	421.1	<0.0001	Significant Effect
Error	0.07882479	0.004926549	16			
Total	6.303022		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.334	11.34	0.1489	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.926	0.866	0.1292	Normal Distribution

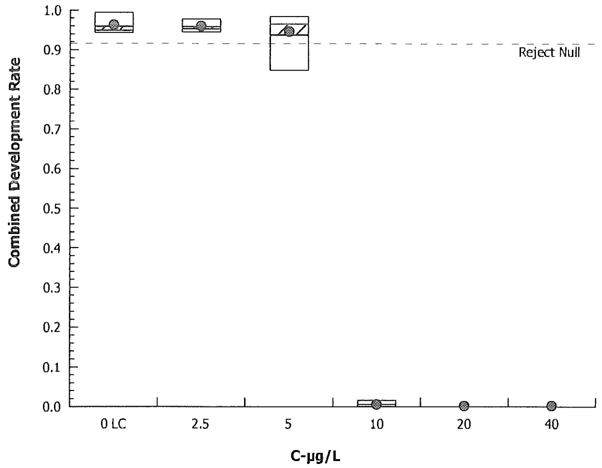
Combined Development Rate Summary

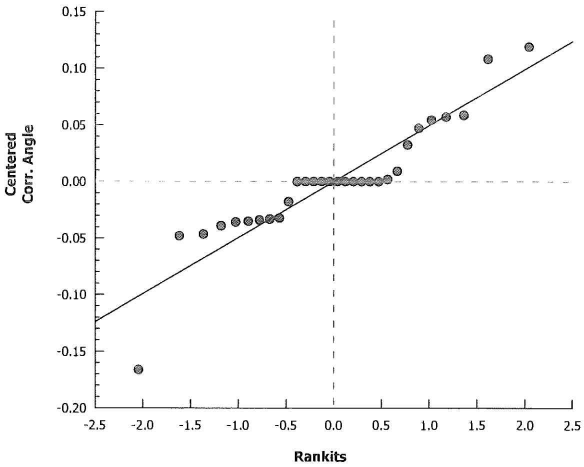
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9588	0.9326	0.9851	0.9487	0.9427	0.9942	0.00946	2.21%	0.0%
2.5		5	0.9584	0.9391	0.9777	0.9524	0.9447	0.9784	0.006951	1.62%	0.04%
5		5	0.9377	0.869	1	0.9653	0.8477	0.9841	0.02477	5.91%	2.2%
10		5	0.005757	0	0.01423	0.005495	0	0.01667	0.003051	118.5%	99.4%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.376	1.29	1.461	1.342	1.329	1.495	0.03081	5.01%	0.0%
2.5		5	1.369	1.318	1.42	1.351	1.333	1.423	0.01836	3.0%	0.51%
5		5	1.336	1.201	1.471	1.383	1.17	1.444	0.04868	8.15%	2.87%
10		5	0.07226	0.02538	0.1191	0.07419	0.03638	0.1295	0.01689	52.25%	94.75%
20		5	0.04139	0.04139	0.0414	0.04139	0.04139	0.04139	0	0.0%	96.99%
40		5	0.04139	0.04139	0.0414	0.04139	0.04139	0.04139	0	0.0%	96.99%

Graphics





Analyst:________ QA: 9/10/17

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 11-0947-9271 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.7
Analyzed: 08 Sep-17 14:28 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.43%	5	10	7.071	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		2.5	0.09256	2.227	0.098	8	0.7157	CDF	Non-Significant Effect
		5	0.894	2.227	0.098	8	0.3741	CDF	Non-Significant Effect
		10*	29.52	2.227	0.098	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.233977	2.077992	3	426.3	<0.0001	Significant Effect
Error	0.07799377	0.00487461	16			
Total	6.311971		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.657	11.34	0.1296	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9299	0.866	0.1540	Normal Distribution

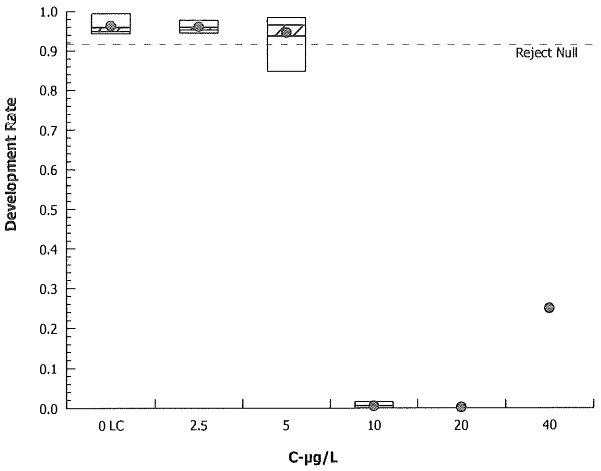
Development Rate Summary

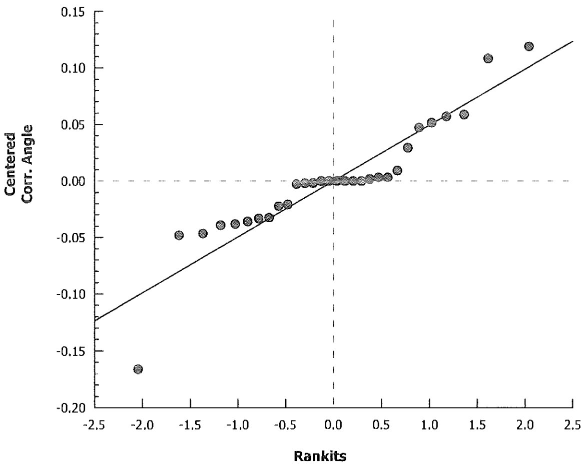
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9588	0.9326	0.9851	0.9487	0.9427	0.9942	0.00946	2.21%	0.0%
2.5		5	0.9597	0.9419	0.9776	0.9524	0.9447	0.9784	0.006434	1.5%	-0.09%
5		5	0.9377	0.869	1	0.9653	0.8477	0.9841	0.02477	5.91%	2.2%
10		5	0.005757	0	0.01423	0.005495	0	0.01667	0.003051	118.5%	99.4%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.376	1.29	1.461	1.342	1.329	1.495	0.03081	5.01%	0.0%
2.5		5	1.372	1.324	1.419	1.351	1.333	1.423	0.01719	2.8%	0.3%
5		5	1.336	1.201	1.471	1.383	1.17	1.444	0.04868	8.15%	2.87%
10		5	0.07226	0.02538	0.1191	0.07419	0.03638	0.1295	0.01689	52.25%	94.75%
20		5	0.04514	0.04147	0.04881	0.04337	0.04242	0.04836	0.001322	6.55%	96.72%
40		5	0.5236	0.5234	0.5238	0.5236	0.5236	0.5236	0	0.0%	61.94%

Graphics





Analyst: QA: 9/11/17

CETIS Analytical Report

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	21-1959-9972	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.98%	10	20	14.14	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		2.5	25	17	1	8	0.5912	Asymp	Non-Significant Effect
		5	27.5	17	1	8	0.8000	Asymp	Non-Significant Effect
		10	27.5	17	1	8	0.8000	Asymp	Non-Significant Effect
		20*	15	17	0	8	0.0158	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4537368	0.1134342	4	24.17	<0.0001	Significant Effect
Error	0.093863	0.00469315	20			
Total	0.5475998		24			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	5.865	4.893	0.0048	Unequal Variances
Variances	Levene Equality of Variance	40.9	4.431	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.6906	0.8877	<0.0001	Non-normal Distribution

Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
2.5		5	0.9986	0.9948	1	1	0.9932	1	0.00137	0.31%	0.14%
5		5	1	1	1	1	1	1	0	0.0%	0.0%
10		5	1	1	1	1	1	1	0	0.0%	0.0%
20		5	0.8493	0.7159	0.9827	0.911	0.7329	0.9521	0.04804	12.65%	15.07%
40		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

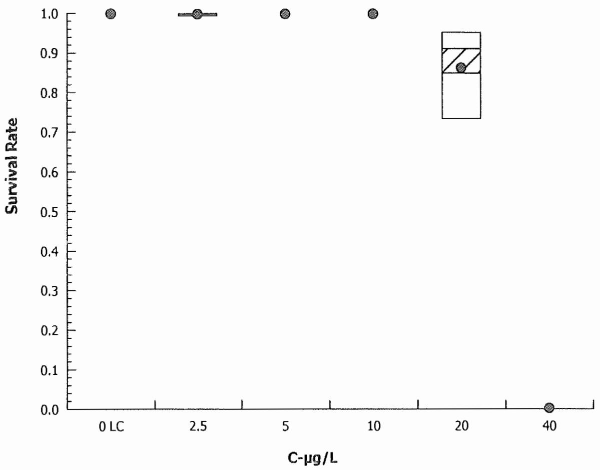
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
2.5		5	1.521	1.498	1.544	1.529	1.488	1.529	0.008291	1.22%	0.54%
5		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
10		5	1.529	1.529	1.53	1.529	1.529	1.529	0	0.0%	0.0%
20		5	1.191	1.002	1.379	1.268	1.028	1.35	0.068	12.77%	22.15%
40		5	0.04139	0.04139	0.0414	0.04139	0.04139	0.04139	0	0.0%	97.29%

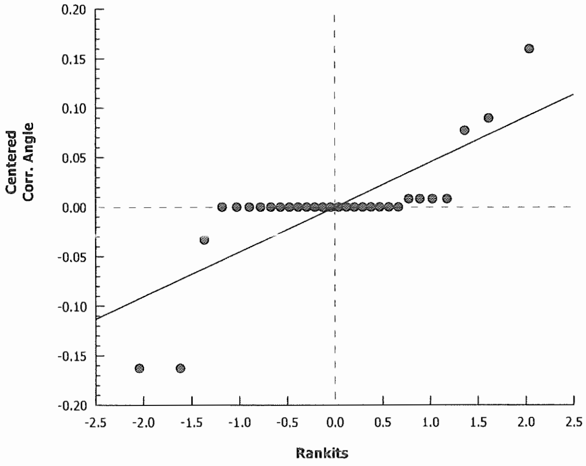
Analyst:______ QA: b-9/11/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	21-1959-9972	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	08 Sep-17 14:29 (p 1 of 3)
Test Code:	170824msdv | 21-2285-7954

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	11-9849-6620	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	547296	1000	Yes	Two-Point Interpolation

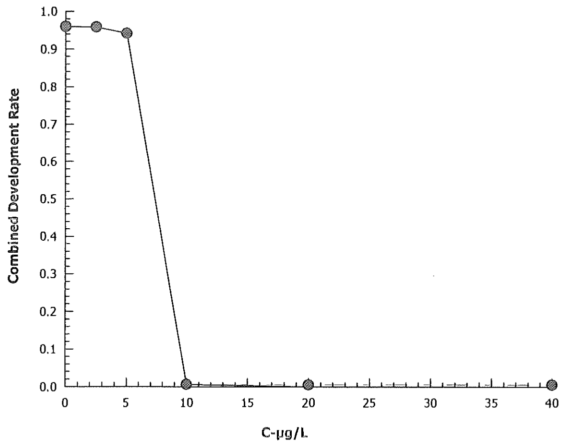
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	6.187	5.861	6.298
EC50	7.468	7.252	7.549

Combined Development Rate Summary

										Calculated Variate(A/B)	
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9588	0.9427	0.9942	0.00946	0.02115	2.21%	0.0%	805	839
2.5		5	0.9584	0.9447	0.9784	0.006951	0.01554	1.62%	0.04%	877	915
5		5	0.9377	0.8477	0.9841	0.02477	0.05538	5.91%	2.2%	825	876
10		5	0.005757	0	0.01667	0.003051	0.006821	118.5%	99.4%	5	860
20		5	0	0	0	0	0		100.0%	0	730
40		5	0	0	0	0	0		100.0%	0	730

Graphics



Analyst: QA: 9/10/17

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	18-4397-7467	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	577398	1000	Yes	Two-Point Interpolation

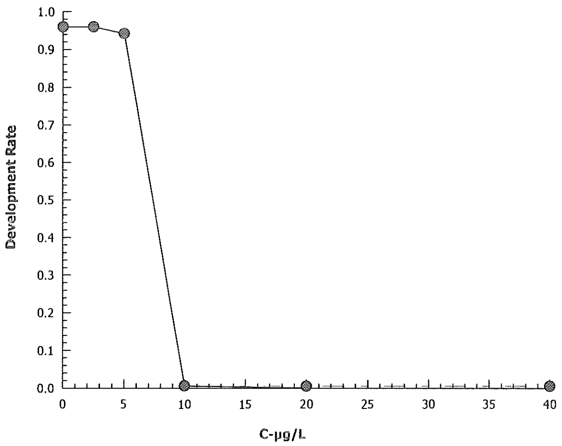
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	6.187	5.892	6.299
EC50	7.468	7.269	7.551

Development Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	0.9588	0.9427	0.9942	0.00946	0.02115	2.21%	0.0%	805	839
2.5		5	0.9597	0.9447	0.9784	0.006434	0.01439	1.5%	-0.09%	877	914
5		5	0.9377	0.8477	0.9841	0.02477	0.05538	5.91%	2.2%	825	876
10		5	0.005757	0	0.01667	0.003051	0.006821	118.5%	99.4%	5	860
20		5	0	0	0	0	0		100.0%	0	620
40		5	0	0	0	0	0		100.0%	0	5

Graphics



Analyst: QA: 9/10/17

CETIS Analytical Report

Report Date: 08 Sep-17 14:29 (p 3 of 3)
Test Code: 170824msdv | 21-2285-7954

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	04-8243-0487	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	08 Sep-17 14:28	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1731960	1000	Yes	Two-Point Interpolation

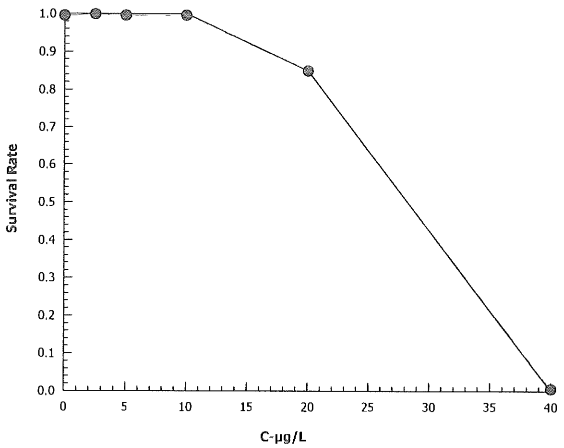
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	22.34	19.55	24.64
EC50	28.23	26.37	29.76

Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	5	1	1	1	0	0	0.0%	0.0%	730	730
2.5		5	0.9986	0.9932	1	0.00137	0.003063	0.31%	0.14%	729	730
5		5	1	1	1	0	0	0.0%	0.0%	730	730
10		5	1	1	1	0	0	0.0%	0.0%	730	730
20		5	0.8493	0.7329	0.9521	0.04804	0.1074	12.65%	15.07%	620	730
40		5	0	0	0	0	0		100.0%	0	730

Graphics



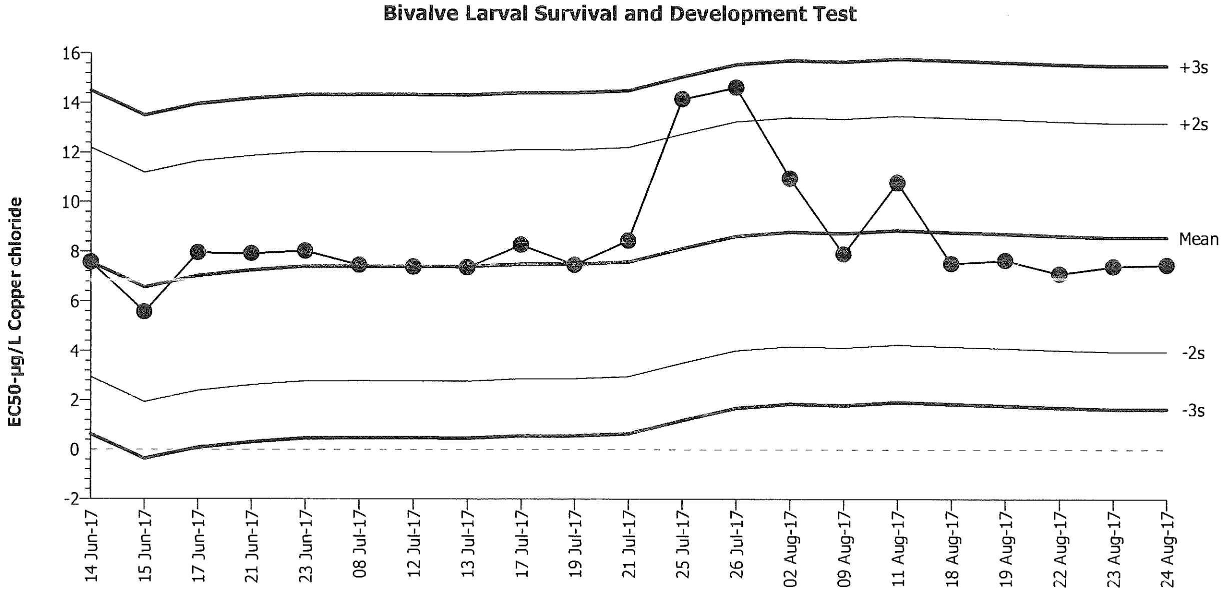
Analyst:________ QA: b9/10/17

CETIS QC Plot

Report Date: 08 Sep-17 14:30 (1 of 1)

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Test Type: Development-Survival **Organism:** Mytilus galloprovincialis (Bay Mussel **Material:** Copper chloride
Protocol: EPA/600/R-95/136 (1995) **Endpoint:** Combined Development Rate **Source:** Reference Toxicant-REF



Mean:	8.58	**Count:**	20	**-2s Warning Limit:**	3.956	**-3s Action Limit:**	1.644
Sigma:	2.312	**CV:**	26.90%	**+2s Warning Limit:**	13.2	**+3s Action Limit:**	15.52

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Jun	14	16:35	7.566	-1.014	-0.4387			12-0557-7207	08-7414-9539
2			15	17:00	5.556	-3.024	-1.308			13-0760-5590	03-3919-2352
3			17	16:35	7.953	-0.627	-0.2712			06-8514-5892	02-3705-3274
4			21	16:20	7.917	-0.6632	-0.2868			15-2492-6549	01-5703-6353
5			23	15:35	8.021	-0.5591	-0.2418			03-5559-2705	13-4205-1983
6		Jul	8	16:50	7.45	-1.13	-0.4886			09-7553-8130	03-1268-7503
7			12	18:15	7.386	-1.194	-0.5163			11-9742-7964	05-1413-9875
8			13	17:30	7.363	-1.217	-0.5262			12-3376-7311	02-9708-5395
9			17	16:45	8.281	-0.2991	-0.1294			00-0340-3065	08-2357-6973
10			19	18:00	7.466	-1.114	-0.4816			08-1164-4379	15-0985-1465
11			21	21:15	8.458	-0.1224	-0.05293			10-9068-8609	04-8762-9687
12			25	19:20	14.17	5.592	2.419	(+)		05-3850-9598	09-6508-4828
13			26	18:30	14.65	6.068	2.625	(+)		05-2549-4056	14-4663-8834
14		Aug	2	16:20	10.97	2.387	1.033			08-8844-0166	17-3344-3445
15			9	15:10	7.909	-0.6713	-0.2904			02-3647-7872	04-4249-9948
16			11	14:20	10.8	2.217	0.9589			10-7776-3483	16-8717-2487
17			18	14:30	7.523	-1.057	-0.4572			01-8895-2121	19-7759-2811
18			19	14:30	7.653	-0.9271	-0.401			05-2766-7107	17-8527-5868
19			22	14:40	7.109	-1.471	-0.6363			11-6889-8330	18-9664-5070
20			23	14:35	7.405	-1.175	-0.508			07-0702-1232	04-1416-1884
21			24	16:00	7.468	-1.112	-0.4809			21-2285-7954	11-9849-6620

Analyst:

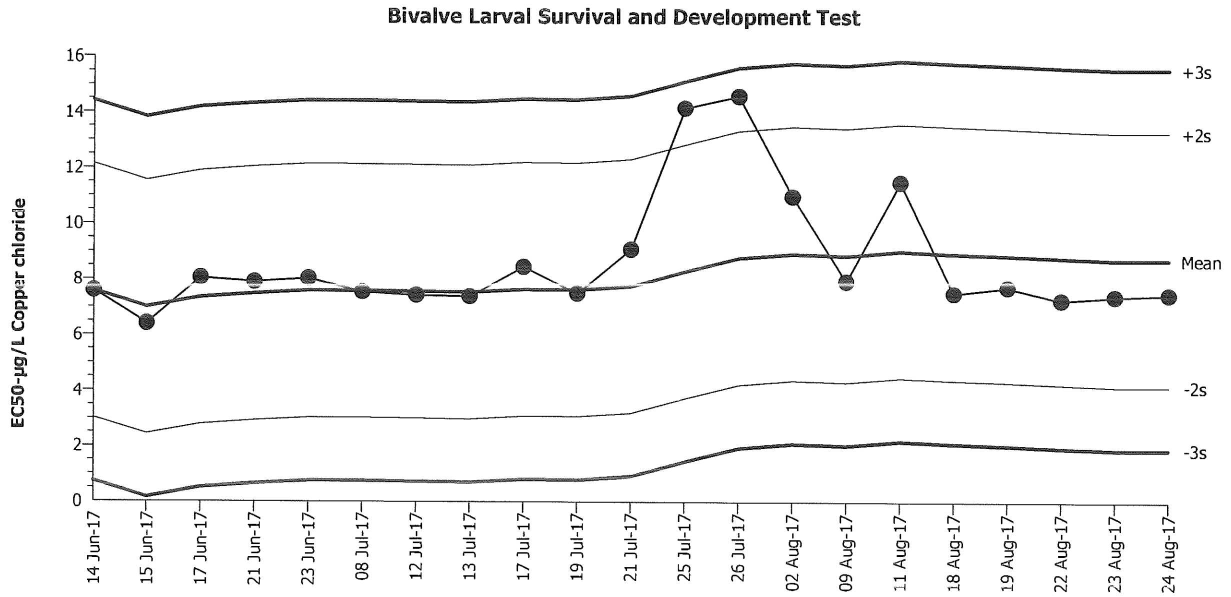
QA: S 9/11/17

CETIS QC Plot

Report Date: 08 Sep-17 14:30 (1 of 1)

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Test Type: Development-Survival **Organism:** Mytilus galloprovincialis (Bay Mussel **Material:** Copper chloride
Protocol: EPA/600/R-95/136 (1995) **Endpoint:** Development Rate **Source:** Reference Toxicant-REF



Mean:	8.725	**Count:**	20	**-2s Warning Limit:**	4.163	**-3s Action Limit:**	1.882
Sigma:	2.281	**CV:**	26.10%	**+2s Warning Limit:**	13.29	**+3s Action Limit:**	15.57

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Jun	14	16:35	7.583	-1.142	-0.5005			12-0557-7207	10-9601-5201
2			15	17:00	6.401	-2.324	-1.019			13-0760-5590	15-4777-0261
3			17	16:35	8.048	-0.6775	-0.297			06-8514-5892	00-7550-1834
4			21	16:20	7.908	-0.8171	-0.3582			15-2492-6549	17-9069-9248
5			23	15:35	8.036	-0.6887	-0.3019			03-5559-2705	13-7037-9907
6		Jul	8	16:50	7.546	-1.179	-0.5167			09-7553-8130	00-6258-4410
7			12	18:15	7.433	-1.292	-0.5665			11-9742-7964	11-5734-0468
8			13	17:30	7.386	-1.339	-0.5872			12-3376-7311	15-3421-1133
9			17	16:45	8.451	-0.2743	-0.1202			00-0340-3065	09-2980-0913
10			19	18:00	7.496	-1.229	-0.5388			08-1164-4379	20-4392-5711
11			21	21:15	9.087	0.3618	0.1586			10-9068-8609	09-7178-0760
12			25	19:20	14.17	5.442	2.386	(+)		05-3850-9598	01-9984-8541
13			26	18:30	14.6	5.876	2.576	(+)		05-2549-4056	20-9765-2987
14		Aug	2	16:20	10.99	2.268	0.9941			08-8844-0166	05-7741-7079
15			9	15:10	7.943	-0.7824	-0.343			02-3647-7872	09-5424-7081
16			11	14:20	11.51	2.782	1.219			10-7776-3483	16-6128-1875
17			18	14:30	7.514	-1.211	-0.5309			01-8895-2121	10-0830-7403
18			19	14:30	7.734	-0.9912	-0.4346			05-2766-7107	05-5439-6759
19			22	14:40	7.267	-1.458	-0.6393			11-6889-8330	01-5646-6901
20			23	14:35	7.403	-1.322	-0.5794			07-0702-1232	08-7168-2267
21			24	16:00	7.468	-1.257	-0.551			21-2285-7954	18-4397-7467

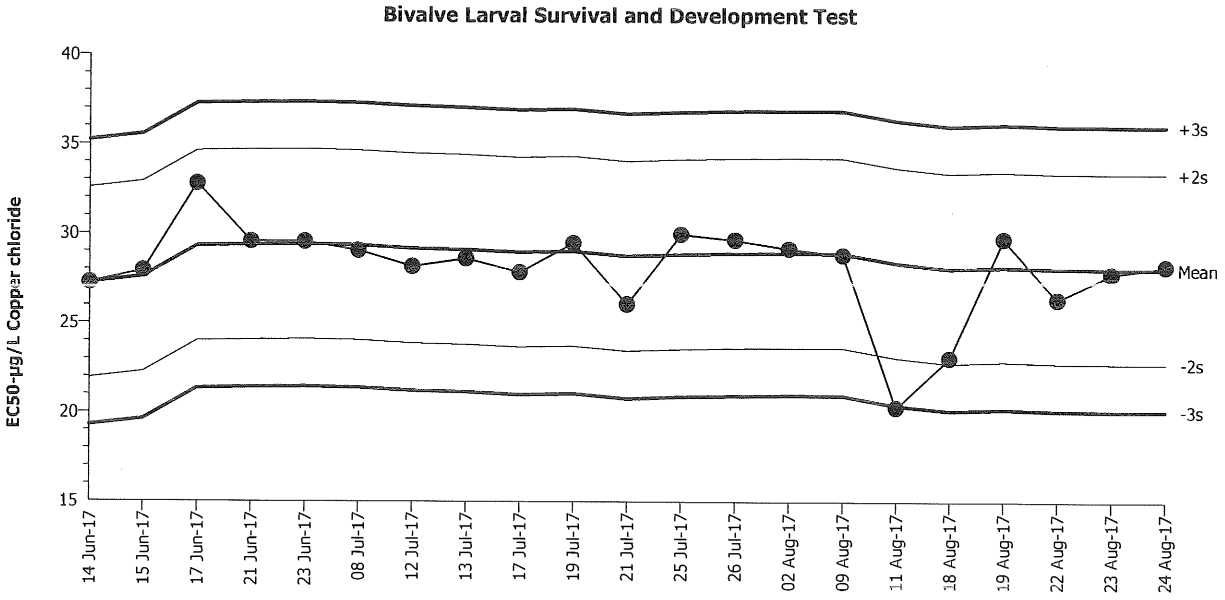
Analyst:______ QA: 9/10/17

CETIS QC Plot

Report Date: 08 Sep-17 14:30 (1 of 1)

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	28.08	**Count:**	20	**-2s Warning Limit:**	22.76	**-3s Action Limit:**	20.1
Sigma:	2.657	**CV:**	9.46%	**+2s Warning Limit:**	33.39	**+3s Action Limit:**	36.05

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Jun	14	16:35	27.26	-0.8248	-0.3104			12-0557-7207	17-4389-1847
2			15	17:00	27.94	-0.1446	-0.05442			13-0760-5590	01-2901-9440
3			17	16:35	32.78	4.704	1.77			06-8514-5892	18-3535-8269
4			21	16:20	29.57	1.492	0.5616			15-2492-6549	21-3845-5267
5			23	15:35	29.56	1.483	0.5583			03-5559-2705	09-9147-5836
6		Jul	8	16:50	29.07	0.9937	0.374			09-7553-8130	16-1250-7746
7			12	18:15	28.18	0.09881	0.03719			11-9742-7964	02-2541-9916
8			13	17:30	28.63	0.5536	0.2083			12-3376-7311	16-6236-5156
9			17	16:45	27.87	-0.2109	-0.07936			00-0340-3065	18-8492-6597
10			19	18:00	29.5	1.422	0.5351			08-1164-4379	09-1332-3273
11			21	21:15	26.08	-1.997	-0.7515			10-9068-8609	07-4575-2126
12			25	19:20	30	1.92	0.7226			05-3850-9598	15-3015-3104
13			26	18:30	29.69	1.614	0.6075			05-2549-4056	19-4893-7601
14		Aug	2	16:20	29.21	1.131	0.4257			08-8844-0166	16-2044-0559
15			9	15:10	28.85	0.7658	0.2882			02-3647-7872	13-2689-5538
16			11	14:20	20.3	-7.778	-2.927	(-)		10-7776-3483	06-8118-7108
17			18	14:30	23.07	-5.008	-1.885			01-8895-2121	15-7798-9971
18			19	14:30	29.76	1.678	0.6315			05-2766-7107	12-0400-9839
19			22	14:40	26.37	-1.715	-0.6453			11-6889-8330	16-1091-0593
20			23	14:35	27.81	-0.2732	-0.1028			07-0702-1232	06-5821-2066
21			24	16:00	28.23	0.1458	0.05488			21-2285-7954	04-8243-0487

Analyst: ____ QA: S 9/10/17

CETIS Test Data Worksheet

Report Date: 23 Aug-17 09:12 (p 1 of 1)
Test Code: 21-2285-7954/170824msdv

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Start Date: 24 Aug-17
End Date: 26 Aug-17
Sample Date: 24 Aug-17

Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Copper chloride

Sample Code: 170824msdv
Sample Source: Reference Toxicant
Sample Station: Copper Chloride

C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			189	186	8/29/17
			2			186	179	
			3			107	0	
			4			182	1	
			5			167	154	
			6			0	0	
			7			167	158	
			8			189	0	
			9			196	190	
			10			175	170	
			11			180	3	
			12			185	181	
			13			173	167	
			14			156	148	
			15			0	0	
			16			157	148	
			17			199	188	
			18			134	0	
			19			151	~~150~~ 1	Q18 RL 9/8/17
			20			0	0	
			21			107	0	
			22			145	138	
			23			173	172	
			24			0	0	
			25			0	0	
			26			210	200	
			27			133	0	
			28			158	0	
			29			139	0	
			30			151	128	

Analyst: RL

QA: AC 9/8/17

CETIS Test Data Worksheet

Report Date: 23 Aug-17 09:12 (p 1 of 1)
Test Code: 21-2285-7954/170824msdv

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Start Date:	24 Aug-17	**Species:**	Mytilus galloprovincialis	**Sample Code:**	170824msdv
End Date:	26 Aug-17	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Reference Toxicant
Sample Date:	24 Aug-17	**Material:**	Copper chloride	**Sample Station:**	Copper Chloride

C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	14			135	125	AC 8/27/17
0	LC	2	2					
0	LC	3	7					
0	LC	4	23					
0	LC	5	16					
2.5		1	12			163	156	
2.5		2	10					
2.5		3	22					
2.5		4	17					
2.5		5	26					
5		1	1			155	147	
5		2	9					
5		3	30					
5		4	5					
5		5	13					
10		1	4			144	2	
10		2	28					
10		3	19					
10		4	11					
10		5	8					
20		1	29			120	0	
20		2	3					
20		3	18					
20		4	21					
20		5	27					
40		1	25			0	0	cells lysed
40		2	24					
40		3	6					
40		4	20					
40		5	15					

QC'd

Analyst: QA: AC 8/30/17

Marine Chronic Bioassay

Water Quality Measurements

Client: Internal
Sample ID: $CuCl_2$
Test No.: 170824msdv

Test Species: *M. galloprovincialis*
Start Date/Time: 8/24/2017 16:00
End Date/Time: 8/26/2017 16:00

Concentration (µg/L)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	31.9	31.5	31.6	15.1	14.5	14.6	8.5	7.9	8.1	8.04	8.03	7.99
2.5	31.9	31.7	31.8	14.8	14.3	14.4	8.4	8.0	8.1	8.02	8.02	7.98
5	32.0	31.7	31.7	14.7	14.3	14.3	8.3	7.9	8.1	8.01	8.01	7.98
10	32.0	31.7	31.8	14.9	14.5	14.3	8.3	8.0	8.1	8.00	8.02	7.98
20	31.9	31.7	31.7	14.8	14.5	14.4	8.3	8.0	8.0	8.02	8.02	7.99
40	31.9	31.6	31.7	14.8	14.3	14.3	8.3	7.9	8.1	8.03	8.03	7.99

Technician Initials:

	0	24	48
WQ Readings:	AC	CG	DM
Dilutions made by:	CH	▨	▨

High conc. made (µg/L):	40
Vol. Cu stock added (mL):	2.0
Final Volume (mL):	500
Cu stock concentration (µg/L):	10,200

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AC 8/27/17

Final Review: b 9/10/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: Internal
Test No.: 170824msdv
Test Species: *Mytilus galloprovincialis*
Animal Source: Mission Bay
Date Received: 8/2/17
Test Chambers: 30 mL glass shell vials
Sample Volume: 10 mL

Start Date/Time: 8/24/2017 1600
End Date/Time: 8/26/2017 1600
Technician Initials: CH/AC

Spawn Information

First Gamete Release Time: 1230

Sex	Number Spawning
Male	5+
Female	3

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	Ⓐ ~~5+~~ 3,4,5	Good density and motility
Female 1	1	High density, pale orange color, uniform shape, large Mussel
Female 2	2	Good density, Ⓐ ~~white~~ pale orange color, uniform shape
Female 3	3	High density, pale orange color, uniform shape, large mussel

Egg Fertilization Time: 1315

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	100

Stock(s) chosen for testing: 1

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

11	10
10	10
8	11
14	9
8	10

Mean: 10.1

Mean 10.1 X 50 = 505 embryos/ml

Initial Density: 505 = 1.68 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

When mean percent dividing is ≥ 90, prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

Rep	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	135	135	100	99.9%
TØ B	162	162	100	
TØ C	143	143	100	
TØ D	134	134	100	
TØ E	157	158	99.4	
TØ F	145	145	100	

48-h QC: 134/142 (94%)

Comments: ⒶCH Q18 8/24/17 x̄ dividing = 146

QC Check: AC 8/27/17

Final Review: 9/10/17

Pacific Topsmelt 96-hr Survival

CETIS Summary Report

Report Date: 30 Aug-17 14:32 (p 1 of 1)
Test Code: 170824aara | 04-3270-4077

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	20-7573-7771	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	24 Aug-17 14:45	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Diluted Natural Seawater
Ending Date:	28 Aug-17 14:15	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample ID:	12-3578-1081	**Code:**	170824aara	**Client:**	Internal
Sample Date:	24 Aug-17	**Material:**	Copper chloride	**Project:**	
Receive Date:	24 Aug-17	**Source:**	Reference Toxicant		
Sample Age:	15h	**Station:**	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-9387-7082	96h Survival Rate	100	200	141.4	16.5%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
21-0546-3622	96h Survival Rate	EC50	141.4	130.3	153.5		Trimmed Spearman-Kärber

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	0	0	0.0%	0.0%
50		4	0.9	0.7163	1	0.8	1	0.05774	0.1155	12.83%	10.0%
100		4	0.9	0.7163	1	0.8	1	0.05774	0.1155	12.83%	10.0%
200		4	0.1	0	0.2837	0	0.2	0.05774	0.1155	115.5%	90.0%
400		4	0	0	0	0	0	0	0		100.0%
800		4	0	0	0	0	0	0	0		100.0%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	1	1	1
50		1	0.8	1	0.8
100		0.8	0.8	1	1
200		0.2	0	0	0.2
400		0	0	0	0
800		0	0	0	0

Analyst:______ QA: KFF 9/6/17

CETIS Analytical Report

Report Date:	30 Aug-17 14:29 (p 1 of 1)
Test Code:	170824aara | 04-3270-4077

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	18-9387-7082	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Aug-17 14:28	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	16.5%	100	200	141.4	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		50	1.414	2.287	0.193	6	0.1976	CDF	Non-Significant Effect
		100	1.414	2.287	0.193	6	0.1976	CDF	Non-Significant Effect
		200*	11.89	2.287	0.193	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.584321	0.8614403	3	60.76	<0.0001	Significant Effect
Error	0.1701237	0.01417698	12			
Total	2.754445		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Distribution	Shapiro-Wilk W Normality	0.7761	0.8408	0.0013	Non-normal Distribution

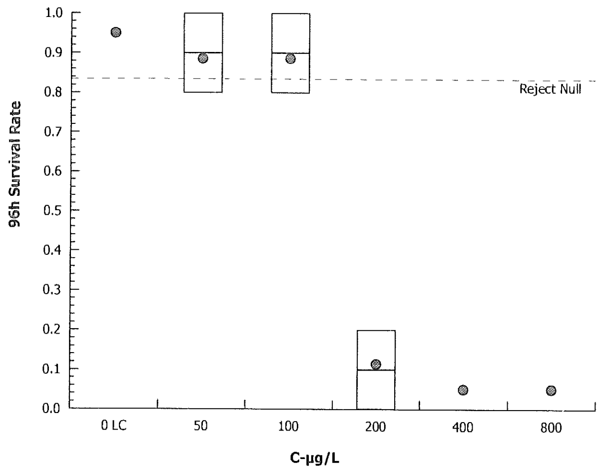
96h Survival Rate Summary

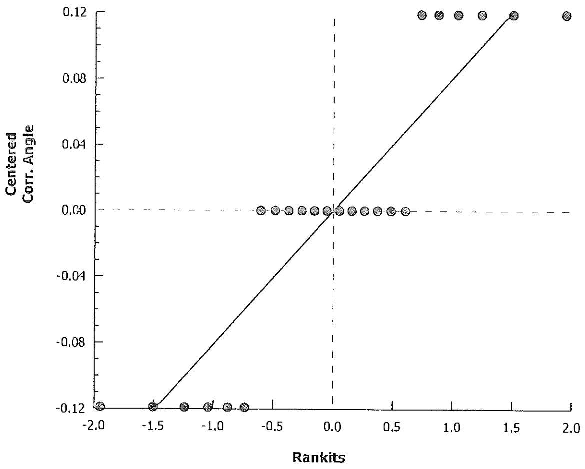
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	1	0	0.0%	0.0%
50		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	10.0%
100		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	10.0%
200		4	0.1	0	0.2837	0.1	0	0.2	0.05774	115.5%	90.0%
400		4	0	0	0	0	0	0	0		100.0%
800		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
50		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	8.85%
100		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	8.85%
200		4	0.3446	0.1258	0.5634	0.3446	0.2255	0.4636	0.06874	39.9%	74.39%
400		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
800		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Graphics





Analyst:

QA: KFP 9/6/17

CETIS Analytical Report

Report Date: 30 Aug-17 14:29 (p 1 of 1)
Test Code: 170824aara | 04-3270-4077

Pacific Topsmelt 96-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 21-0546-3622
Analyzed: 30 Aug-17 14:29
Endpoint: 96h Survival Rate
Analysis: Trimmed Spearman-Kärber
CETIS Version: CETISv1.8.7
Official Results: Yes

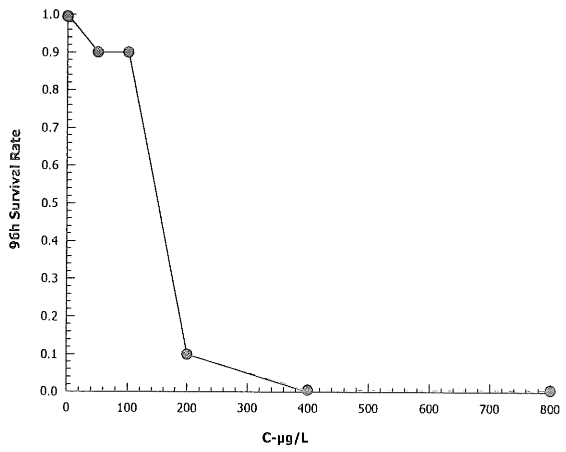
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	10.00%	2.151	0.01785	141.4	130.3	153.5

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	0.9	0.8	1	0.05774	0.1155	12.83%	10.0%	18	20
100		4	0.9	0.8	1	0.05774	0.1155	12.83%	10.0%	18	20
200		4	0.1	0	0.2	0.05774	0.1155	115.5%	90.0%	2	20
400		4	0	0	0	0	0		100.0%	0	20
800		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst:

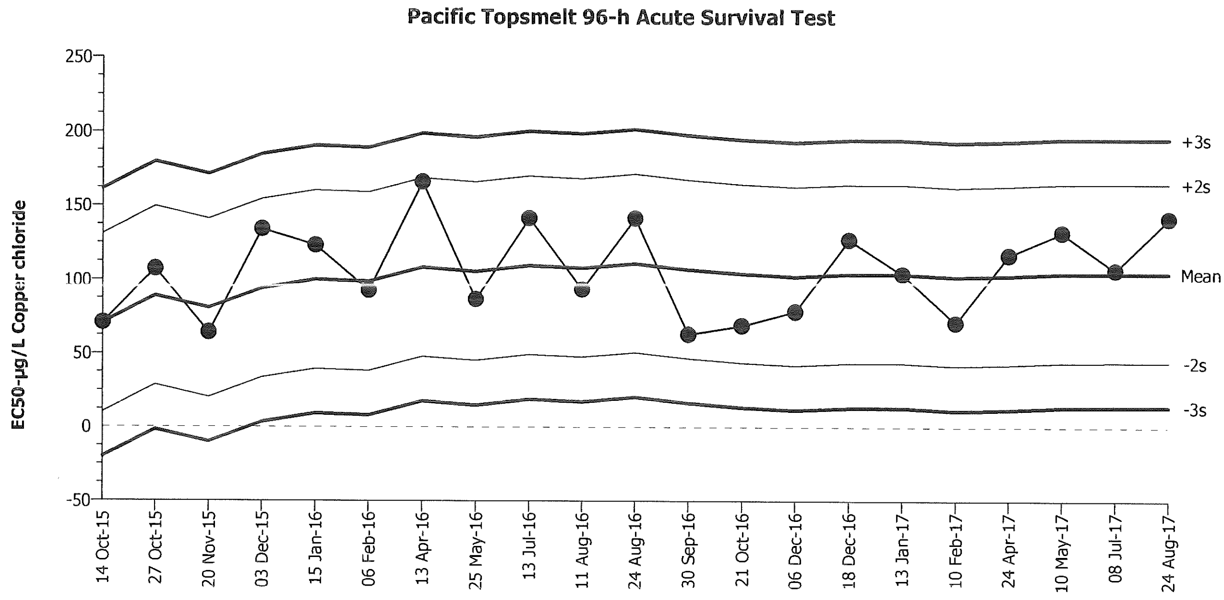
QA: VF 9/6/17

CETIS QC Plot

Report Date: 30 Aug-17 14:36 (1 of 1)

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Atherinops affinis (Topsmelt)	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	104.4	**Count:**	20	**-2s Warning Limit:**	43.97	**-3s Action Limit:**	13.77
Sigma:	30.2	**CV:**	28.90%	**+2s Warning Limit:**	164.8	**+3s Action Limit:**	195

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2015	Oct	14	16:40	70.71	-33.69	-1.116			04-4161-7095	03-6097-1513
2			27	14:25	107.2	2.777	0.09196			14-6236-0417	02-8139-5398
3		Nov	20	14:30	64.04	-40.36	-1.336			19-0245-3966	16-7196-4812
4		Dec	3	12:45	134	29.6	0.9801			14-5323-4110	02-2362-6984
5	2016	Jan	15	14:35	123.1	18.71	0.6197			04-1357-8814	05-9418-7197
6		Feb	6	14:30	92.59	-11.81	-0.3911			02-5371-2482	06-5272-0912
7		Apr	13	17:00	166	61.55	2.038	(+)		07-1307-5309	15-4685-4143
8		May	25	11:00	86.55	-17.85	-0.5909			06-1822-8551	00-5811-9532
9		Jul	13	16:15	141.4	37.02	1.226			13-5507-2356	11-2506-0217
10		Aug	11	15:10	93.3	-11.1	-0.3674			09-9737-0225	18-1616-8617
11			24	11:55	141.4	37.02	1.226			01-7126-4959	07-2284-8883
12		Sep	30	15:30	63	-41.4	-1.371			15-5016-1485	00-5251-2482
13		Oct	21	15:05	68.85	-35.55	-1.177			12-5359-1342	08-1980-0032
14		Dec	6	14:00	78.46	-25.94	-0.859			11-0191-2089	11-9997-9668
15			18	14:30	127.1	22.69	0.7513			07-4756-7914	09-8348-7658
16	2017	Jan	13	16:05	103.9	-0.4741	-0.0157			06-1491-3172	18-6378-7266
17		Feb	10	14:50	70.71	-33.69	-1.116			15-5537-9211	16-0070-6651
18		Apr	24	13:15	116.7	12.28	0.4067			04-2593-1548	15-9565-1968
19		May	10	15:25	132	27.55	0.9123			18-0705-1608	09-7991-9714
20		Jul	8	11:00	106.5	2.058	0.06813			02-7767-0662	04-3078-9331
21		Aug	24	14:45	141.4	37.02	1.226			04-3270-4077	21-0546-3622

Analyst: QA: KF 9/6/17

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: Internal
Sample ID: CuCl$_2$
Test No.: 170824aara

Test Species: *A. affinis*
Start Date/Time: 8/24/2017 1445
End Date/Time: 8/28/2017 1415

Cu stock concentration (µg/L): 99,500

	Tech Initials				
	0	24	48	72	96
Counts:	CG	CG	RH	RH	RH
Readings:	ACS	CG	[illegible]	ACS	RH
Dilutions made by:	BO	—	[illegible]	—	—
High conc. made (µg/L):	800	--	200	--	--
Vol. Cu stock added (mL):	16.1	--	4.0	--	--
Final Volume (mL):	2000	--	2000	--	--

Concentration (µg/L)	Rand #	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	22	5	5	5	5	5	30.4	30.3	i 30.2	30.2	30.0	~~19.7~~ 20.2	20.3	i 20.2	20.7	20.5	7.1	6.2	i 6.4	7.2	6.3	7.97	7.83	i 8.02	7.87	7.85
	2	5	5	5	5	5			f 30.4					f 20.4					f 6.0					f 7.87		
	10	5	5	5	5	5																				
	15	5	5	5	5	5																				
50	24	5	5	5	5	5	30.5	30.3	i 30.2	30.3	30.4	20.8	20.2	i 20.3	20.6	20.5	7.2	6.2	i 6.7	7.4	6.3	8.00	7.85	i 8.04	7.90	7.86
	8	5	5	5	5	4			f 30.4					f 20.4					f 6.0					f 7.86		
	17	5	5	5	5	5																				
	11	5	5	5	5	4																				
100	12	5	5	5	4	4	30.4	30.3	i 30.2	30.3	30.4	20.4	20.2	i 20.4	20.5	20.4	7.2	6.3	i 6.8	7.3	6.3	7.99	7.87	i 8.05	7.90	7.86
	4	5	5	5	4	4			f 30.3					f 20.4					f 6.2					f 7.96		
	1	5	5	5	5	5																				
	19	5	5	5	5	5																				
200	23	5	3	3	3	1	30.5	30.4	i 30.1	30.3	30.4	20.2	20.1	i 20.3	20.5	20.3	7.3	6.4	i 6.9	7.6	6.6	7.97	7.87	i 8.05	7.94	7.92
	13	5	2	2	0	—			f 30.5					f 20.4					f 6.4					f 7.90		
	14	5	1	1	1	0																				
	18	5	4	3	3	1																				
400	9	5	0	all dead			30.5	30.4	i —	—	—	20.2	20.1	i —	—	—	7.3	6.4	i —	—	—	7.97	7.88	i —	—	—
	16	5	0						f —					f —					f —					f —		
	7	5	0																							
	5	5	0																							
800	3	5	0	all dead			30.4	30.3	i —	—	—	20.1	20.0	i —	—	—	7.3	6.4	i —	—	—	7.95	7.87	i —	—	—
	21	5	0						f —					f —					f —					f —		
	6	5	0																							
	20	5	0																							

Rand # QC: CG
Initial Counts QC'd by: ACS
Initiated by: CG

Animal Source/Date Received: ABS 8/22/17
Age at Initiation: 11d

Animal Acclimation Qualifiers (circle all that apply): [✓ Q22] / Q23 / Q24 / none

Feeding Times					
	0	24	48	72	96
AM:	--	0900	0810	0855	0900
PM:	1630	--	--	--	--

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n) ⓐ Q18 ACS 8/24/17

QC Check: CH 8/30/17

Final Review: KFP 9/6/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Appendix E

Laboratory Qualifier Codes

Glossary of Qualifier Codes:

Q1 - Temperatures out of recommended range; corrective action taken and recorded in Test Temperature Correction Log

Q2 - Temperatures out of recommended range; no action taken, test terminated same day

Q3 - Sample aerated prior to initiation or renewal due to dissolved oxygen (D.O.) levels below 6.0 mg/L

Q4 - Test aerated; D.O. levels dropped below 4.0 mg/L

Q5 - Test initiated with aeration due to an anticipated drop in D.O.

Q6 - Airline obstructed or fell out of replicate and replaced; drop in D.O. occurred

Q7 - Salinity out of recommended range

Q8 - Spilled test chamber/ Unable to recover test organism(s)

Q9 - Inadequate sample volume remaining, 50% renewal performed

Q10 - Inadequate sample volume remaining, no renewal performed

Q11 - Sample out of holding time; refer to QA section of report

Q12 - Replicate(s) not initiated; excluded from data analysis

Q13 - Survival counts not recorded due to poor visibility or heavy debris

Q14 - D.O. percent saturation was checked and was ≤ 110%

Q15 - Did not meet minimum test acceptability criteria. Refer to QA section of report.

Q16 - Percent minimum significant difference (PMSD) was below the lower bound limit for acceptability. This indicates that statistics may be over-sensitive in detecting a difference from the control due to low variability in the data set.

Q17 - Percent minimum significant difference (PMSD) was above the upper bound limit for acceptability. This indicates that statistics may be under-sensitive in detecting a difference from the control due to high variability in the data set.

Q18 - Incorrect Entry

Q19 - Illegible Entry

Q20 - Miscalculation

Q21 - Other (provide reason in comments section)

Q22 - Greater than 10% mortality observed upon receipt and/or in holding prior to test initiation. Organisms acclimated to test conditions at Nautilus and ultimately deemed fit to use for testing.

Q23 - Test organisms received at a temperature greater than 3°C outside the recommended test temperature range. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate tests upon the day of arrival. Organisms were acclimated to the appropriate test conditions upon receipt and prior to test initiation.

Q24 - Test organisms received at salinity greater than 3 ppt outside of the recommended test salinity range. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate tests upon the day of arrival. Organisms were acclimated to the appropriate test conditions upon receipt and prior to test initiation.

Updated: 6/30/15

WATER QUALITY RESULTS

2017 ANNUAL SIYB TMDL

ANALYTICAL RESULTS (WECK)

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 7H23002

Project: Annual Shelter Island Yacht Basin TMDL Monitoring

Attn: Barry Snyder

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Report Date: 9/11/2017
Received Date: 8/23/2017
Turnaround Time: Normal
Phones: (858) 300-4320
Fax: (858) 300-4301
P.O. #:
Billing Code:

DoD-ELAP #L2457 • ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH # • ISO 17025 #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Barry Snyder,

Enclosed are the results of analyses for samples received 8/23/17 with the Chain-of-Custody document. The samples were received in good condition, at 4.8 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Brandon Gee For Chris Samatmanakit
Project Manager

Certificate of Analysis

FINAL REPORT

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported: 09/11/2017 13:59

Case Narrative

Preliminary report submitted on 9/8/17 CSS.

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SIYB-1	Corey Sheredy/Chris Stransky	7H23002-01	Water	08/23/17 14:15	
SIYB-1 (REP)	Corey Sheredy/Chris Stransky	7H23002-02	Water	08/23/17 14:55	
SIYB-2	Corey Sheredy/Chris Stransky	7H23002-03	Water	08/23/17 13:15	
SIYB-3	Corey Sheredy/Chris Stransky	7H23002-04	Water	08/23/17 12:15	
SIYB-4	Corey Sheredy/Chris Stransky	7H23002-05	Water	08/23/17 11:15	
SIYB-5	Corey Sheredy/Chris Stransky	7H23002-06	Water	08/23/17 10:15	
SIYB-6	Corey Sheredy/Chris Stransky	7H23002-07	Water	08/23/17 09:15	
SIYB (REF)	Corey Sheredy/Chris Stransky	7H23002-08	Water	08/23/17 08:15	
SIYB-ER	Corey Sheredy/Chris Stransky	7H23002-09	Water	08/23/17 06:45	
SIYB-FB	Corey Sheredy/Chris Stransky	7H23002-10	Water	08/23/17 15:25	

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported: 09/11/2017 13:59

Sample Results

Sample: SIYB-1 Sampled: 08/23/17 14:15 by Corey Sheredy/Chris Stransky

7H23002-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**13**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.7**	0.016	0.10	mg/l	1	08/25/17 08:54	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.5**	0.016	0.10	mg/l	1	08/28/17 11:39	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**13**		0.010	ug/l	1	09/09/17 02:08	
Zinc, Total	**31**		0.20	ug/l	1	09/09/17 02:08	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**12**		0.010	ug/l	1	09/08/17 21:43	
Zinc, Dissolved	**31**		0.20	ug/l	1	09/08/17 21:43	

Sample: SIYB-1 (REP) Sampled: 08/23/17 14:55 by Corey Sheredy/Chris Stransky

7H23002-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**16**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.5**	0.016	0.10	mg/l	1	08/25/17 09:15	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.6**	0.016	0.10	mg/l	1	08/28/17 11:56	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**13**		0.010	ug/l	1	09/09/17 02:22	
Zinc, Total	**31**		0.20	ug/l	1	09/09/17 02:22	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**12**		0.010	ug/l	1	09/08/17 21:57	
Zinc, Dissolved	**32**		0.20	ug/l	1	09/08/17 21:57	

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported: 09/11/2017 13:59

Sample Results

(Continued)

Sample: SIYB-2 Sampled: 08/23/17 13:15 by Corey Sheredy/Chris Stransky

7H23002-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**11**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.5**	0.016	0.10	mg/l	1	08/25/17 09:32	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.5**	0.016	0.10	mg/l	1	08/28/17 12:14	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**13**		0.010	ug/l	1	09/09/17 02:36	
Zinc, Total	**29**		0.20	ug/l	1	09/09/17 02:36	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**13**		0.010	ug/l	1	09/08/17 22:11	
Zinc, Dissolved	**28**		0.20	ug/l	1	09/08/17 22:11	

Sample: SIYB-3 Sampled: 08/23/17 12:15 by Corey Sheredy/Chris Stransky

7H23002-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**11**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.4**	0.016	0.10	mg/l	1	08/25/17 09:49	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.7**	0.016	0.10	mg/l	1	08/28/17 12:27	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**9.8**		0.010	ug/l	1	09/09/17 02:50	
Zinc, Total	**21**		0.20	ug/l	1	09/09/17 02:50	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**9.1**		0.010	ug/l	1	09/08/17 22:25	
Zinc, Dissolved	**20**		0.20	ug/l	1	09/08/17 22:25	

Sample Results

(Continued)

Sample: SIYB-4
7H23002-05 (Water)

Sampled: 08/23/17 11:15 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**12**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.7**	0.016	0.10	mg/l	1	08/25/17 10:06	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.5**	0.016	0.10	mg/l	1	08/28/17 12:45	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**8.3**		0.010	ug/l	1	09/09/17 03:03	
Zinc, Total	**19**		0.20	ug/l	1	09/09/17 03:03	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**7.9**		0.010	ug/l	1	09/08/17 22:39	
Zinc, Dissolved	**18**		0.20	ug/l	1	09/08/17 22:39	

Sample: SIYB-5
7H23002-06 (Water)

Sampled: 08/23/17 10:15 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**13**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.7**	0.016	0.10	mg/l	1	08/25/17 10:27	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**2.5**	0.016	0.10	mg/l	1	08/28/17 13:02	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**3.9**		0.010	ug/l	1	09/09/17 03:17	
Zinc, Total	**10**		0.20	ug/l	1	09/09/17 03:17	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**3.4**		0.010	ug/l	1	09/08/17 22:53	
Zinc, Dissolved	**9.3**		0.20	ug/l	1	09/08/17 22:53	

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported:
09/11/2017 13:59

Sample Results

(Continued)

Sample: SIYB-6
7H23002-07 (Water)

Sampled: 08/23/17 9:15 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1597		**Prepared:** 08/25/17 12:39				**Analyst:** ajk
Total Suspended Solids	**14**		5	mg/l	1	08/28/17 09:40	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.4**	0.016	0.10	mg/l	1	08/25/17 10:46	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**2.1**	0.016	0.10	mg/l	1	08/28/17 13:19	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**2.3**		0.010	ug/l	1	09/09/17 03:31	
Zinc, Total	**6.6**		0.20	ug/l	1	09/09/17 03:31	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**1.8**		0.010	ug/l	1	09/08/17 23:07	
Zinc, Dissolved	**5.6**		0.20	ug/l	1	09/08/17 23:07	

Sample: SIYB (REF)
7H23002-08 (Water)

Sampled: 08/23/17 8:15 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1739		**Prepared:** 08/29/17 09:17				**Analyst:** ajk
Total Suspended Solids	**10**		5	mg/l	1	08/29/17 10:10	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**1.5**	0.016	0.10	mg/l	1	08/25/17 11:04	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.5**	0.016	0.10	mg/l	1	08/28/17 13:35	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**1.2**		0.010	ug/l	1	09/09/17 03:45	
Zinc, Total	**4.4**		0.20	ug/l	1	09/09/17 03:45	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**0.95**		0.010	ug/l	1	09/08/17 23:21	
Zinc, Dissolved	**3.1**		0.20	ug/l	1	09/08/17 23:21	

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Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported: 09/11/2017 13:59

Sample Results

(Continued)

Sample: SIYB-ER
7H23002-09 (Water)

Sampled: 08/23/17 6:45 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1739		**Prepared:** 08/29/17 09:17				**Analyst:** ajk
Total Suspended Solids	**1**		5	mg/l	1	08/29/17 10:10	J
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**0.64**	0.016	0.10	mg/l	1	08/25/17 11:21	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**1.4**	0.016	0.10	mg/l	1	08/28/17 13:53	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**0.042**		0.010	ug/l	1	09/09/17 03:59	
Zinc, Total	**4.2**		0.20	ug/l	1	09/09/17 03:59	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**0.069**		0.010	ug/l	1	09/08/17 23:34	
Zinc, Dissolved	**3.7**		0.20	ug/l	1	09/08/17 23:34	

Sample: SIYB-FB
7H23002-10 (Water)

Sampled: 08/23/17 15:25 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	**Batch ID:** W7H1739		**Prepared:** 08/29/17 09:17				**Analyst:** ajk
Total Suspended Solids	ND		5	mg/l	1	08/29/17 10:10	
Method: SM 5310B	**Batch ID:** W7H1582		**Prepared:** 08/25/17 07:00				**Analyst:** jlp
Total Organic Carbon (TOC)	**0.24**	0.016	0.10	mg/l	1	08/25/17 11:36	
Method: SM 5310B	**Batch ID:** W7H1662		**Prepared:** 08/28/17 10:09				**Analyst:** jlp
Dissolved Organic Carbon	**0.55**	0.016	0.10	mg/l	1	08/28/17 14:09	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	**Batch ID:** W7I0139		**Prepared:** 09/05/17 12:17				**Analyst:** gza
Copper, Total	**0.021**		0.010	ug/l	1	09/09/17 04:13	
Zinc, Total	ND		0.20	ug/l	1	09/09/17 04:13	
Method: EPA 1640	**Batch ID:** W7I0140		**Prepared:** 09/05/17 12:20				**Analyst:** gza
Copper, Dissolved	**0.023**		0.010	ug/l	1	09/08/17 23:48	
Zinc, Dissolved	ND		0.20	ug/l	1	09/08/17 23:48	

Quality Control Results

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W7H1582 - SM 5310B										
Blank (W7H1582-BLK1)				**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	ND	0.0090	mg/l							
Blank (W7H1582-BLK2)				**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	0.0170	0.0090	mg/l							J
LCS (W7H1582-BS1)				**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	0.980	0.0090	mg/l	1.00		98	80-120		10	
LCS (W7H1582-BS2)				**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	2.14	0.0090	mg/l	2.00		107	80-120		10	
Matrix Spike (W7H1582-MS1)	**Source: 7H23002-01**			**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	3.34	0.0090	mg/l	2.00	1.69	82	80-120		10	
Matrix Spike Dup (W7H1582-MSD1)	**Source: 7H23002-01**			**Prepared & Analyzed: 08/25/17**						
Total Organic Carbon (TOC)	3.30	0.0090	mg/l	2.00	1.69	80	80-120	1	10	
Batch: W7H1597 - SM 2540D										
Blank (W7H1597-BLK1)				**Prepared: 08/25/17 Analyzed: 08/28/17**						
Total Suspended Solids	ND		mg/l							
LCS (W7H1597-BS1)				**Prepared: 08/25/17 Analyzed: 08/28/17**						
Total Suspended Solids	61.0		mg/l	56.9		107	90-110			
Duplicate (W7H1597-DUP1)	**Source: 7H23002-01**			**Prepared: 08/25/17 Analyzed: 08/28/17**						
Total Suspended Solids	13.0		mg/l		13.0			0	20	
Duplicate (W7H1597-DUP2)	**Source: 7H23002-02**			**Prepared: 08/25/17 Analyzed: 08/28/17**						
Total Suspended Solids	17.0		mg/l		16.0			6	20	
Batch: W7H1662 - SM 5310B										
Blank (W7H1662-BLK1)				**Prepared & Analyzed: 08/28/17**						
Dissolved Organic Carbon	ND	0.013	mg/l							
LCS (W7H1662-BS1)				**Prepared & Analyzed: 08/28/17**						
Dissolved Organic Carbon	1.10	0.013	mg/l	1.00		110	80-120		20	
Matrix Spike (W7H1662-MS1)	**Source: 7H23002-01**			**Prepared & Analyzed: 08/28/17**						
Dissolved Organic Carbon	3.26	0.013	mg/l	2.00	1.53	87	80-120		20	
Matrix Spike Dup (W7H1662-MSD1)	**Source: 7H23002-01**			**Prepared & Analyzed: 08/28/17**						
Dissolved Organic Carbon	3.36	0.013	mg/l	2.00	1.53	91	80-120	3	20	
Batch: W7H1739 - SM 2540D										
Blank (W7H1739-BLK1)				**Prepared & Analyzed: 08/29/17**						
Total Suspended Solids	ND		mg/l							
LCS (W7H1739-BS1)				**Prepared & Analyzed: 08/29/17**						
Total Suspended Solids	63.0		mg/l	57.7		109	90-110			
Duplicate (W7H1739-DUP1)	**Source: 7H21001-02**			**Prepared & Analyzed: 08/29/17**						
Total Suspended Solids	2.00		mg/l		3.00			40	20	R-03, J

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W7H1739 - SM 2540D (Continued)										
Duplicate (W7H1739-DUP2)	**Source: 7H21001-03**			**Prepared & Analyzed: 08/29/17**						
Total Suspended Solids	ND		mg/l		1.00			200	20	R-03

Metals - Low Level by 1600 Series Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W7I0139 - EPA 1640										
Blank (W7I0139-BLK1)				**Prepared: 09/05/17 Analyzed: 09/09/17**						
Copper, Total	ND	0.010	ug/l							
Zinc, Total	ND	0.20	ug/l							
LCS (W7I0139-BS1)				**Prepared: 09/05/17 Analyzed: 09/09/17**						
Copper, Total	1.89	0.010	ug/l	2.00		94	73-122			
Zinc, Total	9.73	0.20	ug/l	10.0		97	75-127			
Matrix Spike (W7I0139-MS1)	**Source: 7H23002-01**			**Prepared: 09/05/17 Analyzed: 09/09/17**						
Copper, Total	23.1	0.010	ug/l	10.0	12.9	103	60-138			
Zinc, Total	62.7	0.20	ug/l	30.0	31.1	105	68-132			
Matrix Spike Dup (W7I0139-MSD1)	**Source: 7H23002-01**			**Prepared: 09/05/17 Analyzed: 09/09/17**						
Copper, Total	23.2	0.010	ug/l	10.0	12.9	103	60-138	0.3	30	
Zinc, Total	64.2	0.20	ug/l	30.0	31.1	110	68-132	2	30	
Batch: W7I0140 - EPA 1640										
Blank (W7I0140-BLK1)				**Prepared: 09/05/17 Analyzed: 09/08/17**						
Copper, Dissolved	ND	0.010	ug/l							
Zinc, Dissolved	ND	0.20	ug/l							
LCS (W7I0140-BS1)				**Prepared: 09/05/17 Analyzed: 09/08/17**						
Copper, Dissolved	2.27	0.010	ug/l	2.00		114	70-130			
Zinc, Dissolved	10.9	0.20	ug/l	10.0		109	75-127			
Matrix Spike (W7I0140-MS1)	**Source: 7H23002-01**			**Prepared: 09/05/17 Analyzed: 09/08/17**						
Copper, Dissolved	22.1	0.010	ug/l	10.0	12.1	100	70-130			
Zinc, Dissolved	62.6	0.20	ug/l	30.0	30.7	106	68-132			
Matrix Spike Dup (W7I0140-MSD1)	**Source: 7H23002-01**			**Prepared: 09/05/17 Analyzed: 09/08/17**						
Copper, Dissolved	22.3	0.010	ug/l	10.0	12.1	101	70-130	0.6	30	
Zinc, Dissolved	62.6	0.20	ug/l	30.0	30.7	106	68-132	0.03	30	

Certificate of Analysis

FINAL REPORT

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Annual Shelter Island Yacht Basin TMDL Monitoring

Project Manager: Barry Snyder

Reported: 09/11/2017 13:59

Notes and Definitions

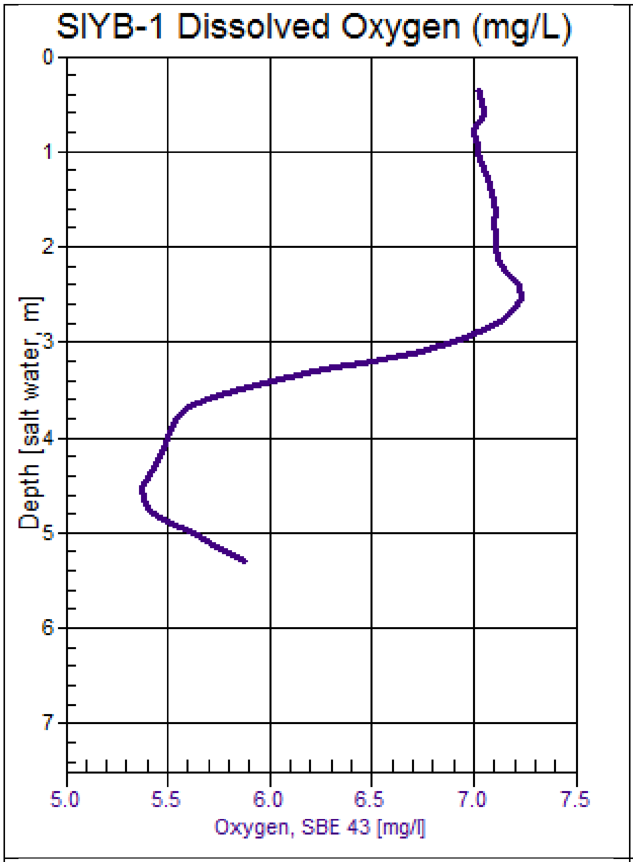
Item	Definition
J	Estimated conc. detected <MRL and >MDL.
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

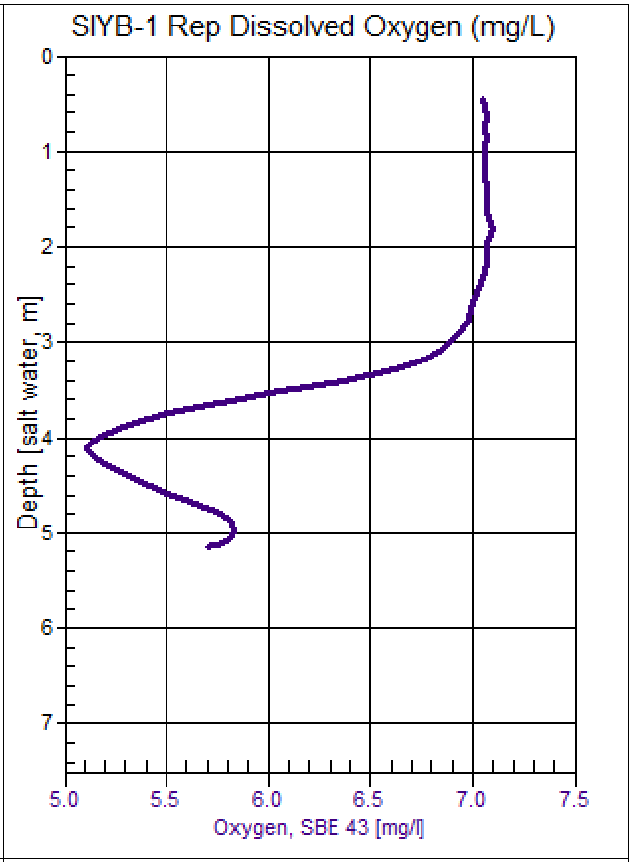
Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)
All results are expressed on wet weight basis unless otherwise specified.
All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

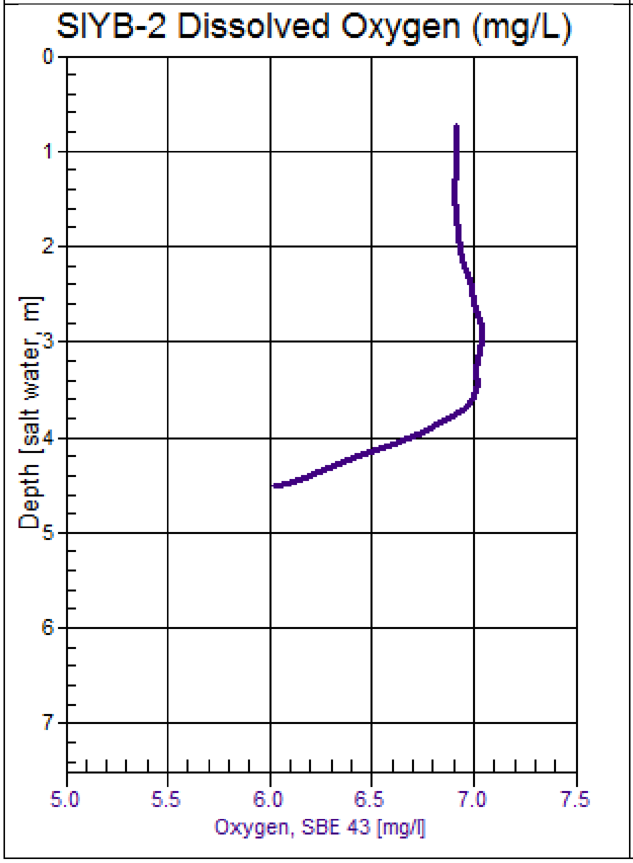
WATER QUALITY RESULTS

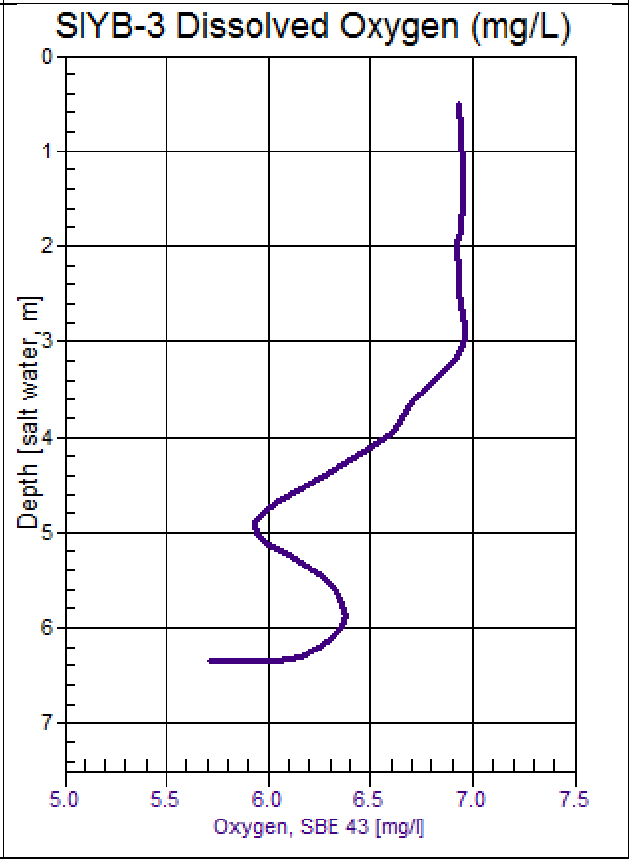
CTD PROFILES: DISSOLVED OXYGEN

2017 SIYB TMDL Annual Monitoring - CTD Profiles for Dissolved Oxygen

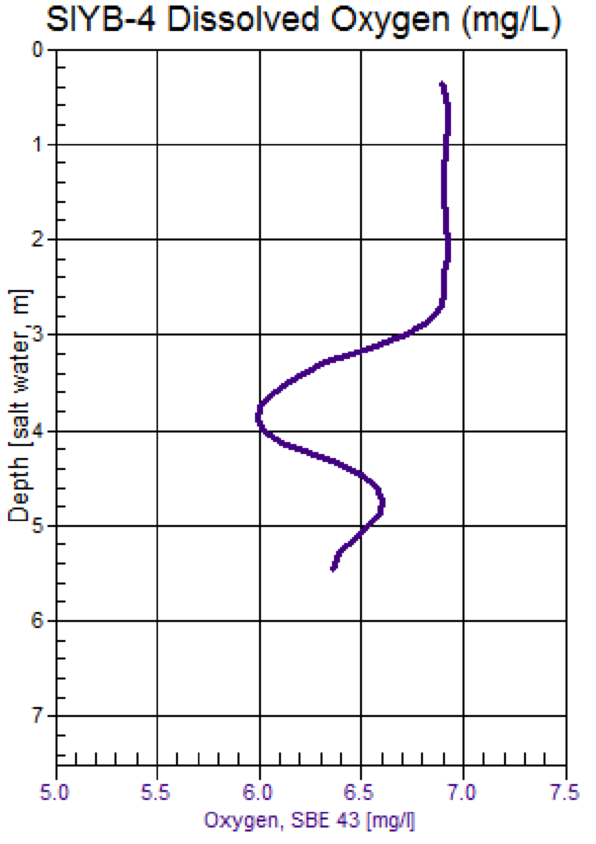


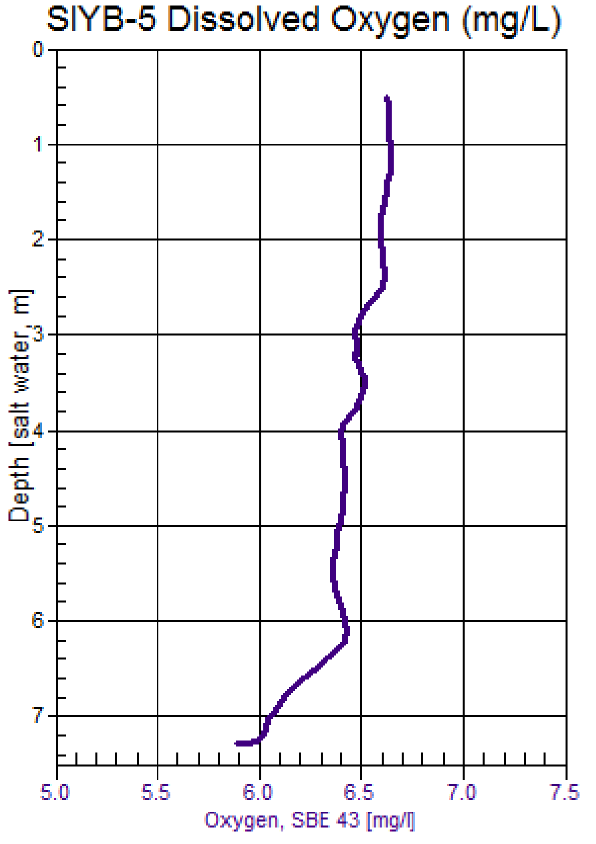


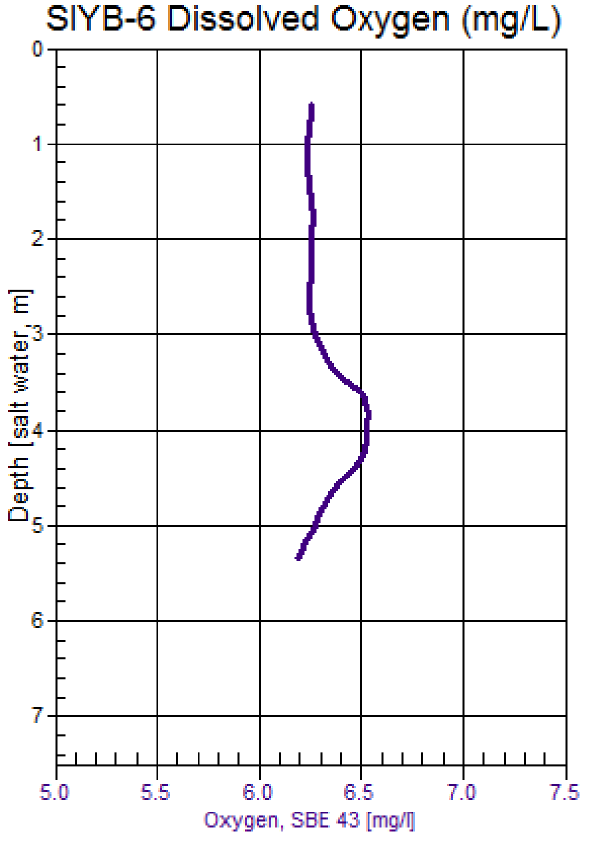




2017 SIYB TMDL Annual Monitoring - CTD Profiles for Dissolved Oxygen

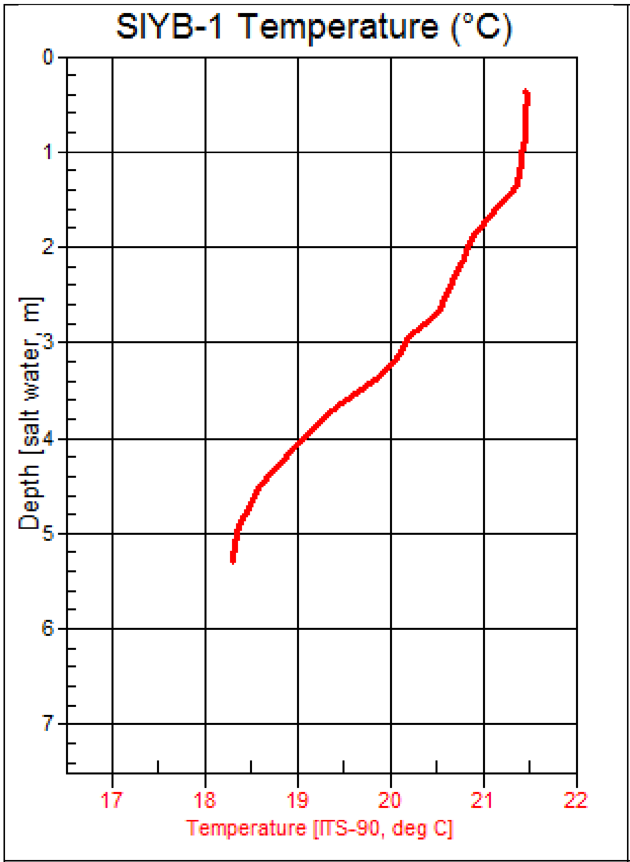


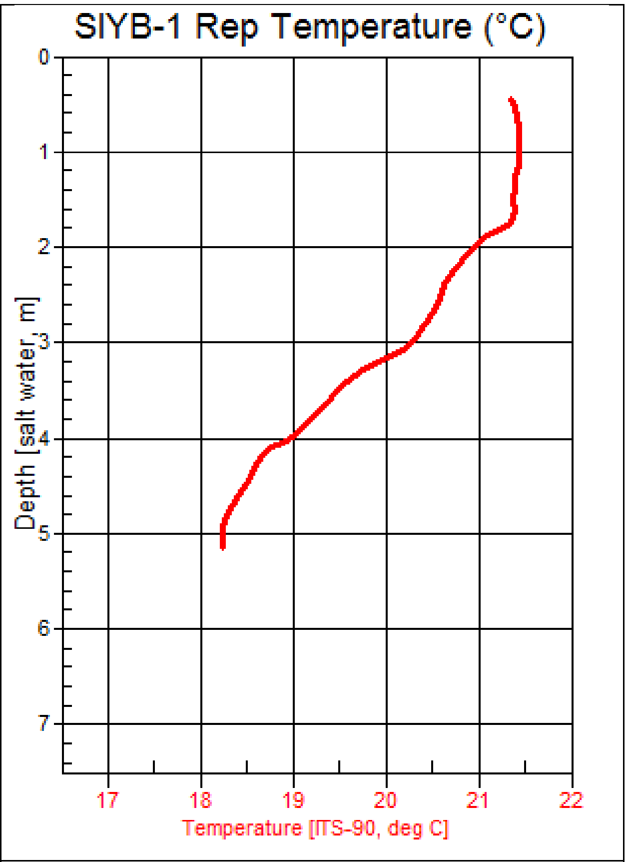


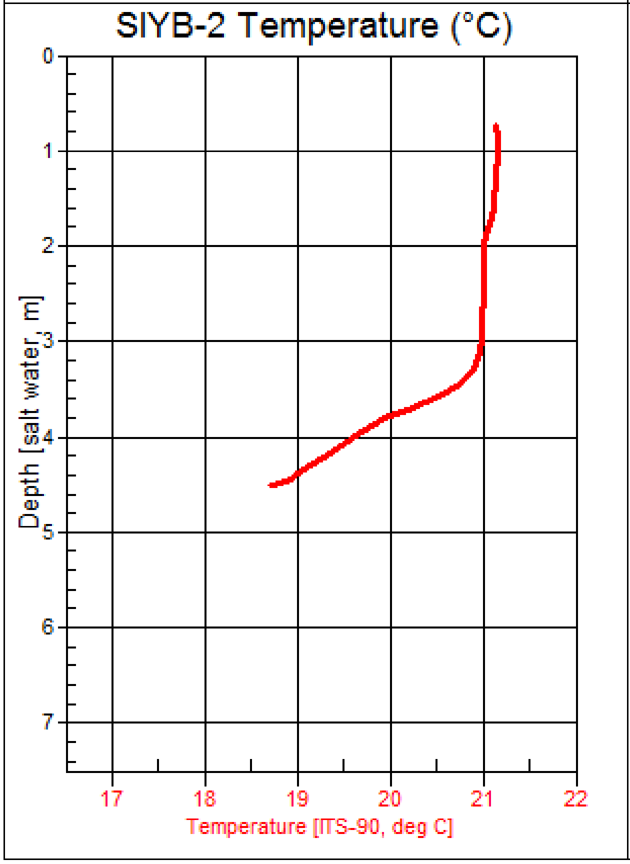


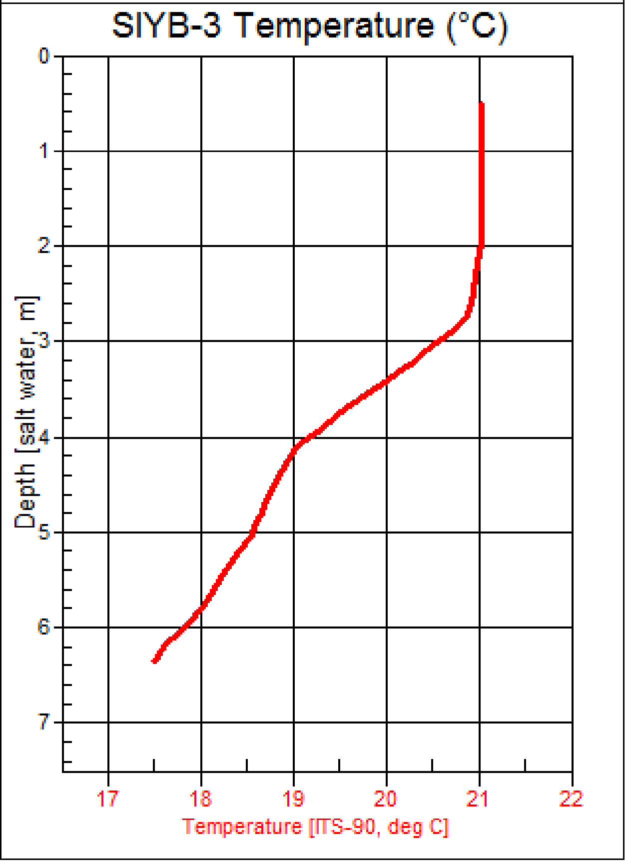
WATER QUALITY RESULTS

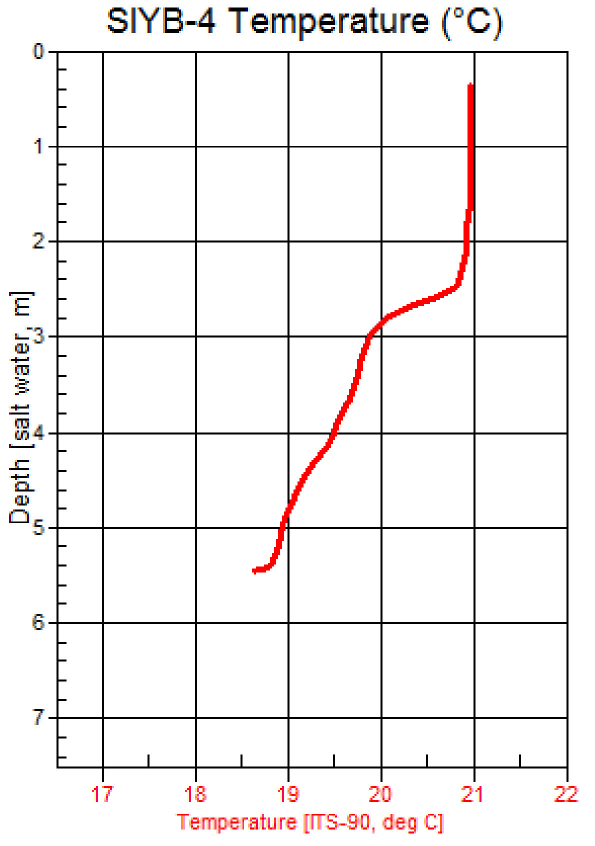
CTD PROFILES: TEMPERATURE

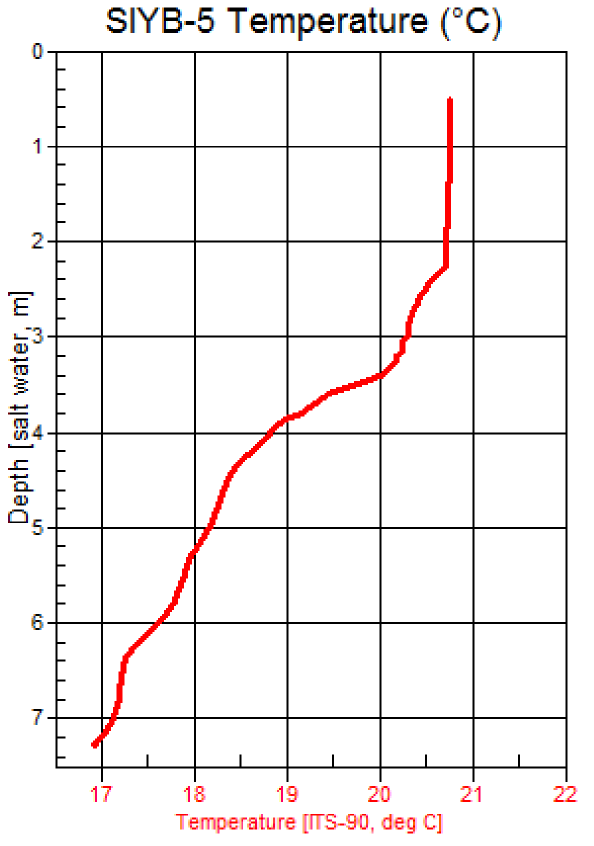

SIYB-1 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]

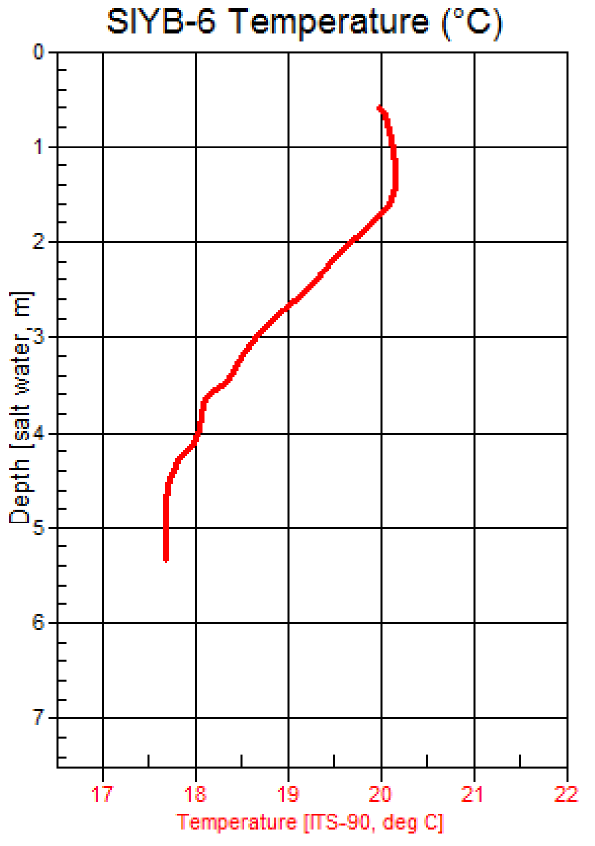

SIYB-1 Rep Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]


SIYB-2 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]


SIYB-3 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]


SIYB-4 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]

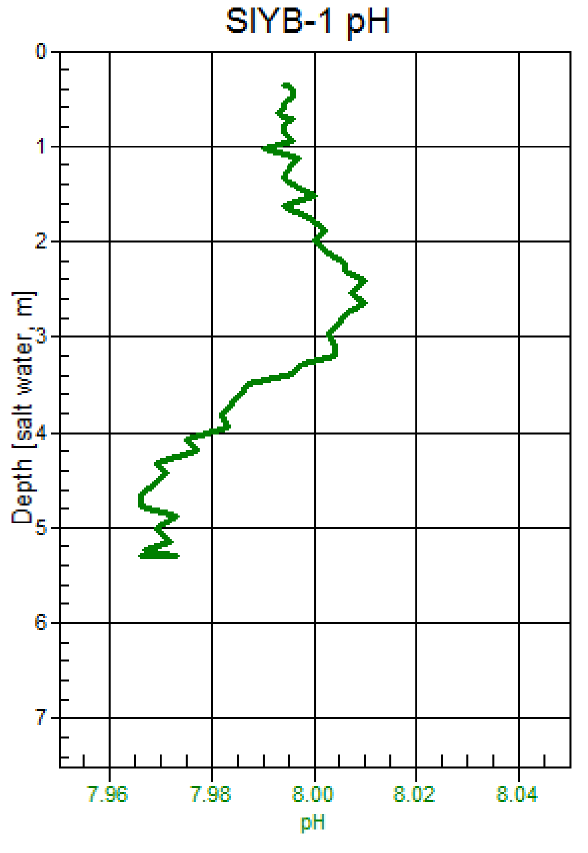

SIYB-5 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]

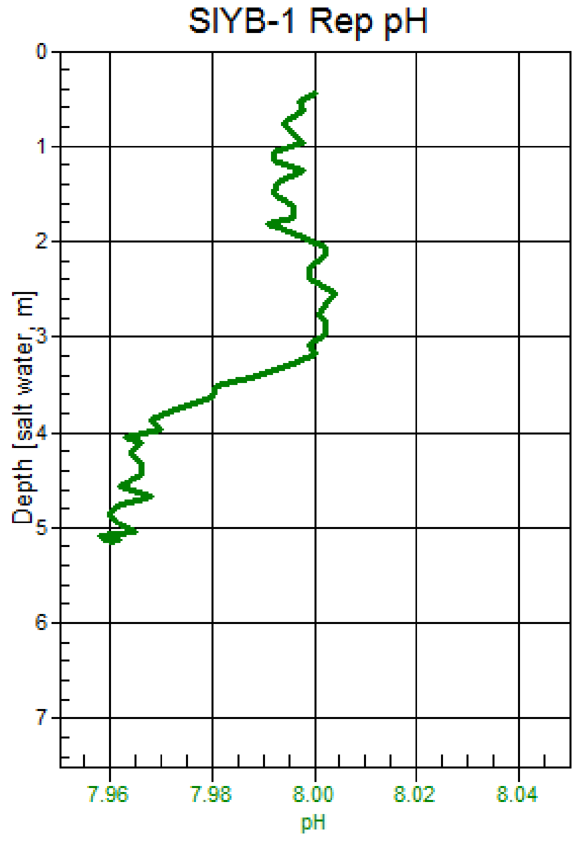

SIYB-6 Temperature (°C)
Depth [salt water, m]
0
1
2
3
4
5
6
7
17
18
19
20
21
22
Temperature [ITS-90, deg C]

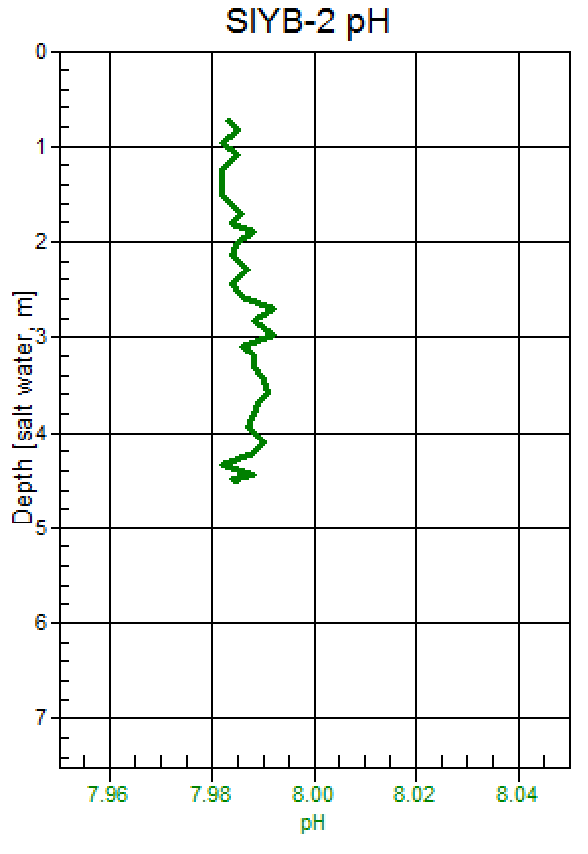
WATER QUALITY RESULTS

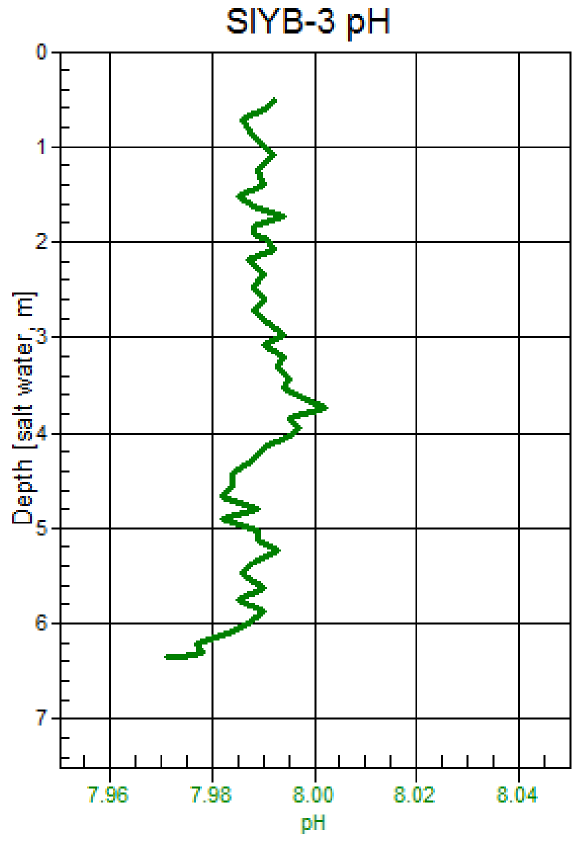
CTD PROFILES: pH

2017 SIYB TMDL Annual Monitoring - CTD Profiles for pH

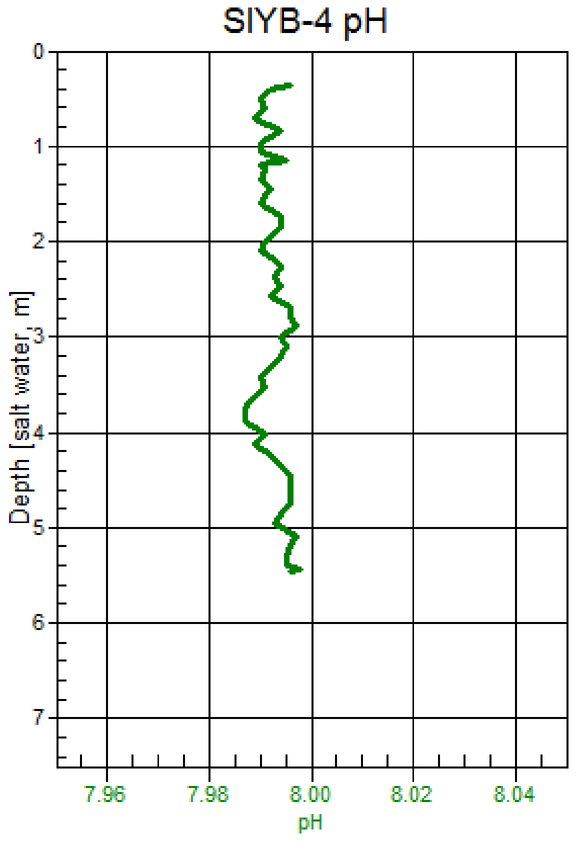


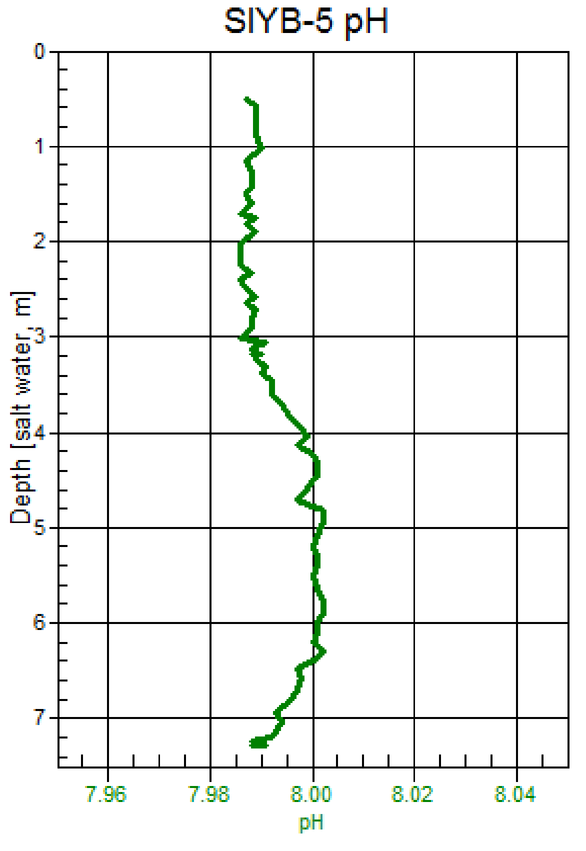


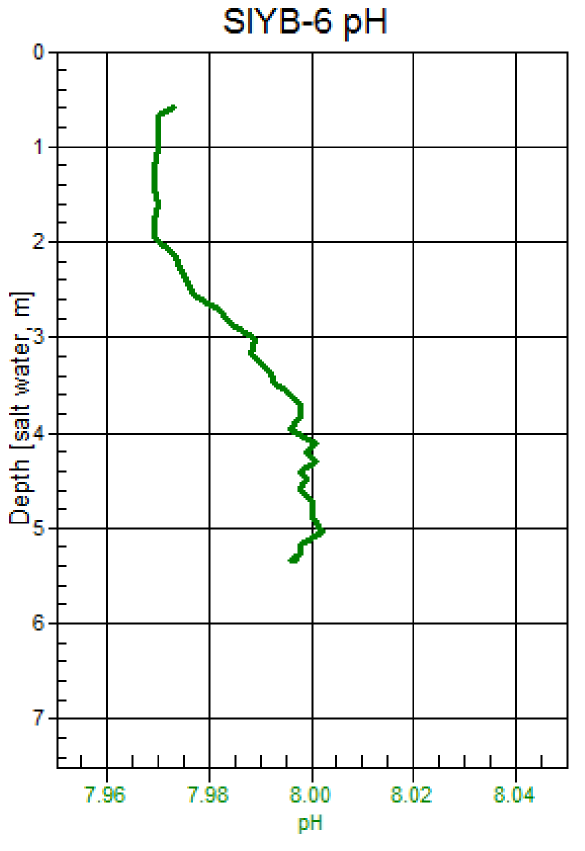




2017 SIYB TMDL Annual Monitoring - CTD Profiles for pH



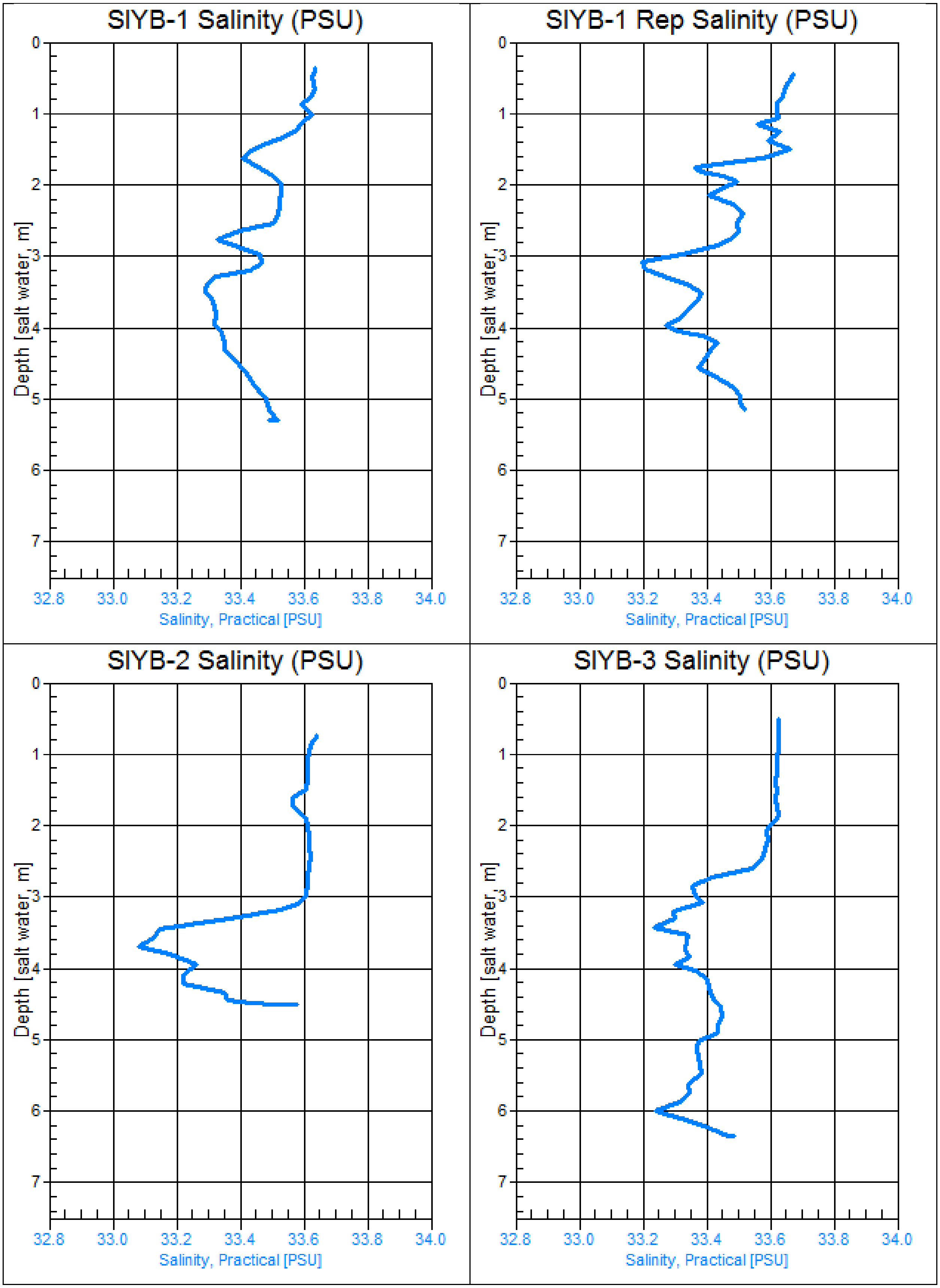




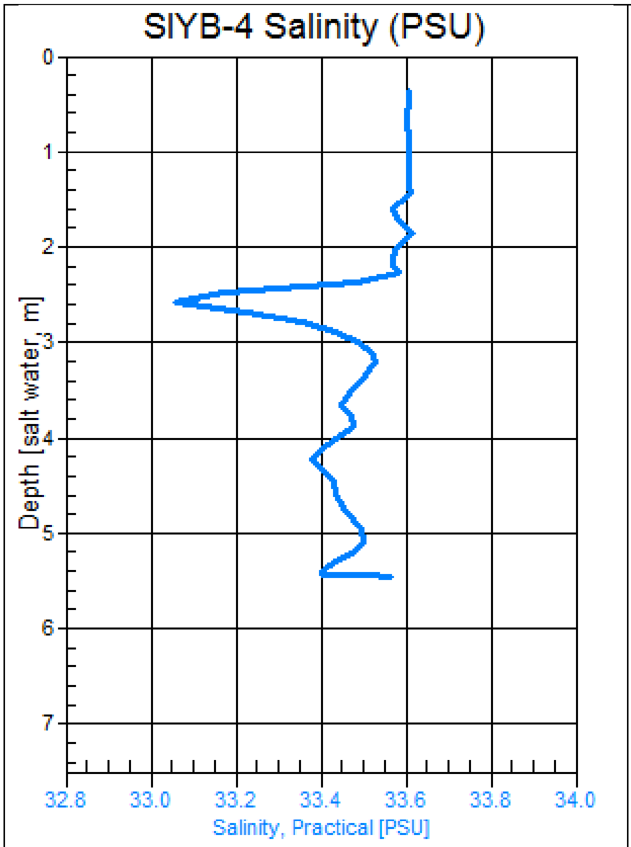
WATER QUALITY RESULTS

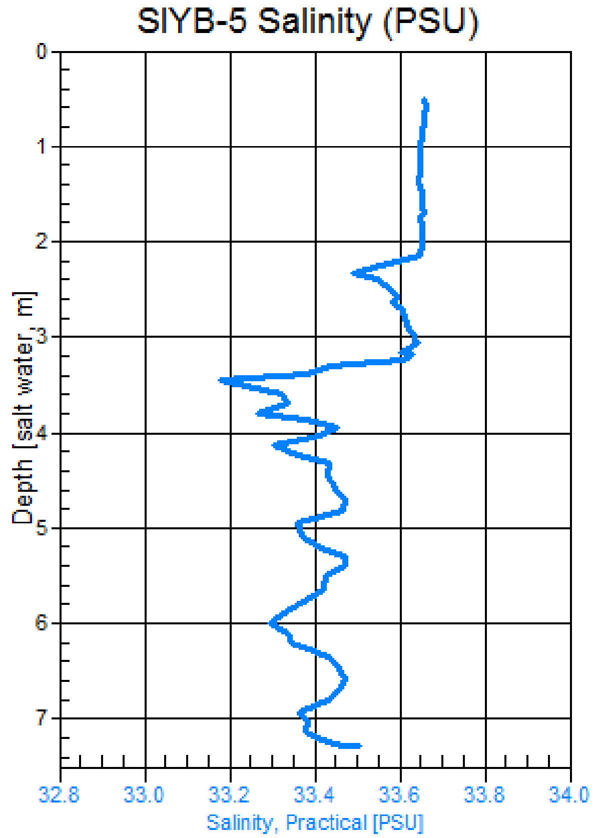
CTD PROFILES: SALINITY

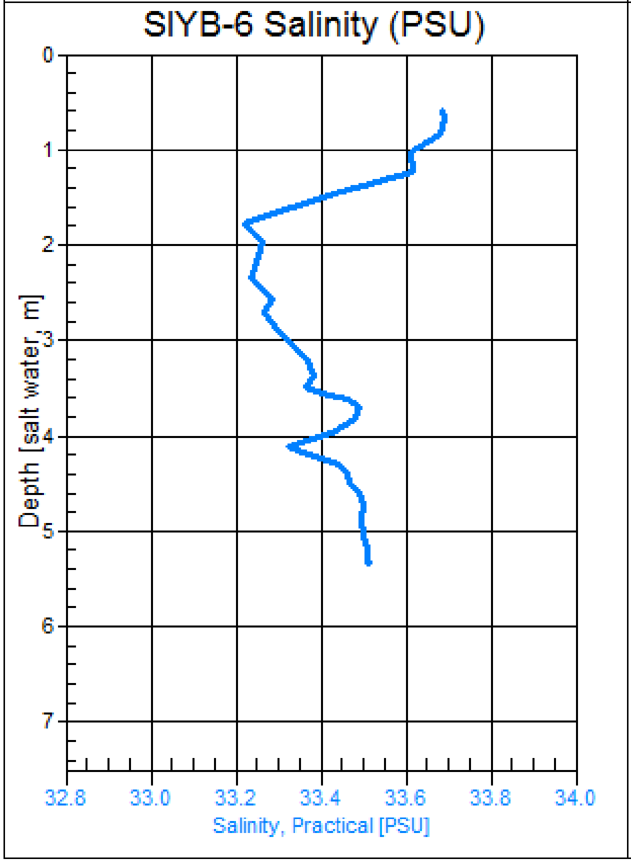
2017 SIYB TMDL Annual Monitoring - CTD Profiles for Salinity



2017 SIYB TMDL Annual Monitoring - CTD Profiles for Salinity







APPENDIX E

2018 TIME SERIES STUDY

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FINAL
24-HOUR TIME SERIES ANALYSIS OF DISSOLVED COPPER IN SHELTER ISLAND YACHT BASIN

TECHNICAL MEMORANDUM

Prepared for:
San Diego Unified Port District

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123

March 2018

Amec Foster Wheeler Project No. 1715100611

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ACRONYMS AND ABBREVIATIONS

Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc. (formerly AMEC Environment & Infrastructure, Inc.)
COC	chain of custody
DI	deionized
ER	equipment rinsate
FB	field blank
GPS	Global Positioning System
ID	identification
MLLW	mean lower low water
NA	not applicable
PDF	Portable Data Format
Port of San Diego or Port	San Diego Unified Port District
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
Regional Board	San Diego Regional Water Quality Control Board
REP	replicate
SAP	Sampling and Analysis Plan
SD	standard deviation
SEM	standard error of the mean
SIYB	Shelter Island Yacht Basin
SIYB TMDL	Total Maximum Daily Load for Dissolved Copper in the San Diego Shelter Island Yacht Basin
SS	Special Study
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
Time Series Study	24-Hour Time Series Study of Dissolved Copper in SIYB
TMDL	total maximum daily load
TS	time series
USEPA	United States Environmental Protection Agency
YSI	YSI Incorporated

UNITS OF MEASURE

%	percent
±	plus or minus
°C	degree(s) Celsius
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
µg/L	microgram(s) per liter
µm	Micrometer
ft	feet or foot
m	meter(s)
mL	milliliter(s)
pH	hydrogen ion concentration
ppt	part(s) per thousand

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1.0 INTRODUCTION

This report presents the results of the 24-Hour Time Series Analysis of Dissolved Copper (Time Series Study) conducted in the Shelter Island Yacht Basin (SIYB) in January 2018. This water quality investigation was designed to evaluate possible variations in dissolved copper concentrations resulting from tidal fluctuations. This study was completed in January 2018 through the combined efforts of the San Diego Unified Port District (Port of San Diego or Port) and Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler).

Surface water quality monitoring is completed on an annual basis to analyze primarily for dissolved copper concentrations as part of the SIYB Dissolved Copper Total Maximum Daily Load (SIYB TMDL). The sampling is completed on similar tidal heights each year during the peak summer months (i.e., August or September); this sampling consequently does not allow for characterization of tidal influence on the surface concentrations of dissolved copper throughout the basin. In an effort to better understand tidal influence on the concentrations of dissolved copper in the surface waters of SIYB, the Time Series Study was conducted in January of 2018 over the duration of one full mixed semidiurnal tidal cycle (approximately 25 hours).

The objective of the Time Series Study is to answer the following question:

> *How do tidal variations affect the concentrations of dissolved copper in the surface waters of SIYB?*

The parameters monitored in the Time Series Study were dissolved copper and general water quality characteristics (e.g., temperature, pH, and salinity). Details regarding sample collection procedures are summarized in Section 2 (Collection Methods and Analysis) of this report, and are discussed in more detail in the project-specific Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2017a; Appendix A).

1.1 Background

Since 2011, dissolved copper concentrations in the surface waters of SIYB have been evaluated each year at six specific locations within the basin as part of the SIYB Dissolved Copper TMDL monitoring program. The annual monitoring results are submitted to the San Diego Regional Water Quality Control Board (Regional Board) as a component of the annual TMDL monitoring report.

Each year, the collection date for the annual monitoring program is selected to target a tidal cycle with a high tide of approximately +5.5 to +6.5 feet mean lower low water (MLLW), and a tidal range between consecutive high and low tides of 5 to 7 feet. Careful effort is made by field scientists to collect samples at each of the six TMDL monitoring stations from year to year at approximately the same time period relative to the tide. Furthermore, the samples are collected at the stations in the same sequence each year, moving from the mouth of the basin to bracket the slack high tide, thus providing relative consistency between monitoring years. For example, Figure 1-1 illustrates the time of collection at each TMDL station compared with tide height during the annual TMDL compliance monitoring events from 2014 through 2017 and during a special study (the 2016 Enhanced Water Quality Special Study). The special study was performed in conjunction with the 2016 TMDL compliance monitoring to supplement the existing TMDL stations with additional stations and monitoring depths (Amec Foster Wheeler, 2017b).

Because of its configuration, the major factor responsible for water circulation in SIYB is the daily tidal exchange between the basin and San Diego Bay (Regional Board, 2005). Tidal mixing has the potential to affect the ambient concentrations of dissolved copper within the water column. Understanding the degree by which dissolved copper fluctuates over a tidal cycle will allow for a better understanding of how representative the single point-in-time annual SIYB sample dissolved copper concentrations compare to other points in the daily tidal cycle.

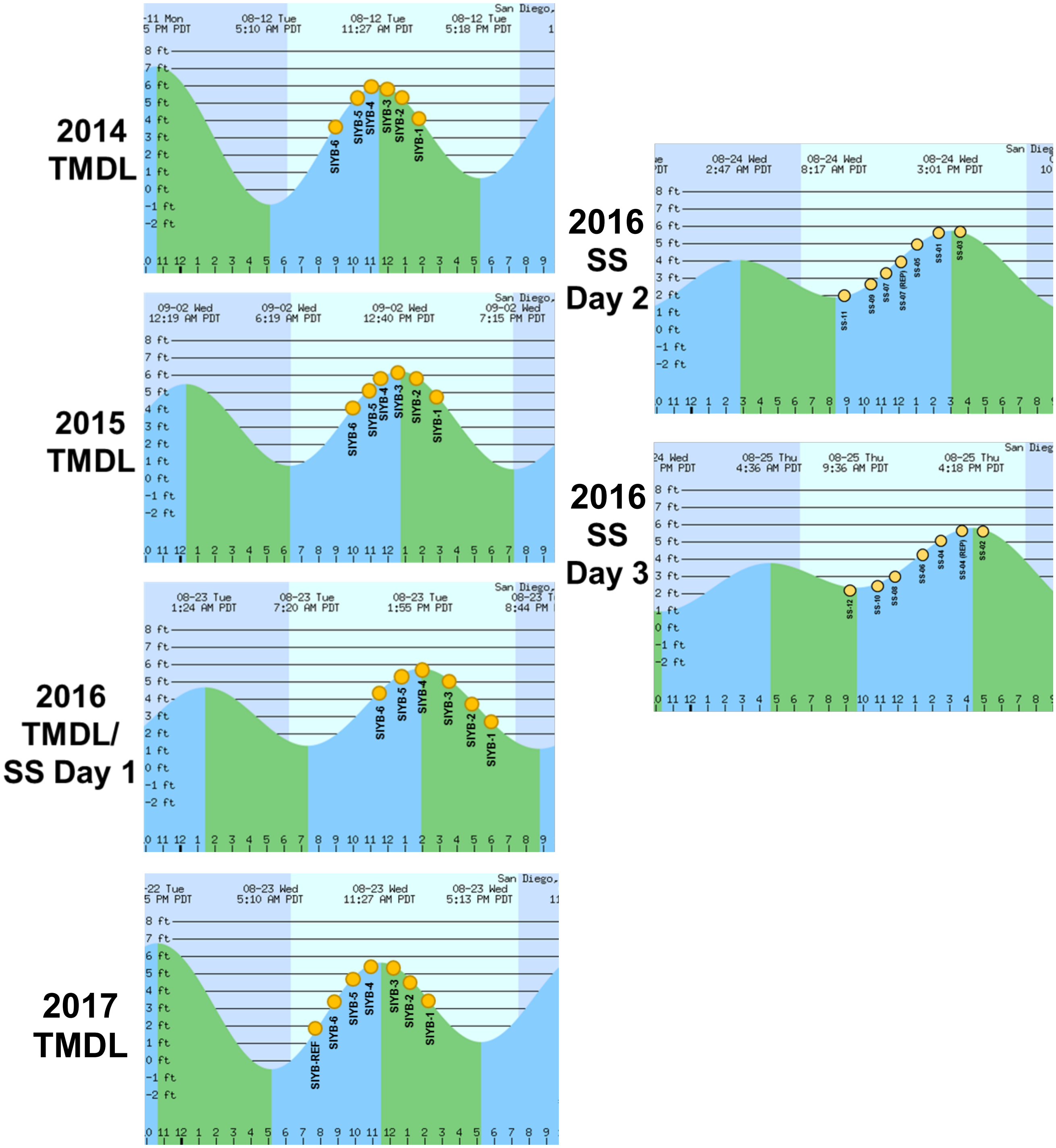

Figure 1-1. Collection Event Versus Tidal Cycle During the SIYB TMDL Monitoring Event (2014–2017) and 2016 Enhanced Water Quality Special Study Event

Note: orange dot = time of collection; SS = Special Study

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2.0 COLLECTION METHODS AND ANALYSIS

This section describes the Time Series Study collection methods, including methods to evaluate how tidal variations may influence dissolved copper levels in surface waters of SIYB, and project-specific quality assurance (QA) and quality control (QC) procedures used during water quality monitoring.

2.1 Sample Collection Methods

Water quality samples were collected from surface water (i.e., 1 meter below the surface) at three locations throughout SIYB. These locations were chosen to characterize different areas of the basin. Samples were collected approximately every two hours throughout one full mixed semidiurnal tidal cycle; the sampling days (January 3–4, 2018) were selected to specifically correspond with the tidal ranges observed during the annual TMDL monitoring.

2.1.1 Sampling Stations

As discussed in Section 2.1, samples were collected at three locations throughout SIYB that reflect distance from the mouth. Station TS-1 was located near the head of the basin, at the southwestern end of the fuel dock. Discrete water samples at this station were collected directly from the dock. Station TS-2 was located approximately mid-basin and a Port-operated vessel with non-biocide paint was used for discrete sample collection. Station TS-3 was at the mouth of SIYB at the southwestern end of the Transient Dock, and as with TS-1, discrete water samples at TS-3 were collected directly from the dock. Figure 2-1 shows the target and actual sampling locations. Target coordinates and actual sampling coordinates for the stations are provided in Table 2-1.

Table 2-1.
Station Location and Coordinates

Station ID	Location	Target Sampling Coordinates		Actual Sampling Coordinates	
		Latitude (dd.ddddd°)	Longitude (ddd·ddddd°)	Latitude (dd.ddddd°)	Longitude (ddd·ddddd°)
TS-1	Southwestern end of Pearson's Fuel Dock	32.71864	-117.22612	32.71864	-117.22612
TS-2	Mid-Basin	32.71550	-117.22989	32.71575	-117.22977
TS-3	Southwestern end of the Transient Dock	32.71013	-117.23450	32.71013	-117.23450

Notes:
ddd/dd.ddddd° = decimal degrees, ID = identification; TS = time series

Figure 2-1. Shelter Island Yacht Basin Time Series Study Sampling Locations

2.1.2 Collection Schedule

Sample collections at the three stations were performed synchronously throughout the full semidiurnal tidal cycle on January 3 and 4, 2018. As discussed, the sampling date was selected primarily on the basis of the tidal range (i.e., tidal heights similar to those selected for TMDL sampling events) and practicality (i.e., a non-holiday or weekend day for reduced vessel traffic). Table 2-2 provides the tide times and heights for the Time Series Study and the most recent TMDL monitoring event.

Table 2-2.
Tide Times and Heights for the Time Series Study and Annual TMDL Monitoring Events

Date	Low Tide	High Tide	Low Tide	High Tide	Low Tide
	time/height [feet]				
1/3/2018 (Primary)	16:42 (-1.9 ft)	23:11 (+7.0 ft)	04:15 (+1.6 ft)	10:24 (+7.0 ft)	17:29 (-1.4 ft)
8/23/2017 (2017 TMDL)	5:19 (+1.4 ft)	11:33 (+5.6 ft)	18:06 (+0.9 ft)	--	--

Field collection began at slack low tide; samples were collected approximately every 2 hours for 25 hours, bracketing two high tides. Figure 2-2 provides an illustration of the sample collection schedule timing, and Table 2-3 provides a matrix of the collection times. Collection at all three stations occurred simultaneously, using three trained sampling teams.

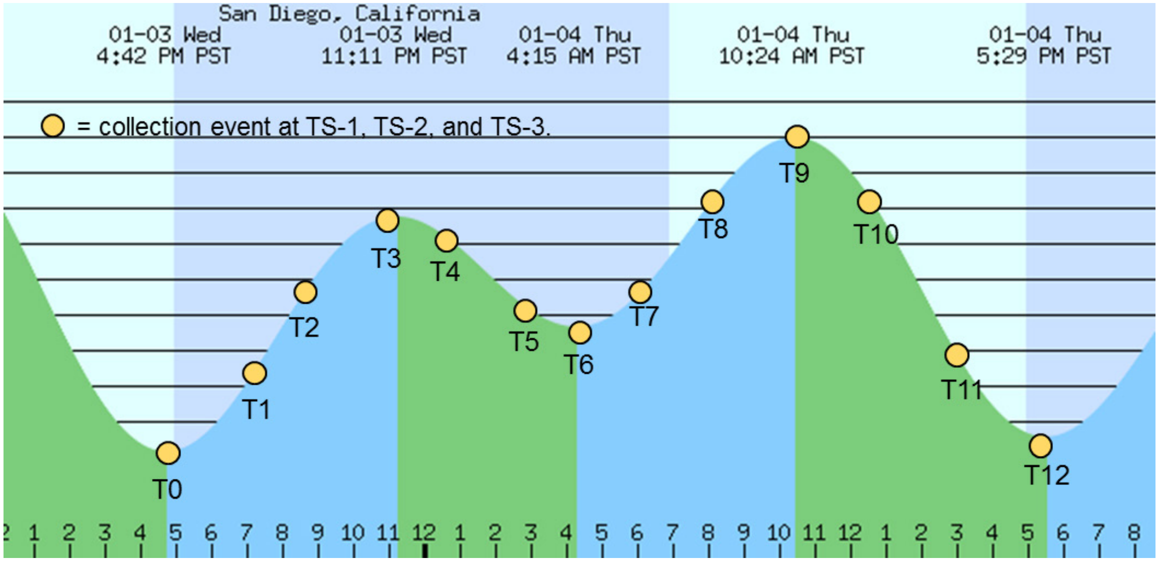

Figure 2-2. Sample Collection Relative to the Tidal Cycle (1/3/2018–1/4/2018)

Table 2-3.
Sample Collection Timing Matrix

Sample ID	Time
TS-[station]-ER	Prior to T0 collection
TS-[station]-T0	16:42 (1/3/2018)
TS-[station]-T1	18:50 (1/3/2018)
TS-[station]-T2	21:00 (1/3/2018)
TS-[station]-T3	23:11 (1/3/2018)
TS-[station]-T4	01:00 (1/4/2018)
TS-[station]-T5	03:00 (1/4/2018)
TS-[station]-T6	04:15 (1/4/2018)
TS-[station]-T7	06:20 (1/4/2018)
TS-[station]-T8	08:20 (1/4/2018)
TS-[station]-T9	10:24 (1/4/2018)
TS-[station]-T10	13:00 (1/4/2018)
TS-[station]-T11	15:15 (1/4/2018)
TS-[station]-T12	17:29 (1/4/2018)
TS-[station]-T12-REP	Immediately followed T12 collection
TS-[station]-FB	Followed T12-REP collection

Notes:
ER = equipment rinsate; FB = field blank; ID = identification; REP = replicate; TS = time series

2.1.3 Field Procedures

Collection methods are presented in Sections 2.3.1 through 2.3.5. Field procedures are described in detail in the project-specific SAP/QAPP (Amec Foster Wheeler, 2017a; Appendix A).

2.1.3.1 Collection Station Positioning

Dockside stations (TS-1 and TS-3) were accessed by land and were located using a Global Positioning System (GPS) device. The mid-basin station (TS-2) was accessed by vessel. Under the direction of the Port Harbor Police[1], positioning and anchoring safety for overnight sampling played a large role in determining the final placement of TS-2, which was positioned at the perimeter of La Playa Anchorage, closest to the main channel of SIYB.

For the mid-channel station (TS-2), the vessel was anchored on station for most of the duration of the sampling event. Upon anchoring on station, the boat engine was turned off for a period of at least 5 minutes before collection activities commenced. During all field efforts, each field team scanned the surrounding area for nearby ongoing vessel maintenance activities and took notes and photographs of these activities (and other factors of note near the collection site), when warranted.

2.1.3.2 Sample Collection Conditions

To ensure sample integrity, specific sample collection conditions were required, as described in the project-specific SAP/QAPP (Amec Foster Wheeler, 2017a; Appendix A). These conditions included taking special care during the anchoring process at TS-2 to ensure that the anchor did not cause excessive sediment resuspension. Once the boat was anchored, the engine was turned off, and a minimum period of 5 minutes elapsed prior to commencing collection activities to allow any potential resuspended sediment to settle.

2.1.3.3 Sample Collection Procedures

To ensure consistency between sampling locations, each sampling team was equipped with a precleaned Niskin bottle, prelabeled bottle kits and extra bottles, precleaned vacuum filtration system units, a filtration pump, a plastic-lined 5-gallon bucket (to store the Niskin in between sample collection times), coolers, and ice.

All sampling steps followed the Surface Water Ambient Monitoring Program (SWAMP)-defined “clean hands” techniques (State Water Resources Control Board [State Board], 2014). For each sample collection event at each station, discrete water samples were collected using a Niskin bottle deployed from the sampling vessel or dock. Surface samples at each station were collected at a depth of 1 meter. Sample timing at each station followed the schedule matrix in Table 2-3 (approximately every two hours). As required by SWAMP protocols, the program included collecting a field replicate at each station. The field replicate sample consisted of a second complete set of samples collected immediately following the collection of the last sample collected

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[1] The Port Harbor Police requested via telephone correspondence that the sampling vessel be positioned outside the main channel.

at each station (TS-[station]-12). In addition to the field replicate, each batch of samples (i.e., each station) included an equipment rinse blank and field blank using laboratory-provided deionized water. The equipment rinse blank was collected prior to collection of TS-[station]-0, and the field blank was collected immediately after the collection of the replicate sample (i.e., following collection of TS-[station]-12-REP) (Table 2-3).

Discrete water samples were filtered in the field (to comply with United States Environmental Protection Agency [USEPA] Method 1640 protocol). Two 500-milliliter (mL) aliquots of water from each Niskin bottle grab sample were filtered through a precleaned[2] 0.45-micrometer (µm) glass fiber filter using a Whatman brand Klari-flex bottle top vacuum filtration system. To ensure that a clean sample was collected, the first 500-mL aliquot was discarded. The second 500-mL aliquot was directly transferred into a prelabeled nonpreserved[3] sample bottle containing ultra-pure nitric acid for preservation. The field team ensured that no airspace remained in the sample bottle once capped. Once confirmed, the sample bottle was immediately transferred to a cooler containing ice. Cooler ice was replenished during the 12-hour shift change and following the conclusion of sampling.

Following the water sample collection, field measurements of pH, temperature, and salinity of the surface water at each station (i.e., within 1 meter of the surface) were made using a YSI meter according to the manufacturer's specifications. Field measurements and any observations (if applicable) were recorded in the field log for that collection event. Completed field logs are provided in Appendix B.

2.1.3.4 Sample Collection Completeness

Upon completion of the sample collection and field measurements, the field crew completed the station- and sample-specific QA/QC checklist to ensure the completeness and accuracy of the field data logs and analytical samples (provided in Appendix B). Once the QA/QC checklist was deemed complete, the field crew prepped for the next sample collection.

Once the entire suite of samples was collected, water samples were logged on a chain-of-custody (COC) form, replaced in newly iced containers, and transported to the analytical laboratory on January 5, 2018.

2.1.3.5 Equipment Decontamination and Cleaning

Prior to field collection, the Niskin bottle was thoroughly cleaned using soapy water and then rinsed thoroughly with deionized water. Upon sample collection, the Niskin bottle was rinsed thoroughly with site water and soaked at the sampling depth (1 meter below the water surface) for at least for one minute prior to sample collection. After collection, water samples were

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[2] The entire filtration apparatus was acid-washed and rinsed thoroughly with deionized (DI) water prior to sample collection.

[3] In the SAP/QAPP, it was stated that sample bottles would contain ultra-pure nitric acid for preservation. In December 29, 2017, email correspondence from the analytical laboratory, it was specified that the samples should be preserved at the laboratory.

transferred from the Niskin bottle to a laboratory-certified, contaminant-free bottle top filtration system. In between sampling times, the Niskin bottle was stored in a plastic-lined, 5-gallon bucket.

2.2 Analytical Analysis

Surface water samples were analyzed for dissolved copper following certified USEPA test methods. The analytical test methods and reporting limits are provided in Table 2-4. Surface water field measurements were taken *in situ* following each sample collection for pH, salinity, and temperature using a YSI data sonde. Measurement accuracy for *in situ* water quality measurements is provided in Table 2-4.

Table 2-4.
Analytical Methods and Measurement Accuracy

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Dissolved Copper	USEPA Method 1640	0.0038 µg/L	0.010 µg/L
Salinity	YSI sonde	NA	± 0.1 ppt
Temperature	YSI sonde	NA	± 0.1 °C
pH	YSI sonde	NA	± 0.1 pH unit

Notes:
°C = degrees Celsius; µg/L = micrograms per liter; NA = not applicable; pH = hydrogen ion concentration; ppt = part(s) per thousand;
USEPA = United States Environmental Protection Agency; YSI = YSI Incorporated

2.2.1 Quality Assurance and Quality Control

Sampling process QA/QC included preparation prior to, during, and after collection of the samples to minimize the possibility of compromising sample integrity. The sample collection team was trained in and followed field sampling operating procedures in accordance with the Special Study SAP/QAPP (Amec Foster Wheeler, 2017a; Appendix A). COC procedures were used for all samples throughout the collection, transport, and analytical process. Completed COC forms are provided in Appendix C. The project-specific SAP/QAPP (Amec Foster Wheeler, 2017a; Appendix A) provides more information regarding COC procedures.

2.2.2 Data Review and Management

Field and laboratory data were reviewed for completeness and accuracy prior to analysis and reporting, and were stored in a database, as described in Sections 2.2.2.1 and 2.2.2.2.

2.2.2.1 Data Review

After the sampling event, field data sheets were checked for completeness and accuracy by the field crew and the Field QA Officer. In addition, all sample COC forms were checked against sample labels prior to transportation to the analytical laboratory. In the laboratory, technicians documented sample receipt and sample preparation activities in laboratory logbooks or on bench sheets. Data validation included use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data. Data for laboratory analyses were entered directly onto data sheets. Data sheets were filled out in ink and signed by the technician, who checked the sheet to ensure completeness and accuracy. The technician who generated the data had primary responsibility for the accuracy and completeness of the data. Each technician reviewed the data to ensure the following:

- The sample description information was correct and complete.
- The analysis information was correct and complete.
- The results were correct and complete.
- The documentation was complete.

All data were reviewed and verified by participating team laboratories to determine whether data quality objectives had been met, and whether appropriate corrective actions had been taken when necessary.

2.2.2.2 Data Management

All laboratory-supplied analytical results were provided as Adobe Portable Data Format (PDF) files. Analytical laboratory results were reviewed by the laboratory QA/QC Officer, and then forwarded to Amec Foster Wheeler for review and reporting. All laboratory records are provided in Appendix D.

2.2.2.3 Data Analysis

The water quality data is presented in tabular format. The dissolved copper concentrations are displayed graphically as a temporal distribution versus the tidal cycle. Analysis of water quality data includes calculations of the range, averages, and standard deviations at each station and study-wide.

3.0 RESULTS

This section discusses and summarizes the analytical chemistry results and *in situ* measurements of the January 2018 Time Series Study. Surface water samples were collected on January 3–4, 2018 at three stations within SIYB. Water samples were tested for concentrations of dissolved copper. Analytical results of the survey are presented in Table 3-1. A QA/QC summary of the analytical laboratory data is provided in Section 3.3. The chemistry results reports submitted by the analytical laboratory are provided in Appendix D.

3.1 Dissolved Copper Results

Table 3-1 provides the surface water dissolved copper concentrations measured at approximately two-hour intervals for the three stations over the 25-hour collection period. Figure 3-1 shows dissolved copper concentrations at the three respective stations throughout the tidal cycle. Figure 3-2 provides the mean concentrations ± standard deviation at each of the three stations. In general, the findings of the Time Series Study showed the following:

- Dissolved copper concentrations in the surface waters of TS-1, located at the fuel dock (nearest to the head of SIYB), ranged from 8.9 µg/L to 10 µg/L over the duration of the study. The average measured concentration over the full semidiurnal tidal cycle was 9.5 µg/L ± 0.34 µg/L (standard deviation). Concentrations over the tidal cycle were the most consistent at this station, compared with results from the other two stations.
- Dissolved copper concentrations at the surface waters of TS-2, located approximately mid-basin and mid-channel, ranged from 2.0 µg/L to 7.1 µg/L; the average concentration over the duration of the study was 5.5 µg/L ± 1.2 µg/L; concentrations varied with the tide more at this station when compared to the values measured at TS-1.
- Dissolved copper concentrations at the surface waters at TS-3, located at the southwestern end of the Transient Dock, ranged from 1.0 µg/L to 4.8 µg/L; the average concentration over the duration of the study was 3.0 µg/L ± 1.2 µg/L. Concentrations of dissolved copper generally varied the greatest with the tidal cycle at this station.

Table 3-1.
Dissolved Copper Concentrations during the SIYB Time Series Study

Sample Sequence	Station TS-1 (Pearson's Fuel Dock)	Station TS-2 (Mid-Channel)	Station TS-3 (Transient Dock)
	Concentration (µg/L)		
T0	9.5	5.5	2.7
T1	9.5	6.4	3.2
T2	9.1	4.1	4.1
T3	9.4	5.0	4.8
T4	9.6	5.7	3.5
T5	9.3	5.3	4.1
T6	9.5	5.4	3.9
T7	9.0	5.5	2.1
T8	8.9	6.4	1.2
T9	10	2.0	1.0
T10	9.8	6.2	1.4
T11	9.9	6.6	3.0
T12	9.9	7.1	3.9
T12-REP	10	7.0	3.9
ER	0.059	0.025	0.044
FB	ND	0.023	0.028

Notes:
µg/L = micrograms per liter; SIYB = Shelter Island Yacht Basin; TS = time series; ER = equipment rinsate; FB = field blank

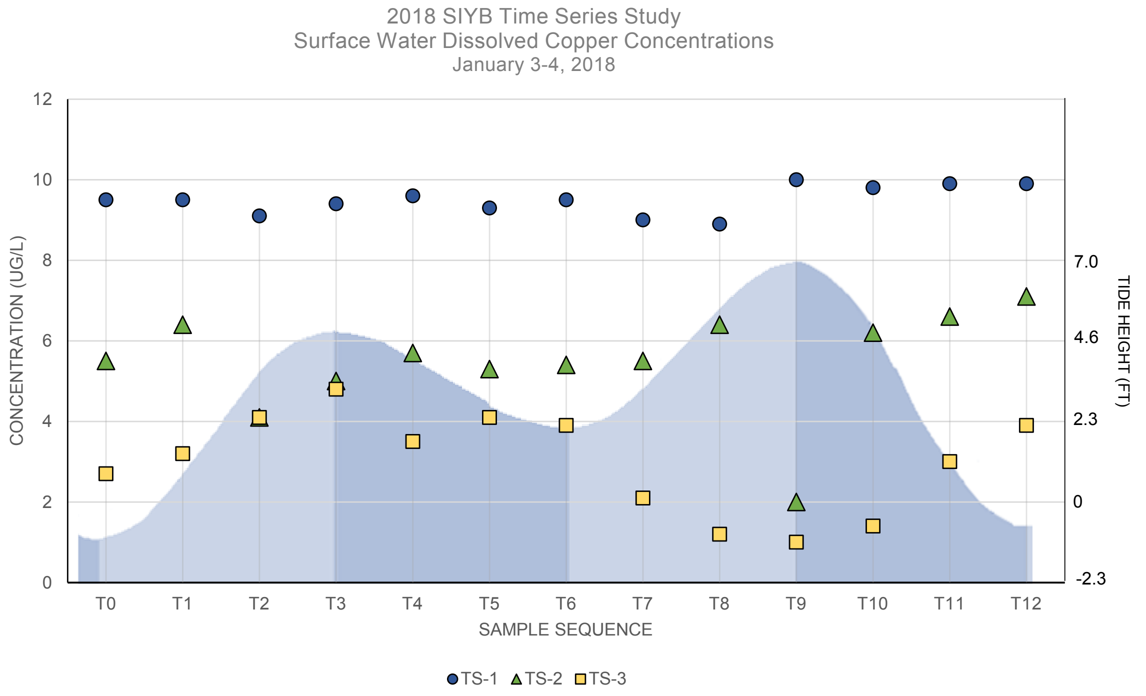

Figure 3-1. Time Series Study Surface Water Dissolved Copper Concentrations versus Tide Sequence

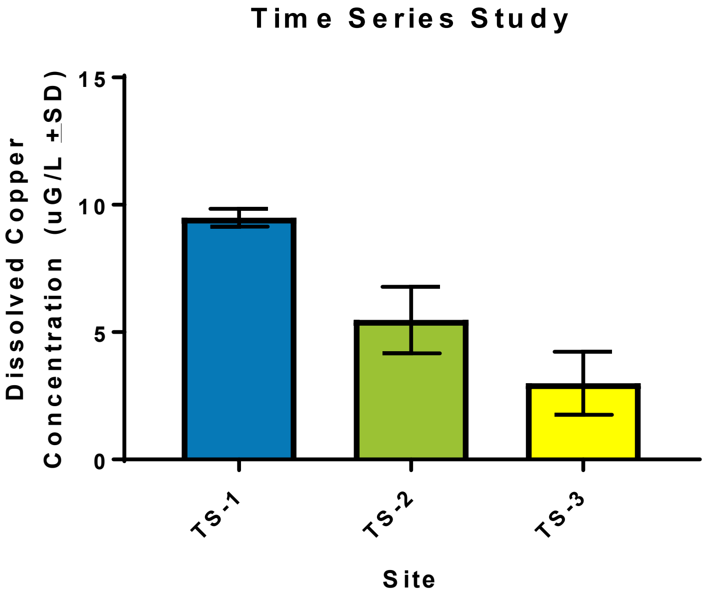

Figure 3-2. Mean Dissolved Copper Concentrations at Each Time Series Study Station

3.2 *In situ* Measurements

Following water collection, the surface water quality indicators were measured using a YSI data sonde. The ranges of each indicator at each station is presented in Table 3-2. Figures 3-3 through 3-5 present the measured values of temperature, salinity, and pH measured over the duration of the study. The field data logs are provided in Appendix E.

Table 3-2.
Range of Water Quality Measurements

Station	Temperature (°C)	pH	Salinity (ppt)
TS-1	15.9 – 16.4	8.1 – 8.5	33.3 – 33.7
TS-2	15.6 – 16.2	8.0 – 8.4	33.4 – 33.9
TS-3	15.8 – 16.2	8.0 – 8.2	33.5 – 33.7

Notes:
°C = degrees Celsius; ppt = parts per thousand

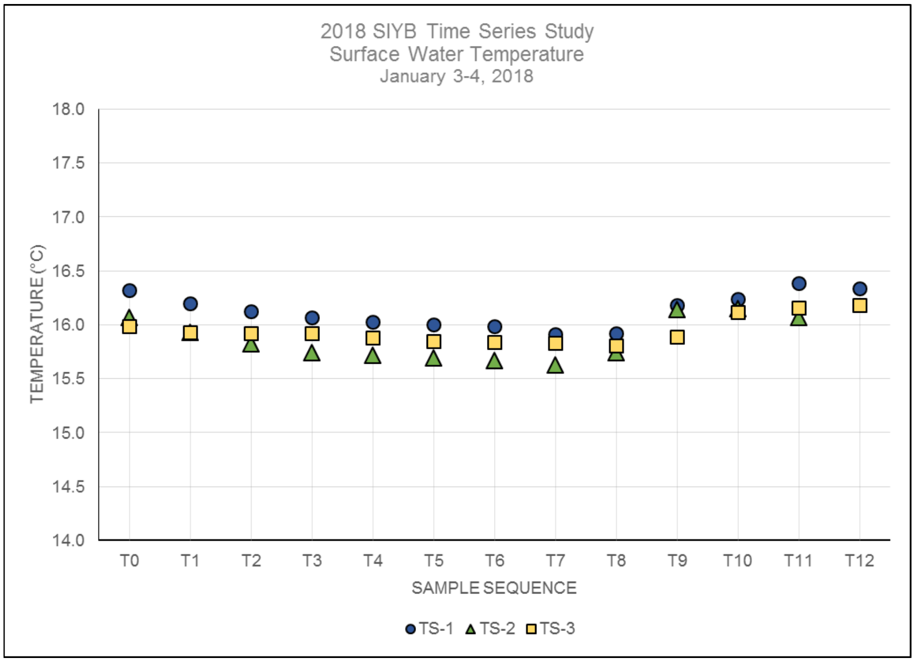

Figure 3-3. Time Series Study Surface Water Temperatures

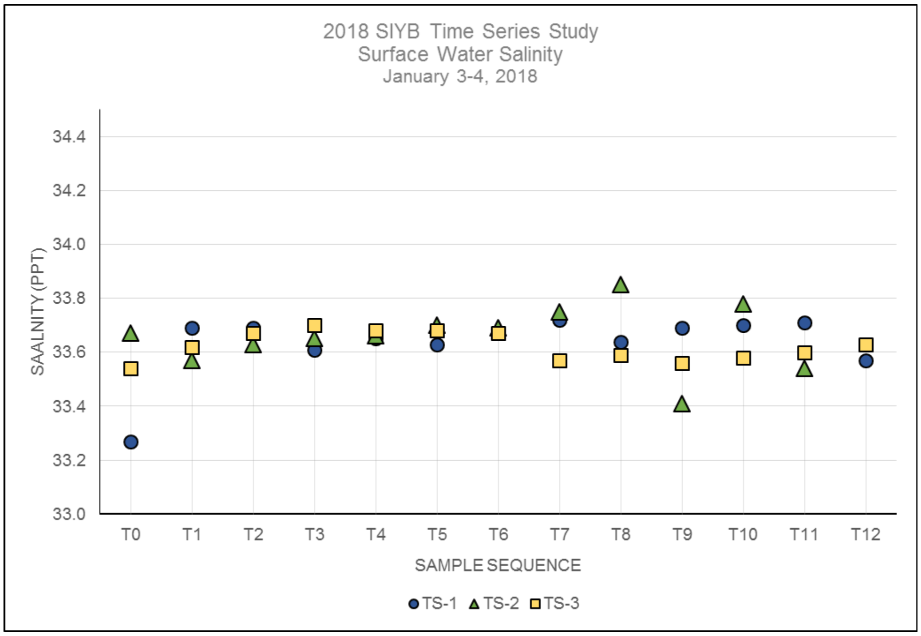

Figure 3-4. Time Series Study Surface Water Salinities

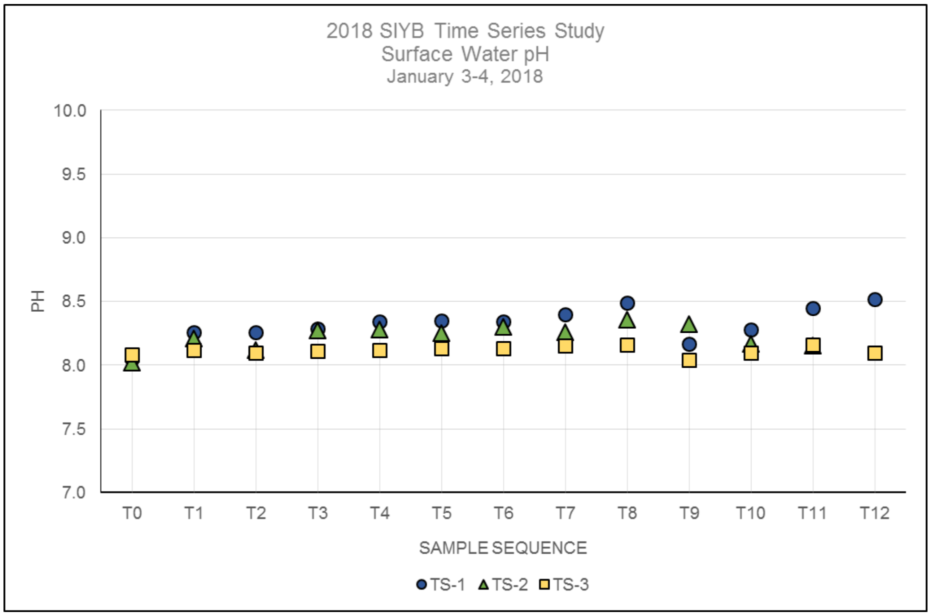

Figure 3-5. **Time Series Study Surface Water pH**

3.3 QA/QC Summary

All samples were submitted to the analytical laboratory on January 5, 2018. All samples were received in good condition at Weck, at or below 4°C and on ice. Samples for dissolved metals were filtered in the field using a 0.45-µm acid-rinse bottle top filtration system and preserved at the laboratory. Holding time requirements for analysis were met for all samples.

Analytical chemistry results underwent a thorough QA/QC evaluation; they were determined to meet the data quality objectives outlined in the SAP/QAPP and were deemed acceptable for reporting purposes, with the qualifications noted in the QA section of the individual laboratory reports (these issues are summarized below). The analytical laboratory reports in Appendix D have specific QA/QC sections that highlight any qualified data.

4.0 DISCUSSION

The goal of this Time Series Study was to better understand how tidal variations affects the concentration of dissolved copper in the surface waters of SIYB.

In general, the results of the Time Series Study showed the following:

- Dissolved copper concentrations at Station TS-1 (off the fuel dock) showed little variation between phase of the tide or sampling times, suggesting that tides may not have as great an influence in the back-basin areas. This is demonstrated in Figures 4-1 and 4-2. Figure 4-1 provides the squared difference from the average concentration for each sample at TS-1, which depicts the measured spread of each data point from the average concentration; the observed sample variance[4] of concentrations at TS-1 was 0.124. Figure 4-2 provides the distribution of concentrations measured at TS-1; concentrations ranged from 8.9 µg/L to 10 µg/L over the duration of the study. Overall, concentrations at TS-1 were the highest compared with results from the other two stations and variability was the least; the mean concentration (±SD) at TS-1 over the duration of the study was 9.5 µg/L ± 0.34 µg/L.
- Dissolved copper concentrations at the mid-channel station and the station closest to the mouth, TS-2 and TS-3, respectively, exhibited more variability than concentrations observed at TS-1 (Figure 4-1; sample variance at TS-2 was 1.70, sample variance at TS-3 was 1.52), suggesting that tides may affect dissolved copper concentrations over the course of a full tidal cycle. Concentrations at TS-2 were lower than those observed at TS-1; the mean concentration (±SD) of dissolved copper at TS-2 over the duration of the study was 5.5 µg/L ± 1.2 µg/L, while the concentrations ranged from 2.0 µg/L to 7.1 µg/L. Variability was the greatest at TS-2. Concentrations at TS-3 were the lowest overall for the three stations; the mean concentration (±SD) at TS-3 over the duration of the study was 3.0 µg/L ± 1.2 µg/L, and the concentrations ranged from 1.0 µg/L to 4.8 µg/L (Figure 4-2).

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[4] The sample variance is determined by the sum of squares divided by the adjusted number of values in the dataset. Variance values closer to zero indicate that values within a data set are similar, while larger values indicate higher scatter of data.

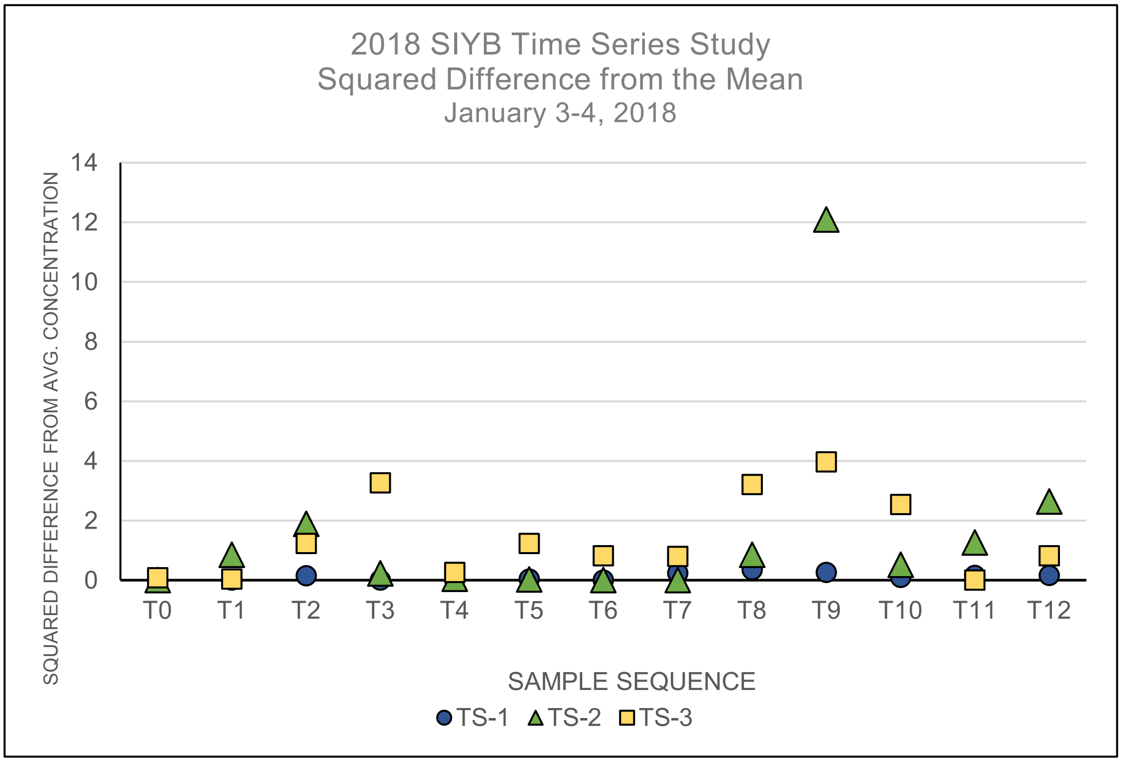

Figure 4-1. Squared differences from the Average Measured Concentrations at Each Station

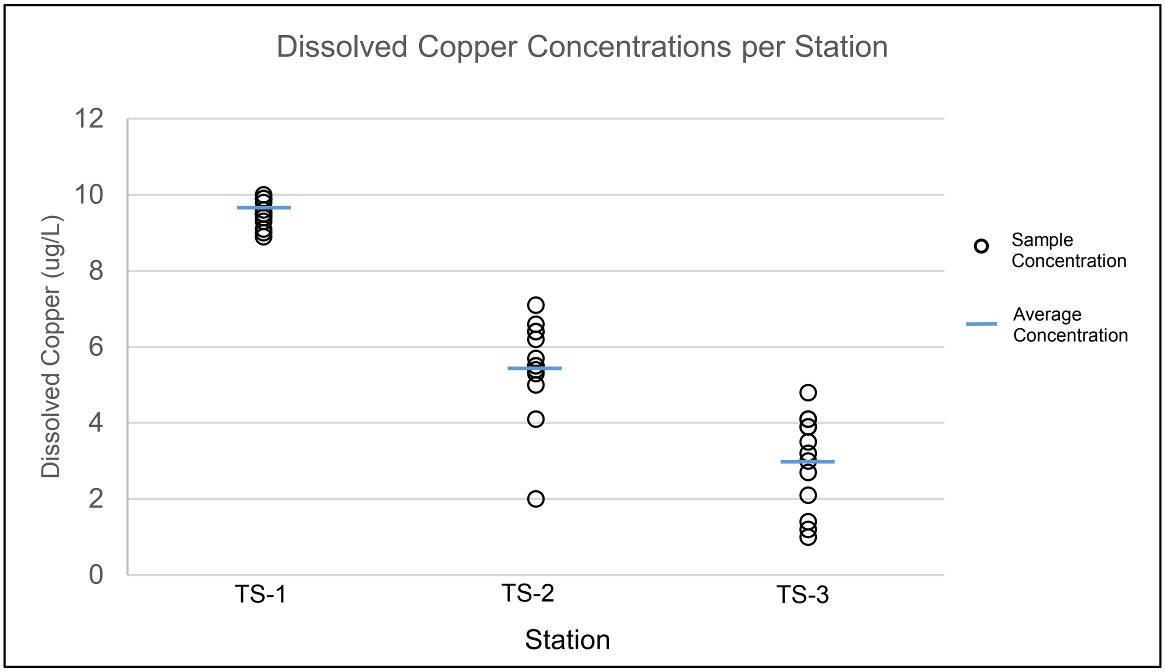

Figure 4-2. Dissolved Copper Concentrations at Each Sampling Station

Tidal Influence and TMDL Methodologies

Dissolved copper concentrations were analyzed to evaluate variations between the portion of the tidal phase sampled during the annual TMDL compliance monitoring and the portion of the tidal phase that is not captured during annual TMDL compliance monitoring. A mixed semidiurnal tidal cycle experiences two high and two low phases of varying tidal height. During the approximately 25-hour sampling, 13 discrete samples (T0-T12) were collected simultaneously at TS-1, TS-2, and TS-3. Samples T0-T1, T5-T7, and T11-T12 captured the portions of the tide that are not sampled with the bracketing methodologies used for the annual TMDL compliance monitoring (during both the ebb and flow around slack low tide; see Figure 4-3). Samples T2-T4 and T8-T10 captured the portions of the tide that are sampled with the bracketing methodologies used for the annual TMDL compliance monitoring (during both the ebb and flow around slack high tide; see Figure 4-3).

Table 4-1 summarizes the dissolved copper averages by station for each bracketed tidal phase of the mixed semidiurnal tide captured during the Time Series Study (two similar bracketed highs tides, and two different bracketed low tides, in relation to TMDL compliance tidal bracketing methodologies). There was little variability in dissolved copper concentrations observed at TS-1 during each phase of the tidal cycle (see Table 4-1). At Stations TS-2 and TS-3, greater variability in dissolved copper averages by tidal phase was observed (see Table 4-1). This concurs with the overall finding that tides may influence dissolved copper concentrations to a greater extent at locations that are closer to the mouth of the basin. When comparing the Time Series Study results by tidal phase to the average concentrations observed at the nearest TMDL Station[5], similar ranges of variability are observed during the TMDL sampling and the high tide phase of the Time Series Study (Figure 4-4). Less variability was associated with the low tide phase during the Time Series Study.

It is important to note that although there was observed variability by station and tidal phase for the Time Series Study, there were no significant differences between the high tide phase and low tide phase during the Time Series Study at TS-1 (t(11)=0.2332, p=0.8199), TS-2 (t(11)=1.562, p=0.1465) or TS-3 (t(11)=0.8722, p=0.4018; see Figure 4-4).

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[5] The TMDL station concentration presented in Figure 4-4 provides the mean (±SEM) of the concentrations measured during the 2011 through 2017 annual TMDL compliance monitoring events.

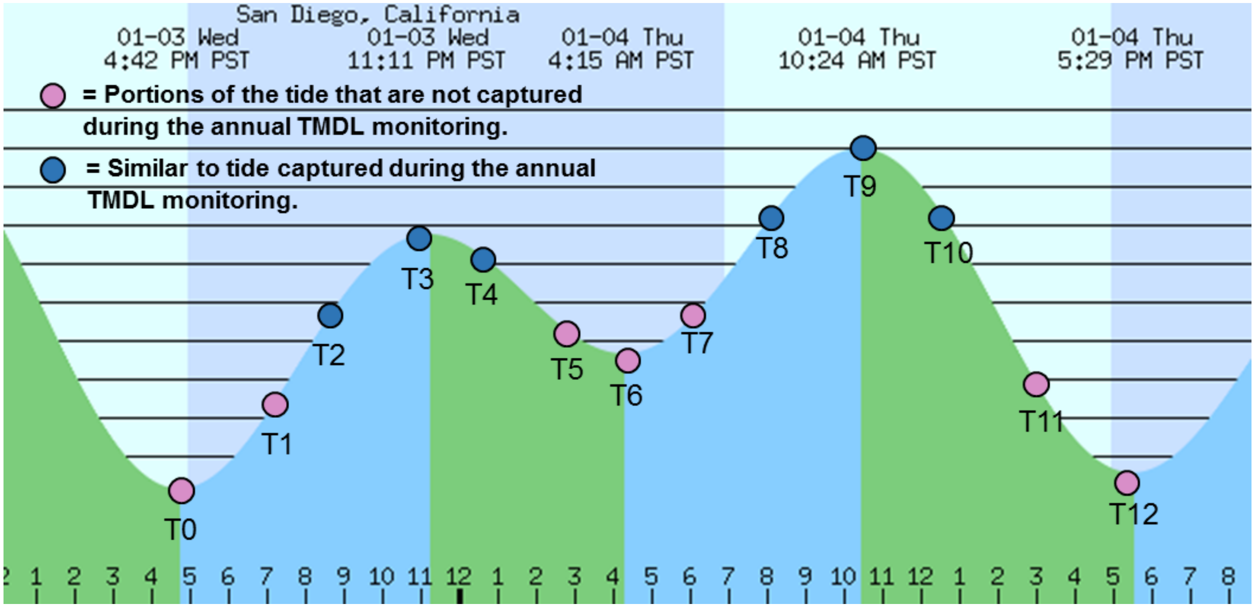

Figure 4-3. **Similar and Dissimilar Tidal Swings of the Time Series Study throughout the Tidal Cycle**

Table 4-1.
Comparison of Tidal Bracket Average Concentrations by Station and by Tidal Phase

Tidal Swing Captured	Time Series Study Sample Points	Average Dissolved Copper Concentration (µg/L) at Each Station		
		TS-1	TS-2	TS-3
Tidal Swing Similar to TMDL Compliance Monitoring (period around slack high)	T2, T3, T4	9.4	4.9	4.1
	T8, T9, T10	9.6	4.9	1.2
Tidal Swing Opposite to TMDL Compliance Monitoring (period around slack low)	T5, T6, T7	9.3	5.4	3.4
	T0, T1, T11, T12	9.7	6.4	3.2

µg/L = micrograms per liter; TMDL = Total Maximum Daily Load; TS = Time Series

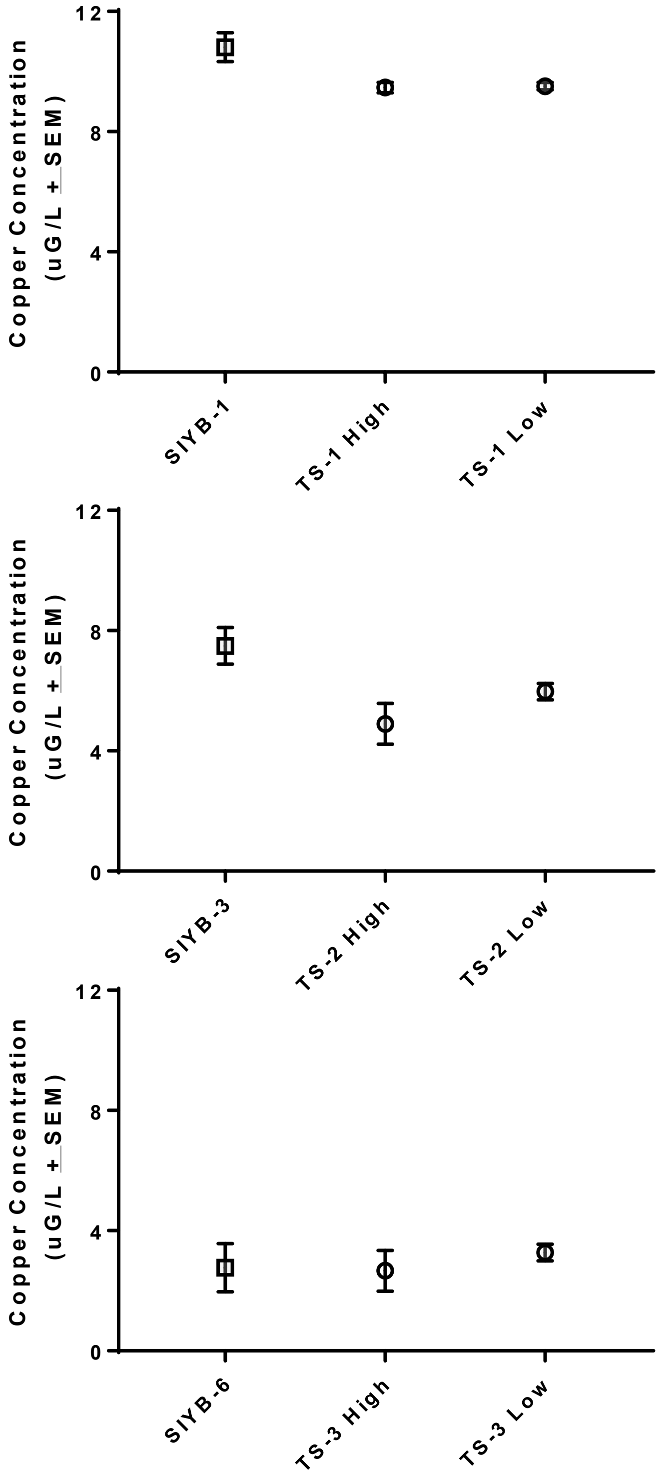

Figure 4-4. Time Series Station Comparisons by Tidal Phase as Compared to Closest TMDL Station

Note: The annual TMDL sampling event is conducted during peak summer months (August or September); the Time Series Study collection occurred in January 2018. The TMDL concentration presented in the mean of concentrations measured during the 2011 through 2017 annual TMDL compliance monitoring events.

Overall, the results of this study indicate that tidal variations may affect the dissolved copper concentrations at individual stations over the duration of one full mixed semidiurnal tide; however, less tidal influence appears to occur in the innermost portions of the basin. As such, the variability in concentrations is realized to a much lesser extent in the head of the basin (i.e., TS-1) at any phase of the tide.

Compared to TS-1, increased variability at TS-2 and TS-3 may be a result of stronger tidal influence occurring at the mouth and mid-basin compared to the head of the basin. This may be further supported by the greater variability observed during the high tide phase. As evidenced by salinity and dissolved copper data at TS-2 and TS-3, a noticeable pulse of water with lower salinity and lower dissolved copper concentrations was captured during sampling time T9 (see Table 3-1). Whether T9 data represents tidal influence or a potential freshwater pocket not related to tidal influence cannot be determined by this data set; however, this data highlights an example of variability that may be present over the course of one full mixed semidiurnal tide.

Tidal variations do seem to affect the dissolved copper concentrations in surface waters of SIYB, to extents dependent on location within the basin. This variability is (1) the least prominent at the head of the basin (i.e., TS-1), where variability between samples was relatively small; (2) more prominent at the locations closer to the mouth of the basin (i.e.,TS-2 and TS-3), (3) more prominent between tidal phases closer to the mouth of the basin (i.e., TS-2 and TS-3), and (4) not significantly different at each station between the high and low tidal phases captured during the Time Series Study.

5.0 REFERENCES

Amec Foster Wheeler. 2017a. 24-Hour Time Series Analysis of Dissolved Copper in Shelter Island Yacht Basin. Sampling and Analysis Plan and Quality Assurance Project Plan. December.

Amec Foster Wheeler. 2017b. 2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study Final Report. March.

California Regional Water Quality Control Board, San Diego Region (Regional Board) (2005). Total Maximum Daily Load for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Resolution No. R9 2005 0019 Basin Plan Amendment and Technical Report.

California State Water Resources Control Board (State Board) (2014). *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*. Version 1.1. Updated March 2014. http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/collect_bed_sediment_update.pdf

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APPENDIX A
24-HOUR TIME SERIES ANALYSIS OF DISSOLVED COPPER IN SIYB SAMPLING AND ANALYSIS PLAN/ QUALITY ASSURANCE PROJECT PLAN

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FINAL

24-HOUR TIME SERIES ANALYSIS OF DISSOLVED COPPER IN SHELTER ISLAND YACHT BASIN

SAMPLING AND ANALYSIS PLAN & QUALITY ASSURANCE PROJECT PLAN

Prepared for:
San Diego Unified Port District

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123

December 2017

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ACRONYMS AND ABBREVIATIONS

Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
COC	chain-of-custody
CRM	Certified Reference Material
Cu	Copper
DI	de-ionized
DQO	data quality objective
ELAP	California Environmental Laboratory Accreditation Program
FD	field duplicate
ID	identification
LCS	laboratory control standard
LD	laboratory duplicate
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NIST	National Institute of Standards and Technology
pH	hydrogen ion concentration
PM	Project Manager
Port	Port of San Diego
ppt	parts per thousand
QA	quality assurance
QA/QC	quality assurance and quality control
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QC	quality control
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SIYB	Shelter Island Yacht Basin
SM	Standard Methods
SOP	Standard Operating Procedure
SRM	Standard Reference Material
SWAMP	Surface Water Ambient Monitoring Program
State Board	State Water Resources Control Board
Time Series Study	SIYB Time Series Analysis of Dissolved Copper
TMDL	Total Maximum Daily Load
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
Weck	Weck Laboratories, Inc.
WQO	water quality objective
YSI	YSI Incorporated

UNITS OF MEASURE

<	less than
±	plus or minus
%	percent
°C	degrees Celsius
µg	microgram(s)
µg/L	micrograms per liter
µm	micrometer(s)
mg/L	milligrams per liter
mL	milliliter(s)
ppt	parts per thousand

1.0 INTRODUCTION

This combined Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) has been prepared for a 24-Hour Time Series Analysis of Dissolved Copper (Time Series Study) to be conducted in the Shelter Island Yacht Basin (SIYB). The Time Series Study is a water quality investigation designed to evaluate possible variations in dissolved copper concentrations resulting from tidal fluctuations. This plan was prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler)[1] for the Port of San Diego (Port).

Surface water quality monitoring is completed on an annual basis to analyze primarily for dissolved copper concentrations as part of the SIYB dissolved copper Total Maximum Daily Load (TMDL) (further described in Section 3.0). The sampling is completed on similar tidal heights each year during the peak summer months (i.e., August or September), which consequently does not allow for any characterization of tidal influence on the surface concentrations of dissolved copper throughout the basin. In an effort to better understand the basin dynamics of SIYB and the effects that tidal flushing may have on the concentrations of dissolved copper in the surface waters of SIYB, a single-day Time Series Study will be conducted. The Time Series Study will assess dissolved copper concentrations in surface waters within SIYB during one full mixed semidiurnal tidal cycle (approximately 25 hours).

The objective of the Time Series Study is to answer the following question:

> *How do tidal variations affect the concentrations of dissolved copper in the surface waters of SIYB?*

The scope of work for the Time Series Study is outlined in this SAP. The study will include:

- Collection of discrete surface water (1 meter deep) samples at three locations in SIYB (i.e., one station each in the mouth of the basin, mid-basin, and at the head of the basin) approximately every two hours over the course of a full day (two full tidal cycles).
- Collection of measurements for pH, temperature, and salinity at all stations using portable field meters after collection of each water sample.
- Analysis of all samples for concentrations of dissolved copper.

This SAP/QAPP provides detailed information on the design and implementation of the Time Series Study. It is organized as follows:

- Section 1, **Introduction** to Time Series Study including purpose and objectives.
- Section 2, **Project Management** overview of the project personnel, roles and responsibilities of the key team members, and lines of communication.
- Section 3, **Project Background and Objectives** for the goals and objectives of the Times Series Study.

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[1] Amec Foster Wheeler's parent company is now owned by Wood plc.

- Section 4, **Sampling and Analysis Plan** with detailed information on the design of the Times Series Study, collection locations and timing, sample collection techniques, sample handling and chain of custody (COC), field measurements and analytical tests to be conducted, data analysis techniques, and project schedules.
- Section 5, **Quality Assurance Project Plan** outlining the procedures to ensure that collection and handling of water samples, collection of field data, and analytical analysis of water samples are conducted with a high degree of quality assurance and quality control (QA/QC).
- Section 6, **Report Preparation** to list information that will be compiled and submitted to the Port at the conclusion of the Times Series Study.
- Section 7, **References** for literature sources and reports cited in this document.

2.0 PROJECT MANAGEMENT

This section presents project personnel, team organization, roles and responsibilities of key team members, and lines of communication for field and laboratory activities.

2.1 SAP/QAPP Distribution

Table 2-1 identifies those individuals who will receive one copy of the approved SAP/QAPP.

Table 2-1.
SAP/QAPP Distribution List

Title	Name (Affiliation)	Signature/Date
Project Manager	Kelly Tait (Port of San Diego)	
Project Manager and Field Quality Assurance (QA) Officer	Barry Snyder (Amec Foster Wheeler)	
Field Project Manager	Corey Sheredy (Amec Foster Wheeler)	
Analytical QA Officer	Rolf Schottle (Amec Foster Wheeler)	
Analytical Laboratory Project Manager	Chris Samatmanakit (Weck Laboratory)	

2.2 Project Organization

Project Personnel and Roles

Amec Foster Wheeler will organize field sampling logistics and equipment, provide sample collection and oversight for laboratory analysis of samples, perform data analysis, and provide a report of the Time Series Study results as an appendix in the 2017 Shelter Island Yacht Basin Dissolved Copper TMDL Annual Report. Individual roles for project personnel are outlined in Table 2-2 and Figures 2-1 and 2-2.

Kelly Tait is the Project Manager (PM) for the Port. Ms. Tait will be responsible for project administration and will serve as the lead contact at the Port.

Barry Snyder is the PM and Field Quality Assurance (QA) Officer for Amec Foster Wheeler. Mr. Snyder will be responsible for overall project management, organization, contracts, and oversight. In addition, he will serve as the Field QA Officer and will oversee field-related QA/QC procedures.

Corey Sheredy is the Field PM for Amec Foster Wheeler. Ms. Sheredy will oversee coordination and execution of the field effort, including organization of field staff and scheduling of sampling days, and will be responsible for overseeing data analysis and finalizing the project report.

Rolf Schottle is the Analytical QA Officer for analytical chemistry for Amec Foster Wheeler. Mr. Schottle will be responsible for guaranteeing the validity of all QA/QC procedures and will ensure that analytical chemistry data reported by the laboratory and Amec Foster Wheeler has been generated in compliance with the appropriate protocols. Mr. Schottle will also be responsible for coordination with the analytical laboratory and will work with the Analytical Laboratory PM to ensure that proper QC procedures are followed.

Tyler Huff is the Field Health & Safety Officer and Field Support for Amec Foster Wheeler. Mr. Huff will ensure that all health and safety protocols are followed during field activities.

Chris Samatmanakit is the Analytical Laboratory PM for Weck Laboratories, Inc. (Weck). Mr. Samatmanakit will be responsible for providing analytical chemistry data in an approved and quality-controlled (QC) format.

Table 2-2.
Project Personnel Roles and Contact Information

Name (Affiliation)	Project Role(s)	Contact Information
Kelly Tait (Port of San Diego)	Port Project Manager	(619) 686-6372 (office) (619) 348-1690 (mobile) (619) 686-6467 (fax) ktait@portofsandiego.org
Barry Snyder (Amec Foster Wheeler)	Project Manager and Field QA Officer	(858) 300-4320 (office) (858) 354-8340 (mobile) (858) 300-4321 (fax) barry.snyder@amecfw.com
Corey Sheredy (Amec Foster Wheeler)	Field Project Manager	(858) 300-4316 (office) (831) 359-7761 (mobile) (858) 300-4321 (fax) corey.sheredy@amecfw.com
Rolf Schottle (Amec Foster Wheeler)	Analytical QA Officer	(858) 300-4323 (office) (619) 985-2405 (mobile) (858) 300-4321 (fax) rolf.schottle@amecfw.com
Tyler Huff (Amec Foster Wheeler)	Field Support and Field Health and Safety Officer	(858) 300-4322 (office) (858) 449-2334 (mobile) (858) 300-4321 (fax) tyler.huff@amecfw.com
Chris Samatmanakit (Weck Laboratories)	Analytical Laboratory Project Manager	(626) 336-2139 ext. 141 (office) (626) 336-2634 (fax) chris.samatmanakit@wecklabs.com

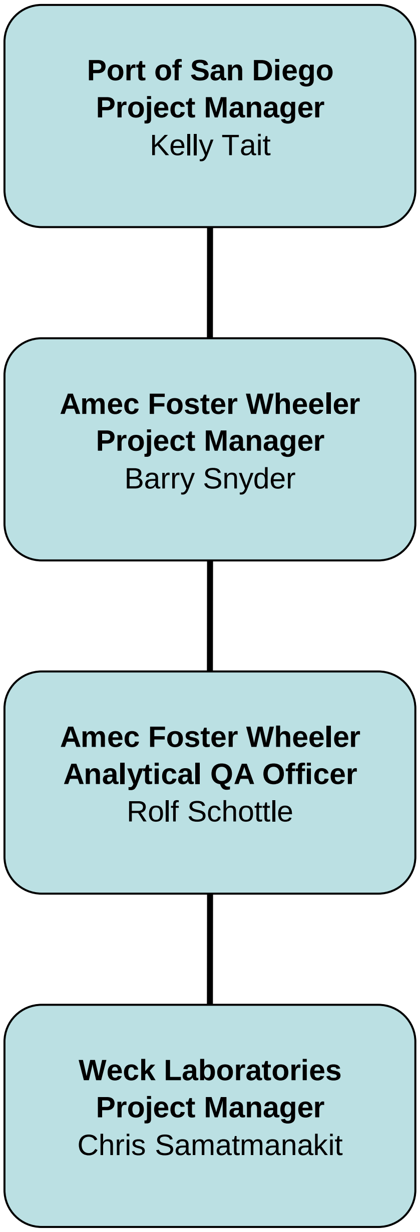

Figure 2-1. Project Organization - Analytical Component

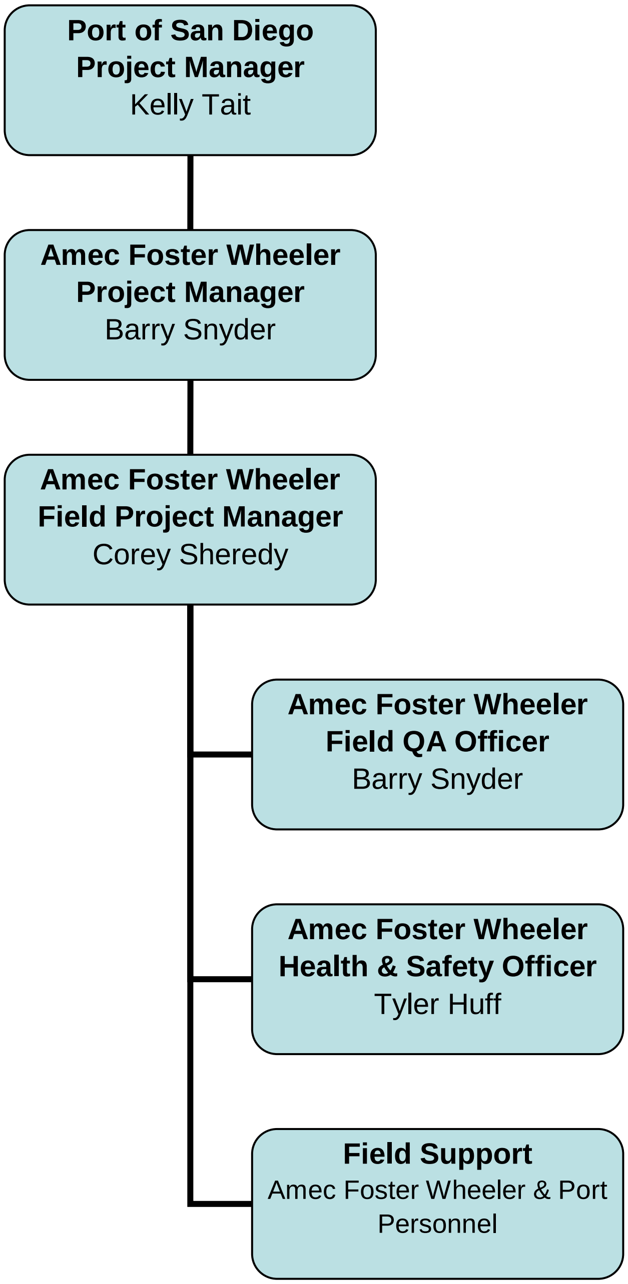

Figure 2-2. Project Organization - Field Component

2.3 Quality Assurance Officers' Roles

The QA Officers are responsible for guaranteeing the overall quality of the data produced and reported throughout the project. Specific duties of the QA Officers include:

- Conducting audits of ongoing tests, data packages, and completed reports;
- Conducting audits of the routine QC documentation of field and laboratory procedures;
- Communicating potential QC problems to the staff; and
- Ensuring that all problems are resolved.

The QA Officers are also responsible for issuing QA reports to management, maintaining a current Quality Assurance Manual (QAM), and issuing QAPPs as required. The QA Officers also ensure that data reported have been generated in compliance with the QAM and the appropriate protocols. The QA Officers are knowledgeable in the quality system standard defined under the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP).

Barry Snyder and Rolf Schottle are the project QA Officers. Mr. Snyder, in the role of Field QA Officer, will oversee sample collection activities to ensure that proper sampling procedures are employed. Mr. Snyder will provide QA checklists to each sampling team member that will be completed after each sample is collected. As Analytical QA Officer, Mr. Schottle will work directly with the Analytical Laboratory PM, Mr. Samatmanakit, to ensure that proper QC procedures are followed.

Mr. Snyder and Mr. Schottle will also review and assess procedures against plan requirements during the life of the project and will evaluate the need for any corrective actions. Mr. Snyder or Mr. Schottle may stop actions conducted by the team if there are significant deviations from required practices or if there is evidence of a systematic failure. Mr. Samatmanakit will also have the same authority for laboratory-related operations.

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3.0 BACKGROUND

Since 2011, dissolved copper concentrations in the surface waters of SIYB have been evaluated each year at six specific locations within the basin as part of the SIYB Dissolved Copper TMDL monitoring program. The annual monitoring results are submitted to the San Diego Regional Water Quality Control Board as a component of the annual TMDL monitoring report.

Each year, the SIYB Dissolved Copper TMDL collection date is selected to target a high tide of approximately 5.5 to 6.5 feet, and a tidal range between consecutive high and low tides of 5 to 7 feet. Careful effort is made by field scientists to perform collection at each of the six TMDL monitoring stations from year to year at approximately the same time period relative to the tide. Furthermore, the stations are collected in the same sequence every year moving from the mouth of the basin to bracket the slack high tide. This effort allows for consistency between monitoring years. As an example, Figure 3-1 illustrates time of collection at each TMDL station compared to the tide during TMDL compliance monitoring during 2014, 2015 and 2016.

Daily tidal exchange circulates the water in the basin. These tidal fluctuations have the potential to affect the concentration of dissolved copper and particulates within the water column. As stated above, to ensure consistency over monitoring years and develop a comparable long-term data set, the SIYB annual water quality monitoring program design was not intended to capture tidal fluctuations. As such, this Time Series Study is being conducted to evaluate how tidal variations may influence the dissolved copper concentrations in the surface waters of SIYB over the course of one full mixed semidiurnal tidal cycle (approximately 25 hours).

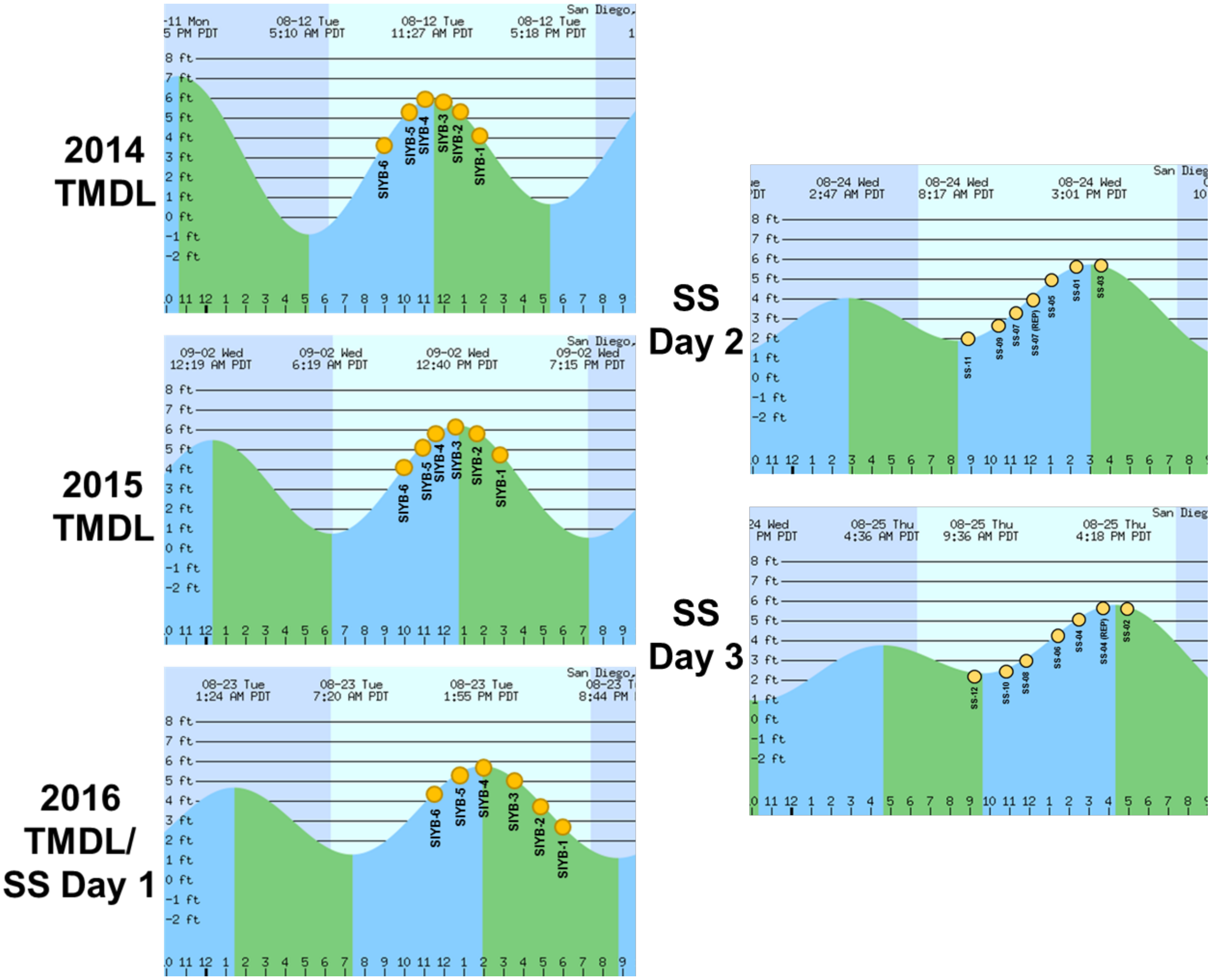

Figure 3-1. Collection Event versus Tidal Cycle during the SIYB TMDL Monitoring Event (2014-2016) and 2016 Enhanced Water Quality Special Study Event

Note: orange dot = time of collection; SS = Special Study

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4.0 SAMPLING AND ANALYSIS PLAN

Sampling methodology, sample collection and handling and analytical test methods to be employed by the field and laboratory teams are discussed in this section.

4.1 Sampling Design

Water quality samples will be collected from surface water (i.e., 1 meter below the surface) at three locations throughout the basin. Locations were chosen to characterize several different areas of the basin. Samples will be collected every two hours to characterize the effect of one mixed semidiurnal tidal cycle; sampling days will be selected to specifically correspond with the tidal ranges observed during the annual TMDL monitoring.

4.1.1 Sample Collection Stations

As discussed in Section 4.1, samples will be collected at three locations throughout SIYB to provide representation of locations throughout the basin that are reflective of distance from the mouth. Station TS-1 will be placed near the head of the basin, at the southwest end of Pearson's Fuel Dock. Discrete water samples at this station will be collected directly from the dock. Station TS-2 is located approximately mid-basin, and is only accessible using a vessel. A Port-operated vessel with either with no paint or coated with a non-biocide paint will be used for collection; vessel operation procedures are outlined in Section 4.4. Station TS-3 will be placed at the mouth of SIYB at the southwest end of the Transient Dock. As with TS-1, discrete water samples at TS-3 will be collected directly from the dock. Figure 4-1 shows the target sampling locations. Target coordinates for the stations are provided in Table 4-1.

Table 4-1.
Station Location and Coordinates

Station ID	Location	Target Coordinate	
		Latitude (dd.ddddd°)	Longitude (ddd·ddddd°)
TS-1	Southwest end of Pearson's Fuel Dock	32.71864	-117.22612
TS-2	Mid-Basin	32.71550	-117.22989
TS-3	Southwest end of the Transient Dock	32.71013	-117.23450

Notes: ddd/dd.ddddd° = decimal degrees, TS = time series, SIYB = Shelter Island Yacht Basin

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Figure 4-1. Shelter Island Yacht Basin Time Series Sampling Locations

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Shelter Island Yacht Basin Water Quality Time Series Study
Sample Locations
San Diego, CA

Meters
0 100 200
N

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4.2 Collection Schedule

Collection at the three stations will be performed synchronously throughout two full tidal cycles. Table 4-2 provides the proposed primary sampling date, contingency dates, and tide times and heights. Dates were selected primarily based upon the tidal range (i.e., similar to tides selected during the TMDL sampling events), and practicality (i.e., a non-holiday or weekend day for reduced vessel traffic). Factors that could possibly delay the collection event to the proposed contingency dates may include an unusual climactic event (e.g., monsoonal rain, hurricane, tsunami, etc.) or other unforeseen but catastrophic occurrence.

Table 4-2.
Annual TMDL Monitoring Station Coordinates

Proposed Date	Low Tide	High Tide	Low Tide	High Tide	Low Tide
	time/ height [ft]				
1/3/2018 (Primary)	16:42 (-1.9 ft)	23:11 (+7.0 ft)	04:15 (+1.6 ft)	10:24 (+7.0 ft)	17:29 (-1.4 ft)
1/4/2018 (1st Contingency)	17:29 (-1.4 ft)	00:02 (+4.7 ft)	05:12 (+1.8 ft)	11:14 (+6.3 ft)	18:16 (-0.9 ft)
1/31/2018 (2nd Contingency)	15:40 (-2.0 ft)	22:01 (+5.0 ft)	03:19 (+1.0 ft)	09:28 (+7.2 ft)	16:20 (-1.7 ft)
1/16/2018 (3rd Contingency)	15:33 (-0.8 ft)	21:56 (+4.1 ft)	02:46 (+2.0 ft)	08:57 (+6.3 ft)	16:02 (-0.7 ft)

Field collection will begin at slack low tide and samples will be collected every two hours for 25 hours, bracketing two high tides. Figure 4-2 provides an illustration of the sample collection schedule timing, and Table 4-3 provides a matrix of the collection times for the primary sampling date. Collection at the three stations will occur simultaneously by utilizing three trained field teams.

Figure 4-2. Sample Collection Relative to the Tidal Cycle (1/3/2018)

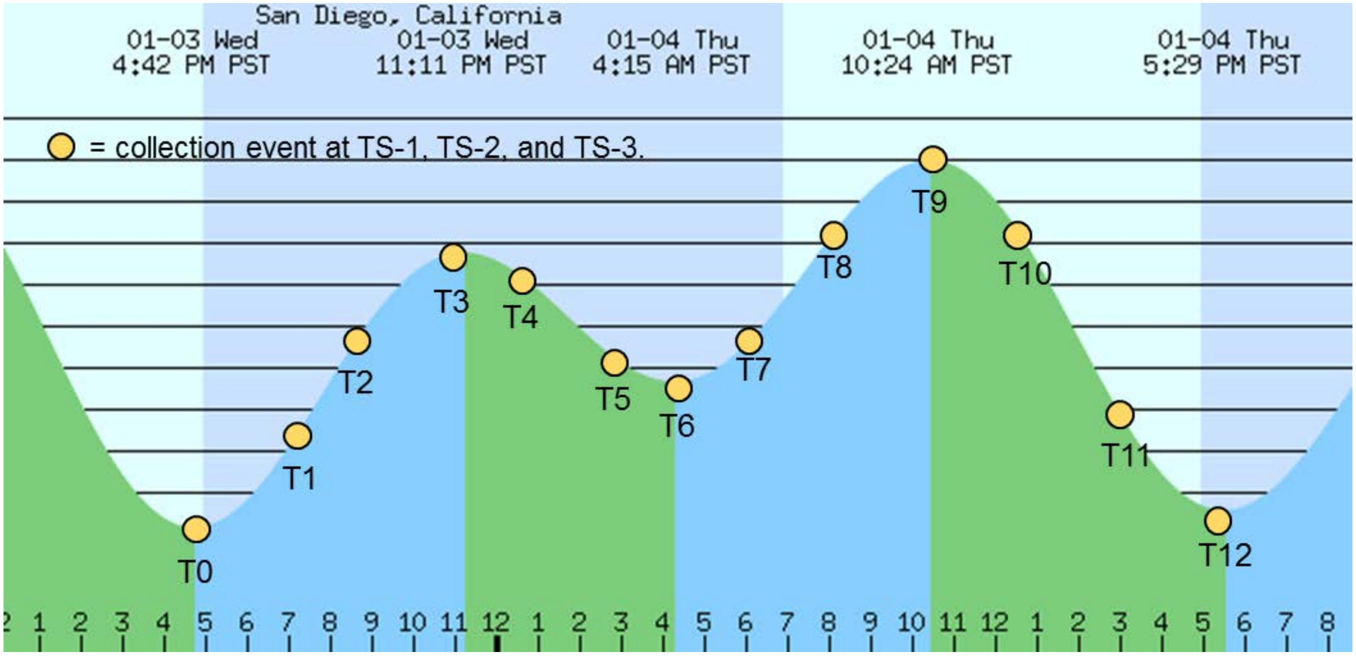

Table 4-3.
Sample Collection Timing Matrix.

Note: Assuming the primary collection date (1/3/2018)

Sample ID	Time
TS-[station]-ER	Prior to T0 collection
TS-[station]-T0	16:42 (1/3/2018)
TS-[station]-T1	18:50 (1/3/2018)
TS-[station]-T2	21:00 (1/3/2018)
TS-[station]-T3	23:11 (1/3/2018)
TS-[station]-T4	01:00 (1/4/2018)
TS-[station]-T5	03:00 (1/4/2018)
TS-[station]-T6	04:15 (1/4/2018)
TS-[station]-T7	06:20 (1/4/2018)
TS-[station]-T8	08:20 (1/4/2018)
TS-[station]-T9	10:24 (1/4/2018)
TS-[station]-T10	13:00 (1/4/2018)
TS-[station]-T11	15:15 (1/4/2018)
TS-[station]-T12	17:29 (1/4/2018)
TS-[station]-T12-REP	Immediately following T12 collection
TS-[station]-FB	Following T12-REP collection

ER = Equipment Rinsate; FB = Field Blank;
REP = Replicate; TS = Time Series.

4.3 Collection Station Positioning

Dockside stations will be accessed by land, and will be located using a Global Positioning System (GPS) device. The mid-basin station (TS-2) must be accessed by vessel, and will be located using a differential GPS. Following the TMDL Monitoring Plan (Amec Foster Wheeler, 2017), the collection location for TS-2 will be done within approximately ±3 meters of the target coordinate listed in Table 4-1.

4.4 Field Collection Procedures

To ensure consistency between each sampling location, each sampling team will be equipped with a pre-cleaned Niskin bottle, pre-labeled bottle kits and extra bottles, pre-cleaned vacuum filtration system units, a filtration pump, a plastic-lined 5-gallon bucket and DI water (for decontamination of the Niskin), coolers, and ice. For the mid-channel station (TS-2), the vessel will be anchored on station for the duration of the sampling event. Upon anchoring on station, the boat engine will be turned off and a period of at least 5 minutes will pass before collection activities can commence. Should the sampling vessel need to up anchor (i.e., for health or safety reasons) in between sample collections, the 5-minute waiting period will be repeated prior to the next sample collection. During all field efforts, each field team will scan the surrounding area for nearby ongoing vessel maintenance activities. The field crew will record notes and take photographs of these activities (and other factors of note near the collection site), if warranted.

All sampling steps will follow Surface Water Ambient Monitoring Program (SWAMP) defined “clean hands” techniques (State Water Resources Control Board [State Board], 2014). For each sample collection event at each station, discrete water samples will be collected using a Niskin bottle deployed from the sampling vessel or dock. Surface samples at each station will be collected at 1-meter depth. To ensure this exact depth is sampled, the line on the Niskin bottle will be pre-marked with the appropriate depth. Sample timing will follow the schedule matrix provided in Table 4-3 (approximately every two hours). As required by SWAMP protocols, the monitoring program will include the addition of a field replicate. The field replicate sample will consist of a second complete set of samples collected immediately following the collection of the last sample collected at each station (TS-[station]-12). In addition to the field replicate, each batch of samples (i.e., each station) will include an equipment rinse blank and field blank using laboratory-provided deionized water. The equipment rinse blank will be collected prior to collection of TS-[station]-0, The field blank will be collected immediately after the collection of the replicate sample (i.e., following collection of TS-[station]-12-REP) (Table 4-3).

Discrete water samples will be filtered in the field (in agreement with United States Environmental Protection Agency (USEPA) 1640 protocol. Two 500-milliliter (mL) aliquots of water from each Niskin bottle grab sample will each be filtered through a pre-cleaned[2] 0.45-micrometer (µm) glass fiber filter using a Whatman brand Klari-flex bottle top vacuum filtration system. To ensure a clean sample is collected, the first 500 mL aliquot will be discarded. The second 500 mL aliquot will be directly transferred into a pre-labeled sample

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[2] The entire filtration apparatus will be acid-washed and rinsed thoroughly with de-ionized (DI) water prior to sample collection.

bottle containing ultra-pure nitric acid for preservation. The field team will ensure that no airspace remains in the sample bottle once capped. Once confirmed, the sample bottle will be immediately transferred to a cooler containing ice. Cooler ice will be replenished during the 12-hour shift change, and following the conclusion of sampling.

Following the water sample collection, field measurements of pH, temperature, and salinity of the surface water at each station (i.e., within 1 meter of the surface) will be made using a YSI meter according to the manufacturer's specifications. Field measurements and any observations (if applicable) will be recorded in the field log for that collection event. An example of the field log is provided as Attachment A.

Once the entire suite of samples has been collected, water samples will be logged on a COC form (Attachment B), and the form will be placed in the cooler for transport to Weck. Samples will be stored at 4 degrees Celsius (°C) during the transportation process.

4.5 Equipment Decontamination and Cleaning

Prior to each sampling event, the Niskin bottle will be cleaned using soapy water followed by a thorough rinse with deionized water. Upon deployment, the Niskin bottle will also be rinsed thoroughly with site water and soaked at the sampling depth (1 meter below the water surface) for at least for one minute prior to sample collection. After collection, water samples will be transferred from the Niskin bottle to laboratory-certified, contaminant-free bottles that are the appropriate type and contain the correct preservative for the required analyses. In between sampling times, the Niskin bottle will be stored in a plastic-lined, 5-gallon bucket filled with deionized water.

4.6 Sample Processing, Handling, and Custody

Water samples will be uniquely identified by labeling laboratory-provided containers with sample labels in indelible ink. All labels will include the project title, appropriate identification number, date and time of sample collection, and preservation method. The field crew will inspect the sample collection bottles before and after they are filled to ensure that each sample bottle is correctly labeled with station location and analysis type. After each sample collection, the field crew will complete a QA form to verify bottle information and ensure labeling accuracy.

Samples will be kept on ice from the time of sample collection until delivery to the analytical laboratory. All samples will be transferred to the appropriate laboratory and analyses initiated within the method specified holding time (Table 4-4). Additionally, appropriate volumes of each sample will be archived at Weck in case any analyses need to be repeated for confirmation. All analyses will be conducted by Weck, a California ELAP accredited laboratory for all the specific tests required for this program.

Table 4-4. Sample Holding Times

Analyte	Holding Time
Field Measurements	
pH	Field Collected
Salinity	Field Collected
Temperature	Field Collected
Water	
Dissolved Copper	180 days

4.7 Field Sampling Preservation, Packaging, and Shipment

During each sampling event, samples will be preserved by placing the sample bottles in wet-iced coolers immediately after collection. Field samples will be shipped via courier with appropriate COC forms within 24 hours of completion of the sampling event.

4.8 Chain-of-Custody Records

Proper COC procedures will be used throughout the sample collection, transport, and analytical process. The principal documents used to identify samples and to document possession are COC records, field logbooks, checklists, and field tracking forms. The COC process is initiated during sample collection. A COC record will be provided with each sample or group of samples. Each employee who has custody of the samples will sign the form and will ensure that the samples are not left unattended and are properly secured.

Documentation of sample handling and COC includes the following:

- Client and project name,
- Sample identifier,
- Sample collection date and time,
- Any special notations on sample characteristics or analysis,
- Initials of the person collecting the sample,
- Date the sample was sent to the analytical laboratory, and
- Shipping company and waybill information or courier.

Completed COC forms will be placed into a plastic envelope and kept inside the cooler containing the samples. A courier will deliver the water samples from the Amec Foster Wheeler Office to the analytical laboratory following the day of collection. Upon delivery of the samples to the analytical laboratory, the COC form will be signed by the person receiving the samples. Copies of the COC records will be included in the final reports prepared by the analytical laboratory.

4.9 Analytical Methods

Water samples will be analyzed for dissolved copper; water will be measured in the field for salinity, temperature, and pH (Table 4-5). Dissolved copper analyses will follow USEPA methods. Analytical methods, detection, and reporting limits are presented in Table 4-5.

Table 4-5.
Laboratory Analytical Methods and Detection Limits

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Dissolved Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Salinity	YSI Pro Plus	NA	± 0.1 ppt
Temperature	YSI Pro Plus	NA	± 0.1 °C
pH	YSI Pro Plus	NA	± 0.1 pH unit

Notes:
°C = degrees Celsius; ± = plus or minus; µg/L = microgram(s) per liter; NA = not applicable; pH = hydrogen ion concentration; ppt = part(s) per thousand; USEPA = United States Environmental Protection Agency; YSI = YSI Incorporated.

4.10 Data Analysis

Summary data tables and figures will be created only after the raw data have passed through the QA/QC criteria, as described in Section 4.8. Finalized data will be summarized in an appendix in the 2017 SIYB Dissolved Copper TMDL Annual Monitoring Report in tables, and dissolved copper concentrations will be displayed graphically as a temporal distribution. These results will help to address the study objective described in Section 1.0.

4.11 Data Review

Following the field event, field data sheets and checklists will be checked for completeness and accuracy by the field crew and the Field QA Officer (Mr. Snyder). In addition, all sample COCs will be checked against sample labels prior to samples being transported to the laboratories. In the laboratory, technicians will document sample receipt and sample preparation activities in laboratory logbooks or on bench sheets.

In the laboratory, data validation will include use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data. Data for laboratory analyses will be entered directly onto data sheets. Data sheets will be filled out in ink and signed by the technician, who is responsible for checking the sheet to ensure completeness and accuracy. The technician who generated the data will have the prime responsibility for the accuracy and completeness of the data.

Each technician will review the data to ensure the following:

- Sample description information is correct and complete,
- Analysis information is correct and complete,

- Results are correct and complete, and
- Documentation is complete.

All data will be reviewed and verified by the analytical laboratory to determine whether data quality objectives have been met and whether appropriate corrective actions have been taken, when necessary, as detailed in this SAP/QAPP.

4.12 Data Management

The analytical laboratory will supply analytical results in both hard copy and electronic formats and will be responsible for ensuring that both forms are accurate. After completion of the data review by the laboratory, hard copy results will be placed in the project files; results in electronic format will be imported into a database system. The database is discussed in further detail in Section 5.4.1.

4.13 Laboratory Quality Assurance and Quality Control

The analytical laboratory will provide a QA/QC narrative that describes the results of the standard QA/QC protocols that accompany analysis of field samples. All hard copies of results will be maintained in the project files. In addition, backup copies of results generated by the laboratory will be maintained at its facility. At a minimum, the laboratory reports will contain results of the laboratory analysis, QA/QC results, all protocols and any deviations from the project SAP/QAPP, and a case narrative of COC details. Laboratory QA/QC requirements are discussed in detail in Section 5.0.

4.14 Health and Safety

The sampling will be conducted over a 24-hour period. There will be a personnel shift after 12 hours to alleviate the hazard of sleep deprivation and/or physical exhaustion. The Harbor Police will be notified of sampling activities and team members will have contact information for the Harbor Police in case any threatening situation arises. Because sampling for one station will be conducted from a boat, dangerous situations can arise. Field personnel will be aware of safety hazards and take appropriate precautions. A health and safety tailgate meeting will be held prior to field activities for all three field teams, including after the 12-hour shift change. During this meeting, site-specific hazards will be discussed and addressed appropriately.

4.14.1 Use of Boats and Working Over Water

Work will be conducted from a boat within and on docks around SIYB; therefore, special considerations are required. All watercraft will be operated according to the applicable navigational rules and regulations. The boat will be operated by a certified captain with United States Coast Guard (USCG) small vessel training. Personnel working on the boat will be trained according to internal SOPs. The primary hazards associated with the operation and use of boats include drowning, heat stress, and injuries from falling. A USCG approved personal flotation device must be available for each person onboard. Wet conditions increase the chances of slipping; therefore, engineering controls such as guardrails will be installed on the vessel.

A float plan will be prepared for each trip and submitted to the safety officer or project manager. At a minimum, it will include the destination, expected time of return, personnel onboard, and a description of the vessel. The float plan will be used if the field crew does not return or notify the shore contact at a specified time, and a rescue is needed. A weather forecast will be reviewed prior to field sampling. High winds may pose potential hazardous conditions within the harbor.

5.0 QUALITY ASSURANCE

5.1 Field and Analytical QA/QC Procedures

Strict QA/QC procedures will be employed throughout the entire study, from mobilization through delivery of samples to the laboratories. Extra care will be taken to minimize the possibility of compromising sample integrity. The sample collection team will be trained in and follow field sampling standard operating procedures (SOPs), as described in this document. A QA/QC log will be completed following each sample collection event to review each step of the sample and data collection process. These checks will ensure that collection procedures are consistent between sampling events and among all three stations, and that all required field data are recorded correctly and completely. The QA/QC log is provided in Attachment C.

Field team members will take care to avoid contamination of samples at all times by employing the SWAMP clean-hands technique and will wear powder-free nitrile gloves during sample collection. In addition, the Field Manager will ensure that the sample collection boat is either un-painted or painted with a non-biocide hull paint containing no copper. All samples will be collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles containing the correct preservative (if applicable).

The sampling team will be familiar with this SAP/QAPP and field sampling SOPs to ensure that all sampling personnel are trained accordingly. Additionally, the field team members will be made aware of the significance of the project's method detection limits and the requirement to avoid contamination of samples at all times.

Field equipment will checked and calibrated for operation in accordance with the manufacturer's specifications (calibration records will be recorded and maintained), and will be inspected for damage prior to and when returned from use. Observations of activities surrounding the sampling area will be recorded on field data sheets at each station and during movement between stations (i.e., boat hull cleaning, boat washing, etc.). Photographs will also be taken if necessary.

As required by SWAMP protocols, the Time Series Study will include field replicates. The purpose of a field replicate is to assess variability in sampling procedures as well as ambient conditions. The field replicate sample will consist of a second complete set of samples collected during one sampling interval at each of the stations. The field replicate samples will be analyzed for the same suite of chemicals as the test samples. In addition to the field replicate samples, the study will also include one equipment rinse blank and one field blank, as specified by SWAMP protocols.

The Time Series Study will include the following QA/QC elements:

- ✓ Verification of laboratory certifications
- ✓ Field mobilization and equipment checklists
- ✓ Field sampling QA/QC checklists at each station
- ✓ Field equipment calibrations records at each station
- ✓ Observations for hull cleaning or other water-quality-impacting activities near sample collection stations
- ✓ Staff training on QAPP-required field procedures
- ✓ Field conditions and water quality data sheets

For this study, the analytical laboratory chosen to conduct the analyses is required to (1) be certified to conduct the analyses for the constituents of concern, (2) be certified for the specific analysis methods required for this program, and (3) hold a valid ELAP certificate at the time the Time Series Study is initiated and the samples are analyzed. The QA objectives for chemical analysis to be followed by the analytical laboratory are detailed in its laboratory QA manual and this QAPP. The objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Methods and SOPs
- Calibration methods and frequency
- Data analysis, validation, and reporting
- Internal QC
- Preventive maintenance
- Procedures to ensure data accuracy and completeness

Results of all laboratory QC analyses will be reported with the final data. Any QC samples that fail to meet the specified QC criteria in the methodology or QAPP will be identified and the corresponding data will be appropriately qualified in the final report. The final report will include a separate section that discusses any QA/QC issues encountered during the sampling activities, as well as the corrective actions taken to address any issues satisfactorily.

5.2 Assessments and Response Actions

The Analytical Laboratory PM at Weck, Chris Samatmanakit, will receive a copy of this SAP/QAPP prior to submission of samples and will be required to sign off that he has read and understands all of the expectations for Weck outlined in this SAP/QAPP. The Amec Foster Analytical QA Officer, Rolf Schottle, will be immediately notified by phone, with a follow-up in writing, of any incident that results in the need for corrective action as described in the following sections.

5.2.1 Corrective Action Plans

An out-of-control event is defined as any occurrence failing to meet pre-established criteria. A nonconformance is a deficiency in characteristic, documentation, or procedure sufficient to make the quality indeterminate or unacceptable. An out-of-control event is a subcategory of nonconformance. Any out-of-control events observed, whether in the field or in the laboratory, will be immediately communicated to the Amec Foster Wheeler PM and Analytical QA Officer to determine the appropriate course of action.

When either situation (out-of-control event or nonconformance) is identified, it will be categorized as follows:

- **Deficiency** – Recognition that a specific requirement (e.g., program, process, or procedure) has been violated.
- **Observation** – Recognition of an activity or action that might be improved, but is not in violation of a specific requirement. Left unaddressed, the activity or action might develop into a deficiency.

5.2.2 Criteria Used for Determination of an Out-of-Control Event

Factors that affect data quality (e.g., failure to meet calibration criteria, inadequate recordkeeping, improper storage, or preservation of samples) require investigation and corrective action.

When a nonconformance is recognized, each individual involved with the analysis in question has an interactive role and responsibility. This process is described in the following two paragraphs.

- **Analytical Laboratory PM** – The Analytical Laboratory PM, Mr. Samatmanakit, must review all analytical and QC data for reasonableness, accuracy, and clerical errors. In an out-of-control event, Mr. Samatmanakit will notify the Analytical QA Officer, Mr. Schottle, immediately (within 24–48 hours) by telephone and email. Mr. Samatmanakit and Mr. Schottle will work together to solve the problem. In this case, Mr. Schottle will notify the Amec Foster Wheeler PM, Barry Snyder, of the issue and the proposed remedy. This process will prevent the reporting of suspect data by stopping work on the analysis in question and ensuring that all results that are suspect are repeated, if possible, after the source of the error is determined and remedied.
- **Analytical QA Officer** – The Analytical QA Officer, Mr. Schottle, will report to the Amec Foster Wheeler PM, Mr. Snyder, on the status of the problem. Mr. Snyder will then notify the Port PM, Kelly Tait, immediately (24–48 hours) by phone with a follow-up notification in writing if the work is affected by an out-of-control event or the results of an internal audit. In the event that a QC measure is out of control and the data are to be reported, qualifiers will be reported together with sampling results. Mr. Schottle is responsible for reviewing nonconformance report forms, recommending or approving proposed corrective actions, and verifying that corrective actions have been completed.

5.2.3 Procedures for Stopping Analyses

Whenever the analytical system is out of control, investigation and correction efforts are initiated by all concerned personnel. Best professional judgment will be used by the person(s) notified to rectify the problem in accordance with the QAPP.

If the problem is instrumental or specific only to preparation of a sample batch, samples will be reprocessed after the instrument is repaired and recalibrated.

5.2.4 Corrective Action

The need for corrective action may arise from various possible sources: equipment malfunction, failure of internal QA/QC checks, failure of follow up on performance or system audit findings, or noncompliance with QA requirements.

When measurement equipment or analytical methods fail QA/QC requirements, the problem(s) will immediately be brought to the attention of the appropriate Analytical Laboratory PM, who will notify the appropriate QA Officer immediately. Corrective measures will depend entirely on the type of analysis, the extent of the error, and whether the error is determinant or not. The corrective action is determined by the Analytical Laboratory PM and the QA Officer. However, final approval is the responsibility of the Amec Foster Wheeler PM, Mr. Snyder.

The Amec Foster Wheeler PM, Mr. Snyder, is responsible for preparing and submitting all project reports. Draft and final reports will summarize the data collected for this project.

5.3 Data Validation and Usability

Data validation is the process whereby data are filtered and accepted or rejected on the basis of a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of its validity prior to its intended use. Data are checked for accuracy and completeness. The data validation process consists of data generation, reduction, and review (Section 5.3). Requirements of the ELAP Standard and Good Automated Laboratory Practices (Document 2185) (USEPA, 1995) are followed for computer processing, manipulation, reporting, storage, and retrieval of data.

Data reduction, validation, and reporting are ongoing processes that involve the Analytical Laboratory PM, QA Officers, and Amec Foster Wheeler PM.

5.4 Verification and Validation Methods

5.4.1 Database Generation

Upon completion of the survey, the field data sheets will be removed from the field logbooks, and the sheets will be checked for completeness and accuracy by the applicable QA Officer or Amec Foster Wheeler PM, Mr. Snyder. Appropriate field sheets must be present and filled out completely. If there are any questions, clarification from field personnel will be obtained as soon as possible. Field data sheets and the field logbooks will be placed into folders by data type, labeled with the data type and survey name, and filed in the appropriate filing cabinet. Field sheets will also be scanned, and electronic copies stored in the project folder on Amec Foster Wheeler's San Diego server.

In the laboratory, technicians will document sample preparation activities in bound laboratory notebooks or on bench sheets. Data validation includes use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data.

The data for laboratory analyses will be entered directly onto data sheets. Data sheets must be filled out in ink and signed by the technician, who is responsible for checking the sheet to ensure completeness and accuracy.

The technician who generates the data has the prime responsibility for the accuracy and completeness of the data. Each technician reviews the data to ensure the following:

- Sample description information is correct and complete.
- Analysis information is correct and complete.
- Results are correct and complete.
- Documentation is complete.

Data sheets are submitted to the Analytical Laboratory PM and Analytical QA Officer. A tracking sheet is initialed when the data are ready for transmittal to a data entry operator. Original data sheets are not allowed to leave laboratory facilities. If for any reason data entry is performed by an employee, but not at Amec Foster Wheeler's facilities, data sheets are copied, and the originals are kept with the Analytical Laboratory PM and Analytical QA Officer.

Data files are assigned a job number and are given a file name, which will be used when the file is put on compact disk.

5.4.2 Error Checking and Verification

The raw data file is printed and 100 percent of the raw data is checked against the original data by the applicable QA Officer or designee. Any errors found are corrected on the raw data printout and on the data entry sheets. If no errors are found, the station checked is marked "OK." The process is continued until no errors are found in the check. After the raw data are checked, each sheet is marked with the date the check was completed and the initials of the applicable QA Officer or designee. The raw data printout used for error checking is saved and filed with the data entry sheets. Any errors in the raw data file are corrected, and the establishment program is rerun.

After the database has been established, the data entry copies may be discarded, and the original data entry sheets and raw data printouts are filed.

Further data validation is performed by the Analytical Laboratory PM. Validation is accomplished by performing routine audits of the data collection and flow procedures and by monitoring QC sampling results.

Data validation includes use of dated and signed entries by the technicians and Analytical Laboratory PM on the bench sheets and notebooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data.

In the data review process, the data are compared with information (e.g., sample history, sample preparation, and QC sample data) to evaluate the validity of the results. Corrective action is minimized by developing and implementing routine internal system controls. Analysts are provided specific criteria that must be met for each procedure, operation, or measurement system.

5.5 Reconciliation with User Requirements

The Amec Foster Wheeler QA Officers (Barry Snyder and Rolf Schottle) will review data after each survey to determine whether data quality objectives (DQOs) have been met. If data do not meet the project's specifications, the applicable QA Officer will review the errors, communicate verbally and in writing with laboratory QA Officers as appropriate, and determine whether the problem is a result of calibration/maintenance, sampling techniques, or other factors. They will suggest corrective action. It is expected that the problem would be corrected by retraining, revision of techniques, or replacement of supplies/equipment. If the problem is not corrected by these methods, then the DQOs will be reviewed for feasibility. If specific DQOs are not achievable, the applicable QA Officer will recommend appropriate modifications. Any revisions need approval by the Amec Foster Wheeler PM, Barry Snyder, and the Port PM, Kelly Tait.

5.6 Quality Objectives for Criteria for Measurement of Data

The laboratory will follow in-house QA/QC plans, and any deviations will be documented in the analytical reports. DQOs applicable to water samples collected for this project consist of accuracy, precision, recovery, and completeness for the following field testing and chemistry analyses types (Table 5-1):

Table 5-1.
Summary of Data Quality Objectives

Measurement or Analysis Type	Applicable Data Quality Objective
Field Testing Temperature Salinity pH	Accuracy, Precision, Completeness
Analytical Chemistry Laboratory Analyses Dissolved Copper	Accuracy, Precision, Recovery, Completeness
Chemical Reporting Limits	Accuracy, Precision

Specific DQOs are presented in Table 5-2, along with acceptability criteria for each measurement.

Table 5-2. Data Quality Objectives for Laboratory and Field Measurements

Group	Parameter	Calibration	Accuracy[1]	Precision		Percent Complete
Field Testing	Temperature pH Salinity	NIST (temp) three point calibration (pH) Salinity standard	± 0.1 °C ± 0.1 pH ± 0.1 ppt	FD		100
Laboratory Analyses	Metals	SRM/CRM or MS/MSD, LCS[2]	83–109% (Cu) 80–118% (Zn)	LD, FD, and MS/MSD	<25%	100

Notes:

1 The objectives are applicable unless the method or manufacturer specifies more stringent requirements.

2 Reported LCS limits for copper were statistically derived by Weck Laboratories, Sept. 2012.

°C = degrees Celsius; < = less than; µg/L = micrograms per liter; % = percent; ± = plus or minus; CRM = Certified Reference Material; Cu = copper; FD = field duplicate; LCS = laboratory control sample; MS = matrix spike; MSD = matrix spike duplicate; NA = not applicable; ppt = part(s) per thousand; NIST = National Institute of Standards and Technology; SRM = Standard Reference Material

Acceptance criteria will be based on the implementation of acceptable and recognized QA/QC procedures. Acceptable data require proper sample collection and handling methods, sample preparation and analytical procedures, holding times, and QA protocols.

Accuracy is defined as the difference between the measured value of an indicator and its true or expected value, which is an estimate of systematic error or net bias. Accuracy will be ensured for trace metals.

Recovery of laboratory control standard (LCS) and matrix spike (MS) recoveries using method specific performance-based control limits. Based upon previous results, the spike levels chosen for this project is10 micrograms per liter (µg/L) for copper.

Precision is defined as the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated either as a range or as a standard deviation. The precision of instrument-related field measurements will be assessed for field instruments by measuring three replicate readings for all three parameters at each station. At one selected location, the replicated field measurements will be reported as the mean, and the precision will be calculated as the standard deviation of the measurements. The precision of chemistry laboratory measurements will be assessed by comparison of the sample result to that for a duplicate sample in addition to comparisons between the laboratory MS and matrix spike duplicate (MSD). Precision will be measured by the degree of agreement between the sample and the laboratory duplicate (LD) or the MS and MSD results. Samples within a ±25% relative percent difference (RPD) between the sample result and duplicate result will be accepted as unqualified results.

Completeness is a measure of the proportion of the expected, valid data (i.e., data not associated with some criterion of potential unacceptability) that is actually collected during a measurement process. The objective for completeness is 100 percent for each measurement process.

The analytical reporting limits for copper are below the relevant regulatory criteria for assessment of aquatic health, meeting this DQO, as presented in Table 5-2. The method detection limits are below the SWAMP reporting limits and preliminary benchmarks in accordance with the DQOs.

5.7 Special Training Needs/Certifications

All field personnel will be trained and will have experience in proper field sampling and sample handling techniques, including COC procedures, prior to sampling. These techniques will be reviewed prior to each sampling event and all field personnel will provide a signature to document the training.

Weck is accredited by the California Department of Public Health ELAP (National ELAP Certificate #04229CA) for the analysis of metals using USEPA Method 1640.

5.7.1 Training and Certification Documentation

All personnel are responsible for complying with the QA/QC requirements that pertain to their organizational/technical function. Technical staff member musts have a combination of experience and education to adequately demonstrate a specific knowledge of their particular functions and a general knowledge of laboratory operations, test methods, QA/QC procedures, and records management. A training sign-in sheet will document that field personnel are trained and experienced in all handling techniques and procedures.

5.7.2 Field Sampling

Field personnel will be trained in proper sampling techniques, sample handling, sample preservation and storage, sample transport, COC, and standard operating procedures.

5.7.3 Analytical Laboratory

The training program for the analytical chemistry laboratory begins with reviewing the SOP for a new task. The Analytical Laboratory PM, Chris Samatmanakit, demonstrates the procedure to the trainee, shows the appropriate steps in the SOP, and explains the significance of each step. The trainee later performs the procedure under the supervision of Mr. Samatmanakit. At this time, questions are answered and parts of the procedure may be demonstrated again to the trainee. The trainee continues to work under the direct supervision until he/she can demonstrate the procedure with competence and full understanding. This process may be short or long, depending on the procedure. Once the trainee has demonstrated competence, Mr. Samatmanakit completes a training form. At this time, the employee can work without supervision. This documentation is kept in files organized by individual with a separate form for each task. On an annual basis, the analyst is requalified, and this requalification is documented on the training form as well.

5.7.4 Training Personnel

Amec Foster Wheeler's Field PM, Corey Sheredy, and/or Field QA Officer, Barry Snyder, will verify that training is provided for field personnel in proper field sampling techniques prior to work initiation to ensure that consistent and appropriate sampling, sample handling/storage, and COC procedures are followed.

5.8 Documents and Records

Amec Foster Wheeler will document and track aspects of the sample collection process, including generating field logs at each site and COC forms for all samples collected. COC forms will accompany water samples to the analytical laboratory. The analytical laboratory will document and track all aspects of sample receipt and storage, analyses, and reporting.

Amec Foster Wheeler will maintain a database of information collected throughout this project. After verification and final database establishment, the raw data files and databases will be copied onto CD for storage onsite. All original data sheets, statistical worksheets, and reports produced will be accumulated into project-specific files maintained in file cabinets at the Amec Foster Wheeler office after the report has been submitted. Final report text and tables are also stored on disk and provided to the Port. After data submissions, directories are archived for storage offsite. All records will be maintained for at least five years or transferred according to agreement between the company and the client, should the laboratory transfer ownership. All records and analyses pertaining to accreditation are kept for a minimum of five years. If there is a change in company ownership, accreditation records for at least the previous five years must be transferred to the new owner.

Analytical results gathered at Weck will be stored in a database system at their main office and will be provided to Amec Foster Wheeler's PM, Barry Snyder, and Analytical QA Officer, Rolf Schottle, electronically. Data received from outside contractors will be kept exactly as received (electronically); data are error checked and processed into Amec Foster Wheeler's database system.

Persons responsible for maintaining records for this project are as follows: Mr. Snyder, Amec Foster Wheeler's PM, will oversee the operations of the project, including field QA, and will arbitrate any issues relative to records retention and any decisions to discard records. The Analytical Laboratory PM, Mr. Samatmanakit, will maintain all chemistry records; and the Field PM, Ms. Sheredy, will maintain the data at Amec Foster Wheeler and will maintain all sample collection, sample transport, COC, and field analyses forms.

Copies of this QAPP will be distributed to the Port's PM, Kelly Tait. Updates to this QAPP will be distributed in like manner, and all previous versions will be discarded from the project file.

Copies of the final report, including laboratory results and field records, will be maintained for a minimum of five years after project completion.

6.0 REPORT PREPARATION

The Time Series Study is being conducted to supplement information collected during the annual SIYB TMDL monitoring program. As such, the report for the Time Series Study will be limited to addressing the study question identified in Section 1 (Introduction) and will be submitted to the San Diego Regional Water Quality Control Board as an appendix to the 2017 SIYB Dissolved Copper TMDL Annual Report.

The Time Series Study technical write-up will provide a summary of water quality sampling results. In addition, the report will include a QA/QC assessment of field and analytical data.

At a minimum, the following information will be included in the Time Series Study technical write-up:

1. *Introduction*. A presentation of the study objectives.
2. *Sampling collection methods*. This section will provide detailed information on collection locations, number of samples, and collection methods. Target and actual sampling locations will be depicted on a site map.
3. *Sample analyses*. Laboratory analytical methods, sample handling and transport, lab QA/QC results, and other pertinent information will be described.
4. *Results*. A presentation of the Time Series Study results in tabular and graphic form will be included in this section.
5. *Discussion.* This section will include a discussion of the Times Series Study results in relation to the study question.
6. *QA/QC Summary.* This section will discuss adherence to project-specific QAPP requirements, QA/QC issues to be addressed, and any necessary corrective actions.

The tables, figures, and write-up will be reviewed by at least two Amec Foster Wheeler staff, including, at a minimum, the PM and a QA Officer. The document will also be reviewed by a technical editor. The report will be returned to the office staff for any corrections, and the final draft will then be reviewed again by the Amec Foster Wheeler PM. The Amec Foster Wheeler PM will sign the letter of transmittal for delivery of the report to the Port PM.

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7.0 REFERENCES

Amec Foster Wheeler. 2017. *Shelter Island Yacht Basin Dissolved Copper TMDL. Monitoring Plan (Revision 3)*. August.

California State Water Resources Control Board (State Board) (2014). *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*. Version 1.1. Updated March 2014. http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/collect_bed_sediment_update.pdf

United States Environmental Protection Agency (USEPA). 1995. *Good Automated Laboratory Practices*. EPA/200/B-95/006. USEPA Resources Management. Triangle Park, NC.

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ATTACHMENT A

FIELD LOG FORMS

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FIELD WATER QUALITY DATA SHEET

Station Identification: ____________________

Date: (mm/dd/yyyy) ____________________

Time Started: (hh:mm) ____________________ Ended: (hh:mm) ____________________

GPS: (WGS84) Lat. ____________________ Long. ____________________

Tide (ft): ____________________ : ____________________

Weather conditions: ____________________

Wind (mph): ____________________

Sea State Conditions ____________________

Physical Water Quality Measurements

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: ____________________

ATTACHMENT B

CHAIN-OF-CUSTODY FORMS

Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

CHAIN OF CUSTODY RECORD

STANDARD

Page 1 Of 2

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

PROJECT: Port of San Diego - Shelter Island Yacht Basin 24hr Water Quality Study

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PHONE: 858-300-4316
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com
barry.snyder@amecfw.com

PROJECT MANAGER: Corey Sheredy / Barry Snyder

SAMPLER: Corey Sheredy (CCS)

ANALYSES REQUESTED

SPECIAL HANDLING

☐ Same Day Rush 150%
☐ 24 Hour Rush 100%
☐ 48-72 Hour Rush 75%
☐ 4 - 5 Day Rush 30%
☐ Rush Extractions 50%
☐ 10 Business Days
☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	**Dissolved Copper** Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	**Dissolved Zinc** Method EPA 1640 MDL 0.036 µg/L, RL= 0.20 µg/L									COMMENTS
			seawater	TS-[1,2,3]-T0	1	X	X									
			seawater	TS-[1,2,3]-T1	1	X	X									
			seawater	TS-[1,2,3]-T2	1	X	X									
			seawater	TS-[1,2,3]-T3	1	X	X									
			seawater	TS-[1,2,3]-T4	1	X	X									
			seawater	TS-[1,2,3]-T5	1	X	X									
			seawater	TS-[1,2,3]-T6	1	X	X									
			seawater	TS-[1,2,3]-T7	1	X	X									
			seawater	TS-[1,2,3]-T8	1	X	X									
			seawater	TS-[1,2,3]-T9	1	x	x									

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Intact	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Samples are preseved and filtered in the field; 2) FB = Field Blank; 3) ER = Equipment Rinsate (Equipment Blank); 4) REP = Replicate
5) WECK will contact Amec FW PM within 24 hours if any sample anomalies are found; 6) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L;
7) Select pages from Amec FW QAPP included for reference;

Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

CHAIN OF CUSTODY RECORD

14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

STANDARD

Page 2 Of 2

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

PROJECT: Port of San Diego - Shelter Island Yacht Basin 24hr Water Quality Study

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PHONE: 858-300-4316
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com
barry.snyder@amecfw.com

PROJECT MANAGER: Corey Sheredy / Barry Snyder

SAMPLER: Corey Sheredy (CCS)

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	**Dissolved Copper** Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	**Dissolved Zinc** Method EPA 1640 MDL 0.036 µg/L, RL= 0.20 µg/L									COMMENTS
			seawater	TS-[1,2,3]-T10	1	X	X									
			seawater	TS-[1,2,3]-T11	1	X	X									
			seawater	TS-[1,2,3]-T12	1	X	X									
			seawater	TS-[1,2,3]-T12-REP	1	X	X									
			seawater	TS-[1,2,3]-FB	1	X	X									
			seawater	TS-[1,2,3]-ER	1	X	X									

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Intact	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Samples are preseved and filtered in the field; 2) FB = Field Blank; 3) ER = Equipment Rinsate (Equipment Blank); 4) REP = Replicate

5) WECK will contact AMEC PM within 24 hours if any sample anomalies are found; 6) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L;

7) Select pages from AMEC QAPP included for reference;

ATTACHMENT C

QA CHECKLIST

FIELD SAMPLING QA CHECKLIST

Station Location: TS- **Date/Time:**

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (if at TS-2)	
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	
Tide recorded	
Weather conditions recorded	
Surface water conditions (incl. currents) recorded	
General site observations recorded	
Check for boat cleaning operations in the area, document if applicable	

2. Sampling procedures:

TS-1-ER

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T0

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T1

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T2

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T3

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T4

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T5

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T6

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T7

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T8

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T9

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T10

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T11

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-T12

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

TS-1-T12-REP

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

FIELD SAMPLING QA CHECKLIST

TS-1-FB

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	
Sampling instrument given site water rinse prior to deployment for at least 1 minute	
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket filled with DI water	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time	
Staff avoided contaminating samples at all times	
pH and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	
Field notes have been recorded for this collection event	
Water samples placed in cooler with wet ice	

4. Data Recording:

Water samples properly logged on COC form	
Proper persons have signed the COC	

5. Sample Storage:

Water samples properly stored on ice in a cooler	
Cooler and samples hand delivered to labs	
Completed COC included with courier to hand deliver to labs	

Additional Notes:

FIELD SAMPLING QA CHECKLIST

Signature of QA/QC Personnel:___________________________ Date/Time___________________

Print Name/Company:__________________________________

APPENDIX B
QA/QC FIELD CHECKLIST FORMS

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FIELD SAMPLING QA CHECKLIST

Station Location: **TS-1**

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (if at TS-2)	N/A
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded or identified on a map	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area, document if applicable	Y

2. Sampling procedures:

TS-1-ER

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 16:22 **Initials:** CN	

FIELD SAMPLING QA CHECKLIST

TS-1-T0

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y

Date & Time: 1/7/18 17:07 **Initials:** CN

TS-1-T1

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y

Date & Time: 1/7/18 19:15 **Initials:** CN

FIELD SAMPLING QA CHECKLIST

TS-1-T2

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	N/A
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 21:24 **Initials:** CN	

TS-1-T3

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	N/A
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 23:34 **Initials:** CN	

FIELD SAMPLING QA CHECKLIST

TS-1-T4

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	N/A
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y

Date & Time: 1/4/18 01:28 **Initials:** CN

TS-1-T5

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	N/A
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y

Date & Time: 1/4/18 04:20 **Initials:** CN

FIELD SAMPLING QA CHECKLIST

TS-1-T6

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/17 0440 **Initials:** AR	

TS-1-T7

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	~~NA~~ Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 **Initials:** KB	

FIELD SAMPLING QA CHECKLIST

TS-1-T8

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 0830	**Initials:** EW

TS-1-T9

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 1030	**Initials:** EW

FIELD SAMPLING QA CHECKLIST

TS-1-T10

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 1310 **Initials:** EW	

TS-1-T11

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 1525 **Initials:** EW	

FIELD SAMPLING QA CHECKLIST

TS-1-T12

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 **Initials:** CCS	

TS-1-T12-REP

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	Y
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 **Initials:** CCS	

FIELD SAMPLING QA CHECKLIST

TS-1-FB

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 **Initials:** CLS	

4. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: **Date/Time** 1/5/2018

Print Name/Company: Corey Sheridy

FIELD SAMPLING QA CHECKLIST

Station Location: TS-2

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (if at TS-2)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded or identified on a map	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area, document if applicable	Y

2. Sampling procedures:

TS-2-EB

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/2/18 1615 **Initials:** CCS	

FIELD SAMPLING QA CHECKLIST

TS-2-T0

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 1655 **Initials:** KT	

TS-2-T1

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 **Initials:** CLA	

FIELD SAMPLING QA CHECKLIST

TS-2-T2

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 21:12 **Initials:** KT	

TS-2-T3

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/3/18 23 22 **Initials:** KT	

FIELD SAMPLING QA CHECKLIST

TS-2-T4

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N/A
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 1111 **Initials:** VK	

TS-2-T5

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N A
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 312 **Initials:** [illegible]	

FIELD SAMPLING QA CHECKLIST

TS-2-T6

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	Y
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time	Y
Staff avoided contaminating samples at all times	Y
Temperature, pH, and salinity readings taken following sample collection	Y
PPE properly removed and disposed of upon completion	Y
Field notes have been recorded for this collection event	Y
Water samples placed in cooler with wet ice	Y
Date & Time: 1/4/18 427 **Initials:** KT	

TS-2-T7

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

FIELD SAMPLING QA CHECKLIST

TS-2-T8

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time:	**Initials:**

TS-2-T9

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time:	**Initials:**

FIELD SAMPLING QA CHECKLIST

TS-2-T10

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

TS-2-T11

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

FIELD SAMPLING QA CHECKLIST

TS-2-T12

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

TS-2-T12-REP

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	✓
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

FIELD SAMPLING QA CHECKLIST

TS-2-FB

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

4. Data Recording:

Water samples properly logged on COC form	✓
Proper persons have signed the COC	✓

5. Sample Storage:

Water samples properly stored on ice in a cooler	✓
Cooler and samples hand delivered to labs	✓
Completed COC included with courier to hand deliver to labs	✓

Additional Notes:

Signature of QA/QC Personnel: **Date/Time** 1/5/2018

Print Name/Company: Corey Shively

FIELD SAMPLING QA CHECKLIST

Station Location: **TS-3**

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Vessel has been anchored (if at TS-2)	NA
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded or identified on a map	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded	Y
General site observations recorded	Y
Check for boat cleaning operations in the area, document if applicable	Y

2. Sampling procedures:

TS-3-ER

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 1618 1/3/18	**Initials:** TY

FIELD SAMPLING QA CHECKLIST

TS-3-T0

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 1708 1/3/17 **Initials:** TM	

TS-3-T1

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 1905 1/3/17 **Initials:** TM	

FIELD SAMPLING QA CHECKLIST

TS-3-T2

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 2115 1/3/18 **Initials:** TY	

TS-3-T3

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 2325 1/3/18 **Initials:** TY	

FIELD SAMPLING QA CHECKLIST

TS-3-T6

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: 04 30 1/4/18	**Initials:** TM

TS-3-T7

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time:	**Initials:**

FIELD SAMPLING QA CHECKLIST

TS-3-T8

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓

Initials: BI

Date & Time:

TS-3-T9

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓

Initials: BI

Date & Time:

FIELD SAMPLING QA CHECKLIST

TS-3-T10

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:** BI	

TS-3-T11

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:** BI	

FIELD SAMPLING QA CHECKLIST

TS-3-T12

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	✓
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:** BI	

TS-3-T12-REP

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	✓
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	✓
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:** BI	

FIELD SAMPLING QA CHECKLIST

TS-3-FB

Vessel engine has been shut off for 3-5 minutes prior to sampling (TS-2 only)	NA
Field staff wearing fresh, powder free nitrile gloves	✓
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	NA
Sampling instrument given site water rinse prior to deployment for at least 2-3 minutes	NA
If in between sampling stations, sampling instrument stored in plastic lined, 5-gallon bucket	✓
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	✓
Samples bottles and containers are the correct type and preservation in accordance with SAP/ QAPP	✓
Sample bottles correctly labeled and match the station identification	✓
Sample bottles correctly labeled with date and time	✓
Staff avoided contaminating samples at all times	✓
Temperature, pH, and salinity readings taken following sample collection	NA
PPE properly removed and disposed of upon completion	✓
Field notes have been recorded for this collection event	✓
Water samples placed in cooler with wet ice	✓
Date & Time: **Initials:**	

4. Data Recording:

Water samples properly logged on COC form	✓
Proper persons have signed the COC	✓

5. Sample Storage:

Water samples properly stored on ice in a cooler	✓
Cooler and samples hand delivered to labs	✓
Completed COC included with courier to hand deliver to labs	✓

Additional Notes:

Signature of QA/QC Personnel: ______________ **Date/Time** 1/5/2018

Print Name/Company: Corey Sheedy

APPENDIX C
CHAIN-OF-CUSTODY FORMS

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8A05090

WL Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964
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Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

CHAIN OF CUSTODY RECORD

STANDARD

Page 1 Of 6

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PROJECT: SIYB Times Series Study

PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com

PROJECT MANAGER: Barry Snyder / Corey Sheredy

SAMPLER:

SPECIAL HANDLING
☐ Same Day Rush 150%
☐ 24 Hour Rush 100%
☐ 48-72 Hour Rush 75%
☐ 4 - 5 Day Rush 30%
☐ Rush Extractions 50%
☑ 10 Business Days
☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L										COMMENTS
TS-1-T0	01/03/18	1642	seawater	TS-1-T0	1	X										
TS-1-T1	01/03/18	1850	seawater	TS-1-T1	1	X										
TS-1-T2	01/03/18	2100	seawater	TS-1-T2	1	X										
TS-1-T3	01/03/18	2311	seawater	TS-1-T3	1	X										
TS-1-T4	01/04/18	100	seawater	TS-1-T4	1	X										
TS-1-T5	01/04/18	300	seawater	TS-1-T5	1	X										
TS-1-T6	01/04/18	415	seawater	TS-1-T6	1	X										
TS-1-T7	01/04/18	620	seawater	TS-1-T7	1	X										
TS-1-T8	01/04/18	820	seawater	TS-1-T8	1	X										
TS-1-T9	01/04/18	1024	seawater	TS-1-T9	1	X										
TS-1-T10	01/04/18	1300	seawater	TS-1-T10	1	X										

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	9:45 1-5-18 Am	
	12:10 1-5-18	1-5-18 12:10

SAMPLE CONDITION:
Actual Temperature: 3.1
Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y [✓ N]

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION
1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.
2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 30 ug/L, 3)~~ WECK will contact Amec PM within 24 hours if any sample anomalies are found;
4) Select pages from Amec FW QAPP included for reference.

8A05040

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CHAIN OF CUSTODY RECORD

STANDARD

Page 2 Of 6

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PROJECT: SIYB Times Series Study

PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com

PROJECT MANAGER: Barry Snyder / Corey Sheredy

SAMPLER:

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☑ 10 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

COMMENTS

ANALYSES REQUESTED

	ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L
X	TS-1-T11	01/04/18	1515	seawater		1	X
X	TS-1-T12	01/04/18	1729	seawater		1	X
X	TS-1-T12-REP	01/04/18	1739	seawater		1	X
X	TS-1-ER	01/03/18	1605 ~~1515~~	DI		1	X
X	TS-1-FB	01/04/18	1748	DI		1	X

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	9:45 1-5-18 AM	Hector Sanch
Hector Sanch	12:10 1-5-18	1-5-18 12:10

SAMPLE CONDITION:

Actual Temperature: 3.1

Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y / [✓ N]

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.

2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 30 ug/L; 3)~~ WECK will contact Amec PM within 24 hours if any sample anomalies are found;

4) Select pages from Amec FW QAPP included for reference.

8A05040

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CHAIN OF CUSTODY RECORD

STANDARD

Page 3 Of 6

CLIENT NAME: Amec Foster Wheeler E&I, Inc.
ADDRESS: 9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PROJECT: SIYB Times Series Study
PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com

PROJECT MANAGER: Barry Snyder / Corey Sheredy
SAMPLER:

SPECIAL HANDLING

☐ Same Day Rush 150%
☐ 24 Hour Rush 100%
☐ 48-72 Hour Rush 75%
☐ 4 - 5 Day Rush 30%
☐ Rush Extractions 50%
☑ 10 Business Days
☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L										COMMENTS
TS-2-T0	01/03/18	1642	seawater	TS-2-T0	1	X										
TS-2-T1	01/03/18	1850	seawater	TS-2-T1	1	X										
TS-2-T2	01/03/18	2100	seawater	TS-2-T2	1	X										
TS-2-T3	01/03/18	2311	seawater	TS-2-T3	1	X										
TS-2-T4	01/04/18	100	seawater	TS-2-T4	1	X										
TS-2-T5	01/04/18	300	seawater	TS-2-T5	1	X										
TS-2-T6	01/04/18	415	seawater	TS-2-T6	1	X										
TS-2-T7	01/04/18	620	seawater	TS-2-T7	1	X										
TS-2-T8	01/04/18	820	seawater	TS-2-T8	1	X										
TS-2-T9	01/04/18	1024	seawater	TS-2-T9	1	X										
TS-2-T10	01/04/18	1300	seawater	TS-2-T10	1	X										

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	1-5-18 9:45 AM	Hector Sanch
Hector Sanch	1-5-18 12:10	1-5-18 12:10

SAMPLE CONDITION:

Actual Temperature: 3.1

Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y / [✓ N]

SAMPLE TYPE CODE:

AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.
2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 30 ug/L.~~ 3) WECK will contact Amec PM within 24 hours if any sample anomalies are found;
4) Select pages from Amec FW QAPP included for reference.

8A05040

W L **Weck Laboratories, Inc.**
Analytical Laboratory Services - Since 1964

14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

CHAIN OF CUSTODY RECORD

STANDARD

Page 4 Of 6

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

PROJECT: SIYB Times Series Study

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com

PROJECT MANAGER: Barry Snyder / Corey Sheredy

SAMPLER:

SPECIAL HANDLING

☐ Same Day Rush 150%
☐ 24 Hour Rush 100%
☐ 48-72 Hour Rush 75%
☐ 4 - 5 Day Rush 30%
☐ Rush Extractions 50%
☑ 10 Business Days
☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ANALYSES REQUESTED

	ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L	COMMENTS
X	TS-2-T11	01/04/18	1515	seawater		1	X	
X	TS-2-T12	01/04/18	1729	seawater		1	X	
X	TS-2-T12-REP	01/04/18	1739	seawater		1	X	
X	TS-2-ER	01/03/18	1530	DI		1	X	
X	TS-2-FB	01/04/18	1750	DI		1	X	

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	1-5-18 9:45 AM	Hector Sanch
Hector Sanch	1-5-18 12:10	1-5-18 12:10

SAMPLE CONDITION:

Actual Temperature: 3.1

Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y / [✓ N]

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.
2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 50 ug/L~~; 3) WECK will contact Amec PM within 24 hours if any sample anomalies are found;
4) Select pages from Amec FW QAPP included for reference.

8A05040

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CHAIN OF CUSTODY RECORD

STANDARD

Page 25 Of 26

CLIENT NAME: Amec Foster Wheeler E&I, Inc.
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9210 Sky Park Ct., Suite 200
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PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com
PROJECT MANAGER: Barry Snyder / Corey Sheredy
SAMPLER:

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L
TS-3-T0	01/03/18	1642	seawater	TS-3-T0	1	X
TS-3-T1	01/03/18	1850	seawater	TS-3-T1	1	X
TS-3-T2	01/03/18	2100	seawater	TS-3-T2	1	X
TS-3-T3	01/03/18	2311	seawater	TS-3-T3	1	X
TS-3-T4	01/04/18	100	seawater	TS-3-T4	1	X
TS-3-T5	01/04/18	300	seawater	TS-3-T5	1	X
TS-3-T6	01/04/18	415	seawater	TS-3-T6	1	X
TS-3-T7	01/04/18	620	seawater	TS-3-T7	1	X
TS-3-T8	01/04/18	820	seawater	TS-3-T8	1	X
TS-3-T9	01/04/18	1024	seawater	TS-3-T9	1	X
TS-3-T10	01/04/18	1300	seawater	TS-3-T10	1	X

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☑ 10 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays
Method of Shipment:
COMMENTS

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	1-5-18 6:45	
	1-5-18 12:10	1-5-18 12:10

SAMPLE CONDITION:
Actual Temperature: 3.1
Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y / [✓ N]

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION
1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.
2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 60 ug/L; 3~~) WECK will contact Amec PM within 24 hours if any sample anomalies are found;
4) Select pages from Amec FW QAPP included for reference.

8A05040

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CHAIN OF CUSTODY RECORD

STANDARD

Page 6 Of 6

CLIENT NAME: Amec Foster Wheeler E&I, Inc.

PROJECT: SIYB Times Series Study

ADDRESS:
9210 Sky Park Ct., Suite 200
San Diego, CA 92123

PHONE: 831-359-7761
FAX: 858-300-4301
EMAIL: corey.sheredy@amecfw.com

PROJECT MANAGER: Barry Snyder / Corey Sheredy

SAMPLER:

ANALYSES REQUESTED: Dissolved Copper^{1,2} Method EPA 1640 MDL 0.0038 µg/L, RL= 0.01 µg/L

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Dissolved Copper
TS-3-T11	01/04/18	1515	seawater	TS-3-T11	1	X
TS-3-T12	01/04/18	1729	seawater	TS-3-T12	1	X
TS-3-T12-REP	01/04/18	1745	seawater	TS-3-T12-REP	1	X
TS-3-ER	01/03/18	1600	DI	TS-3-ER	1	X
TS-3-FB	01/04/18	1800	DI	TS-3-FB	1	X

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☑ 10 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

COMMENTS

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	9:25 1-5-18	
	12:10 1-5-18	1-5-18 12:10

SAMPLE CONDITION:

Actual Temperature: 3.1
Received On Ice [✓ Y] / N
Preserved [✓ Y] / N
Evidence Seals Present Y / [✓ N]
Container Intact Y / [✓ N]
Preserved at Lab Y / [✓ N]

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
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SPECIAL REQUIREMENTS / BILLING INFORMATION

1) Diss. metals were field filtered using 0.45 um bottletop filt. System. LAB ACTION: PRESERVE IMMEDIATELY.

2) SPIKE level at the following amounts: Copper = 10 ug/L, ~~Zinc = 30 ug/L~~; 3) WECK will contact Amec PM within 24 hours if any sample anomalies are found;

4) Select pages from Amec FW QAPP included for reference.

APPENDIX D
ANALYTICAL REPORTS

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 8A05040

Project: SIYB Times Series Study

Attn: Barry Snyder

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Report Date: 1/19/2018

Received Date: 1/5/2018

Turnaround Time: Normal

Phones: (858) 300-4320

Fax: (858) 300-4301

P.O. #:

Billing Code:

DoD-ELAP #L2457 • ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • HW-DOH # • ISO 17025 #L2457.01 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Barry Snyder,

Enclosed are the results of analyses for samples received 1/05/18 with the Chain-of-Custody document. The samples were received in good condition, at 3.1 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Chris Samatmanakit
Project Manager

Certificate of Analysis

FINAL REPORT

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: SIYB Times Series Study

Project Manager: Barry Snyder

Reported:
01/19/2018 10:47

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
TS-1-T0	Client	8A05040-01	Water	01/03/18 16:42	
TS-1-T1	Client	8A05040-02	Water	01/03/18 18:50	
TS-1-T2	Client	8A05040-03	Water	01/03/18 21:00	
TS-1-T3	Client	8A05040-04	Water	01/03/18 23:11	
TS-1-T4	Client	8A05040-05	Water	01/04/18 01:00	
TS-1-T5	Client	8A05040-06	Water	01/04/18 03:00	
TS-1-T6	Client	8A05040-07	Water	01/04/18 04:15	
TS-1-T7	Client	8A05040-08	Water	01/04/18 06:20	
TS-1-T8	Client	8A05040-09	Water	01/04/18 08:20	
TS-1-T9	Client	8A05040-10	Water	01/04/18 10:24	
TS-1-T10	Client	8A05040-11	Water	01/04/18 13:00	
TS-1-T11	Client	8A05040-12	Water	01/04/18 15:15	
TS-1-T12	Client	8A05040-13	Water	01/04/18 17:29	
TS-1-T12-REP	Client	8A05040-14	Water	01/04/18 17:39	
TS-1-ER	Client	8A05040-15	Water	01/03/18 16:05	
TS-1-FB	Client	8A05040-16	Water	01/04/18 17:45	
TS-2-T0	Client	8A05040-17	Water	01/03/18 16:42	
TS-2-T1	Client	8A05040-18	Water	01/03/18 18:50	
TS-2-T2	Client	8A05040-19	Water	01/03/18 21:00	
TS-2-T3	Client	8A05040-20	Water	01/03/18 23:11	
TS-2-T4	Client	8A05040-21	Water	01/04/18 01:00	
TS-2-T5	Client	8A05040-22	Water	01/04/18 03:00	
TS-2-T6	Client	8A05040-23	Water	01/04/18 04:15	
TS-2-T7	Client	8A05040-24	Water	01/04/18 06:20	
TS-2-T8	Client	8A05040-25	Water	01/04/18 08:20	
TS-2-T9	Client	8A05040-26	Water	01/04/18 10:24	
TS-2-T10	Client	8A05040-27	Water	01/04/18 13:00	
TS-2-T11	Client	8A05040-28	Water	01/04/18 15:15	
TS-2-T12	Client	8A05040-29	Water	01/04/18 17:29	
TS-2-T12-REP	Client	8A05040-30	Water	01/04/18 17:39	
TS-2-ER	Client	8A05040-31	Water	01/03/18 15:30	
TS-2-FB	Client	8A05040-32	Water	01/04/18 17:50	
TS-3-T0	Client	8A05040-33	Water	01/03/18 16:42	
TS-3-T1	Client	8A05040-34	Water	01/03/18 18:50	
TS-3-T2	Client	8A05040-35	Water	01/03/18 21:00	
TS-3-T3	Client	8A05040-36	Water	01/03/18 23:11	
TS-3-T4	Client	8A05040-37	Water	01/04/18 01:00	
TS-3-T5	Client	8A05040-38	Water	01/04/18 03:00	
TS-3-T6	Client	8A05040-39	Water	01/04/18 04:15	
TS-3-T7	Client	8A05040-40	Water	01/04/18 06:20	
TS-3-T8	Client	8A05040-41	Water	01/04/18 08:20	
TS-3-T9	Client	8A05040-42	Water	01/04/18 10:24	
TS-3-T10	Client	8A05040-43	Water	01/04/18 13:00	
TS-3-T11	Client	8A05040-44	Water	01/04/18 15:15	
TS-3-T12	Client	8A05040-45	Water	01/04/18 17:29	
TS-3-T12-REP	Client	8A05040-46	Water	01/04/18 17:45	

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: SIYB Times Series Study

Project Manager: Barry Snyder

Reported:
01/19/2018 10:47

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
TS-3-ER	Client	8A05040-47	Water	01/03/18 16:00	
TS-3-FB	Client	8A05040-48	Water	01/04/18 18:00	

Sample Results

Sample: TS-1-T0 Sampled: 01/03/18 16:42 by Client
8A05040-01 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.5**	0.010	ug/l	1	01/10/18 23:42	

Sample: TS-1-T1 Sampled: 01/03/18 18:50 by Client
8A05040-02 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.5**	0.010	ug/l	1	01/10/18 23:56	

Sample: TS-1-T2 Sampled: 01/03/18 21:00 by Client
8A05040-03 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.1**	0.010	ug/l	1	01/11/18 00:10	

Sample: TS-1-T3 Sampled: 01/03/18 23:11 by Client
8A05040-04 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.4**	0.010	ug/l	1	01/11/18 00:23	

Sample: TS-1-T4 Sampled: 01/04/18 1:00 by Client
8A05040-05 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.6**	0.010	ug/l	1	01/11/18 00:37	

Sample: TS-1-T5 Sampled: 01/04/18 3:00 by Client
8A05040-06 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.3**	0.010	ug/l	1	01/11/18 00:51	

Sample Results

(Continued)

Sample: TS-1-T6 — Sampled: 01/04/18 4:15 by Client
8A05040-07 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.5**	0.010	ug/l	1	01/11/18 01:05	

Sample: TS-1-T7 — Sampled: 01/04/18 6:20 by Client
8A05040-08 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.0**	0.010	ug/l	1	01/11/18 02:00	

Sample: TS-1-T8 — Sampled: 01/04/18 8:20 by Client
8A05040-09 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**8.9**	0.010	ug/l	1	01/11/18 02:13	

Sample: TS-1-T9 — Sampled: 01/04/18 10:24 by Client
8A05040-10 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**10**	0.010	ug/l	1	01/11/18 02:27	

Sample: TS-1-T10 — Sampled: 01/04/18 13:00 by Client
8A05040-11 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.8**	0.010	ug/l	1	01/11/18 02:41	

Sample: TS-1-T11 — Sampled: 01/04/18 15:15 by Client
8A05040-12 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.9**	0.010	ug/l	1	01/11/18 02:55	

Sample Results

(Continued)

Sample: TS-1-T12 Sampled: 01/04/18 17:29 by Client
8A05040-13 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**9.9**	0.010	ug/l	1	01/11/18 03:09	

Sample: TS-1-T12-REP Sampled: 01/04/18 17:39 by Client
8A05040-14 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**10**	0.010	ug/l	1	01/11/18 03:22	

Sample: TS-1-ER Sampled: 01/03/18 16:05 by Client
8A05040-15 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**0.059**	0.010	ug/l	1	01/11/18 03:36	

Sample: TS-1-FB Sampled: 01/04/18 17:45 by Client
8A05040-16 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	ND	0.010	ug/l	1	01/11/18 03:50	

Sample: TS-2-T0 Sampled: 01/03/18 16:42 by Client
8A05040-17 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0398	**Prepared:** 01/09/18 11:00				**Analyst:** gza
Copper, Dissolved	**5.5**	0.010	ug/l	1	01/11/18 04:04	

Sample: TS-2-T1 Sampled: 01/03/18 18:50 by Client
8A05040-18 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**6.4**	0.010	ug/l	1	01/11/18 20:35	

Sample Results

(Continued)

Sample: TS-2-T2 — Sampled: 01/03/18 21:00 by Client

8A05040-19 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**4.1**	0.010	ug/l	1	01/11/18 20:49	

Sample: TS-2-T3 — Sampled: 01/03/18 23:11 by Client

8A05040-20 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**5.0**	0.010	ug/l	1	01/11/18 21:03	

Sample: TS-2-T4 — Sampled: 01/04/18 1:00 by Client

8A05040-21 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**5.7**	0.010	ug/l	1	01/11/18 21:16	

Sample: TS-2-T5 — Sampled: 01/04/18 3:00 by Client

8A05040-22 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**5.3**	0.010	ug/l	1	01/11/18 21:30	

Sample: TS-2-T6 — Sampled: 01/04/18 4:15 by Client

8A05040-23 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**5.4**	0.010	ug/l	1	01/11/18 21:44	

Sample: TS-2-T7 — Sampled: 01/04/18 6:20 by Client

8A05040-24 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 — **Batch ID:** W8A0399 — **Prepared:** 01/09/18 11:03 — **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**5.5**	0.010	ug/l	1	01/11/18 21:58	

Sample Results

(Continued)

Sample: TS-2-T8 Sampled: 01/04/18 8:20 by Client
8A05040-25 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**6.4**	0.010	ug/l	1	01/11/18 22:12	

Sample: TS-2-T9 Sampled: 01/04/18 10:24 by Client
8A05040-26 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**2.0**	0.010	ug/l	1	01/11/18 22:25	

Sample: TS-2-T10 Sampled: 01/04/18 13:00 by Client
8A05040-27 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**6.2**	0.010	ug/l	1	01/11/18 22:39	

Sample: TS-2-T11 Sampled: 01/04/18 15:15 by Client
8A05040-28 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**6.6**	0.010	ug/l	1	01/11/18 23:34	

Sample: TS-2-T12 Sampled: 01/04/18 17:29 by Client
8A05040-29 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.1**	0.010	ug/l	1	01/11/18 23:48	

Sample: TS-2-T12-REP Sampled: 01/04/18 17:39 by Client
8A05040-30 (Water)

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W8A0399 **Prepared:** 01/09/18 11:03 **Analyst:** gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.0**	0.010	ug/l	1	01/12/18 00:02	

Sample Results

(Continued)

Sample: TS-2-ER
8A05040-31 (Water)

Sampled: 01/03/18 15:30 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**0.025**	0.010	ug/l	1	01/12/18 00:15	

Sample: TS-2-FB
8A05040-32 (Water)

Sampled: 01/04/18 17:50 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**0.023**	0.010	ug/l	1	01/12/18 00:29	

Sample: TS-3-T0
8A05040-33 (Water)

Sampled: 01/03/18 16:42 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**2.7**	0.010	ug/l	1	01/12/18 00:43	

Sample: TS-3-T1
8A05040-34 (Water)

Sampled: 01/03/18 18:50 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**3.2**	0.010	ug/l	1	01/12/18 00:57	

Sample: TS-3-T2
8A05040-35 (Water)

Sampled: 01/03/18 21:00 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**4.1**	0.010	ug/l	1	01/12/18 01:10	

Sample: TS-3-T3
8A05040-36 (Water)

Sampled: 01/03/18 23:11 by Client

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**4.8**	0.010	ug/l	1	01/12/18 01:24	

Sample Results

(Continued)

Sample: TS-3-T4 Sampled: 01/04/18 1:00 by Client
8A05040-37 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0399	**Prepared:** 01/09/18 11:03				**Analyst:** gza
Copper, Dissolved	**3.5**	0.010	ug/l	1	01/12/18 01:38	

Sample: TS-3-T5 Sampled: 01/04/18 3:00 by Client
8A05040-38 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**4.1**	0.010	ug/l	1	01/11/18 06:21	

Sample: TS-3-T6 Sampled: 01/04/18 4:15 by Client
8A05040-39 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**3.9**	0.010	ug/l	1	01/11/18 06:35	

Sample: TS-3-T7 Sampled: 01/04/18 6:20 by Client
8A05040-40 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**2.1**	0.010	ug/l	1	01/11/18 06:49	

Sample: TS-3-T8 Sampled: 01/04/18 8:20 by Client
8A05040-41 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**1.2**	0.010	ug/l	1	01/11/18 07:03	

Sample: TS-3-T9 Sampled: 01/04/18 10:24 by Client
8A05040-42 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**1.0**	0.010	ug/l	1	01/11/18 07:58	

Sample Results

(Continued)

Sample: TS-3-T10 — Sampled: 01/04/18 13:00 by Client
8A05040-43 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**1.4**	0.010	ug/l	1	01/11/18 08:12	

Sample: TS-3-T11 — Sampled: 01/04/18 15:15 by Client
8A05040-44 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**3.0**	0.010	ug/l	1	01/11/18 08:25	

Sample: TS-3-T12 — Sampled: 01/04/18 17:29 by Client
8A05040-45 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**3.9**	0.010	ug/l	1	01/11/18 08:39	

Sample: TS-3-T12-REP — Sampled: 01/04/18 17:45 by Client
8A05040-46 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**3.9**	0.010	ug/l	1	01/11/18 08:53	

Sample: TS-3-ER — Sampled: 01/03/18 16:00 by Client
8A05040-47 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**0.044**	0.010	ug/l	1	01/11/18 09:07	

Sample: TS-3-FB — Sampled: 01/04/18 18:00 by Client
8A05040-48 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Metals - Low Level by 1600 Series Methods						
Method: EPA 1640	**Batch ID:** W8A0400	**Prepared:** 01/09/18 11:04				**Analyst:** gza
Copper, Dissolved	**0.028**	0.010	ug/l	1	01/11/18 09:20	

Quality Control Results

Metals - Low Level by 1600 Series Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W8A0398 - EPA 1640										
Blank (W8A0398-BLK1)				**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	ND	0.010	ug/l							
LCS (W8A0398-BS1)				**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	10.1	0.010	ug/l	10.0		101	70-130			
Matrix Spike (W8A0398-MS1)	**Source: 8A05040-01**			**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	19.5	0.010	ug/l	10.0	9.52	100	70-130			
Matrix Spike (W8A0398-MS2)	**Source: 8A05040-02**			**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	18.9	0.010	ug/l	10.0	9.45	95	70-130			
Matrix Spike Dup (W8A0398-MSD1)	**Source: 8A05040-01**			**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	19.7	0.010	ug/l	10.0	9.52	102	70-130	1	30	
Matrix Spike Dup (W8A0398-MSD2)	**Source: 8A05040-02**			**Prepared: 01/09/18**	**Analyzed: 01/10/18**					
Copper, Dissolved	19.0	0.010	ug/l	10.0	9.45	95	70-130	0.3	30	
Batch: W8A0399 - EPA 1640										
Blank (W8A0399-BLK1)				**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	ND	0.010	ug/l							
LCS (W8A0399-BS1)				**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	9.89	0.010	ug/l	10.0		99	70-130			
Matrix Spike (W8A0399-MS1)	**Source: 8A05040-18**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	15.6	0.010	ug/l	10.0	6.37	92	70-130			
Matrix Spike (W8A0399-MS2)	**Source: 8A05040-19**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	13.8	0.010	ug/l	10.0	4.11	97	70-130			
Matrix Spike Dup (W8A0399-MSD1)	**Source: 8A05040-18**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	16.1	0.010	ug/l	10.0	6.37	98	70-130	4	30	
Matrix Spike Dup (W8A0399-MSD2)	**Source: 8A05040-19**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	14.1	0.010	ug/l	10.0	4.11	100	70-130	2	30	
Batch: W8A0400 - EPA 1640										
Blank (W8A0400-BLK1)				**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	ND	0.010	ug/l							
LCS (W8A0400-BS1)				**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	10.9	0.010	ug/l	10.0		109	70-130			
Matrix Spike (W8A0400-MS1)	**Source: 8A05040-38**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	14.8	0.010	ug/l	10.0	4.14	107	70-130			
Matrix Spike (W8A0400-MS2)	**Source: 8A05040-39**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	14.1	0.010	ug/l	10.0	3.92	102	70-130			
Matrix Spike Dup (W8A0400-MSD1)	**Source: 8A05040-38**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	15.0	0.010	ug/l	10.0	4.14	108	70-130	1	30	
Matrix Spike Dup (W8A0400-MSD2)	**Source: 8A05040-39**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: SIYB Times Series Study

Project Manager: Barry Snyder

Reported:
01/19/2018 10:47

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W8A0400 - EPA 1640 (Continued)										
Matrix Spike Dup (W8A0400-MSD2)	**Source: 8A05040-39**			**Prepared: 01/09/18**	**Analyzed: 01/11/18**					
Copper, Dissolved	14.8	0.010	ug/l	10.0	3.92	109	70-130	5	30	

Notes and Definitions

Item	**Definition**
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)
All results are expressed on wet weight basis unless otherwise specified.
All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

APPENDIX E
FIELD DATA FORMS

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PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-ER

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) ~~15:45~~ 1605 Ended: (hh:mm) 16:20

GPS: (WGS84) Lat. NA Long. NA

Tide (ft): -1.4ft :

Weather conditions: overcast, cool

Wind (none, light, moderate, heavy): Light

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 16:05	pH	Salinity (ppt)	Temperature (°C)
Measurement:	NA	NA	NA

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

[illegible]

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T0

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) 16:40 Ended: (hh:mm) 17:05

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): -1.9 ft :

Weather conditions: overcast, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 16:42	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.05	~~34.93~~	16.32

CONDUCTIVITY
mg/
~~5249 294~~ ~~/cm~~ cm
44147us/cm Specific.

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.27

Notes:

vessel ~60ft away turned on engine, bilge, drained water. Fumes

vessel ~20ft away

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T1

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) 18:47 Ended: (hh:mm) 19:13

GPS: (WGS84) Lat. 32.718166 Long. -117.226079

Tide (ft): -0.1 ↑

Weather conditions: overcast, cool

Wind (none, light, moderate, heavy): none.

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection: 18:50	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.26	~~34.95~~	16.2

COND mg/cm
44033

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.69

Notes:

vessel ~20ft away w/bilge

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T2

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) 20:58 Ended: (hh:mm) 21:22

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): 3.0 ft ↑ :

Weather conditions: overcast, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 21:00	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.26	~~35.02~~ 33.69	16.13	44665

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

Vessel ~20ft away

* "scummy" water on sampling area, slight film w/ floating trash scattered ~30ft radius around area

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T3

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) 23:09 Ended: (hh:mm) 23:32

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): 4.7 ft

Weather conditions: partially overcast, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 23:11	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.29	~~35.02~~	16.07	43~~9~~97

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.61

Notes:

Water clear again, no noticable films, etc on surface.

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS - 1 - T4

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 00:58 Ended: (hh:mm) 01:26

GPS: (WGS84) Lat. 32.71026 Long. -117.23499

Tide (ft): +3.6 ↓ :

Weather conditions: clear, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 01:00	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.34	~~34.99~~ 33.65	16.03	43921

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

Water calm. no particulates seen on top of water. small film/sheen on surface @ sample site.

boat ~20ft bilge started during sampling event

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS - 1 - TS

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 02:58

Ended: (hh:mm) 03:18

GPS: (WGS84) Lat. 3271026 Long. -117.23449

Tide (ft): 1.9 ft ↓

Weather conditions: clear, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 0301	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.35	~~35.01~~	16.00

CONP
~~43919~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.63

Notes:

Some particulates (trash & vegetative debris) on surface.

vessel bilge running ~20ft away.

observed little condensation in filter bottle when opened & no liquid on bottom

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T6

Date: (mm/dd/yyyy) 1/4/2018

Time Started: (hh:mm) 04:13 Ended: (hh:mm) 04:40

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): 1.6 ft

Weather conditions: clear, cool

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 0415	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.34	35.00	15.99	~~43902~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.67

Notes:

Few particles (trash & vegetative debris) on surface.

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS - 1 - T7

Date: (mm/dd/yyyy) 1/4/2018

Time Started: (hh:mm) 06:20 Ended: (hh:mm) 6:30

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): +2.7

Weather conditions: slightly hazy, clear overhead

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.4	~~35~~	15.91

COND
43815

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.72

Notes:

Few particles (trash + vegetative debris) on surface.
Sail boat moored near site. on south side of dock

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T8

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 0820

Ended: (hh:mm) 0829

GPS: (WGS84) Lat. 32.718166 Long. -117.226077

Tide (ft): 5.2 ft

Weather conditions: Sunny, slightly hazy, calm

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection: 0820	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.49	~~35~~	15.92

COND
~~45,787~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.64

Notes:

Some paint specks in water near meter.

50-ft yacht came in for fuel ~ 0830, after samples + pH were pulled.

minimal debris in filter.

same boats moored overnight on South side of dock

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T9

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 1024 Ended: (hh:mm) 1036

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): 64 ft. :

Weather conditions: Sunny, slightly hazy

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.17	35	16.018	~~44155~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.69

Notes:

Boat leaving dock @ 1020

Same boats moored overnight on south side of dock

minor vegetative debris on water surface

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T11

Date: (mm/dd/yyyy) 01/04/18

Time Started: (hh:mm) 1515

Ended: (hh:mm) 1525

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): +0.5 ft. ↓ :

Weather conditions: sunny, mostly clear

Wind (none, light, moderate, heavy): moderate wind

Sea State Conditions (calm, ripples, small waves) ripples

Physical Water Quality Measurements

Time of collection: 1525	**pH**	**Salinity (ppt)**	**Temperature (°C)**	COND
Measurement:	8.45	~~35~~	16.39	~~44,419~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.71

Notes:

Same boats moored on south side.
one small boat leaving dock@1310
one boat came in for fuel @ 1315

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T12

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 1729

Ended: (hh:mm) 1735

GPS: (WGS84) Lat. 32.71866

Long. -117.226077

Tide (ft): -1.3 ft

Weather conditions: clear, dark

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.52	~~34.63~~	16.34

COND
~~44,310~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.57

Notes:

same boat moored @ south side

large boat on N. side of Right finger fueling

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T12-REP

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 1739

Ended: (hh:mm)

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): -1.3 ft

Weather conditions: clear, dark

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.47	~~35.08~~	16.31	~~44.296~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.63

Notes:

Same boat moored @ south side
large boat on N. side of right finger for fueling

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-FB

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) ~~1729~~ 1745 Ended: (hh:mm)

GPS: (WGS84) Lat. NA Long. NA

Tide (ft): +1.3 ft :

Weather conditions: clear, dark

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	NA	NA	NA

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-1-T10

Date: (mm/dd/yyyy) 01/04/18

Time Started: (hh:mm) 1300 Ended: (hh:mm) 1310

GPS: (WGS84) Lat. 32.71866 Long. -117.226077

Tide (ft): 5 ft. ↓

Weather conditions: sunny, mostly clear

Wind (none, light, moderate, heavy): light breeze

Sea State Conditions (calm, ripples, small waves) ripples

Physical Water Quality Measurements

Time of collection: 1310	pH	Salinity (ppt)	Temperature (°C)	COND
Measurement:	8.28	35	16.24	~~47,248~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.70

Notes:

same boats moored on south side
hull cleaning approx. 50yds west.
oil slicks seen in water ~ 1200
large yacht in for fueling ~ 1305

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-ER

Date: (mm/dd/yyyy) 1/3/2018.

Time Started: (hh:mm) 15 ~~13~~30

Ended: (hh:mm) 1610

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: overcast, fog rolling in

Wind (none, light, moderate, heavy): moderate to light

Sea State Conditions (calm, ripples, small waves) small ripples

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	NA	NA	NA

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

Heavy fog layer rolling in. Tied off at Buoy "A" at La Playa anchorage.

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T0

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 1642

Ended: (hh:mm) 1651

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: overcast fog rolling in

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) Calm

~~conductivity 4608~~ mS/cm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.02	~~36.9~~	16.07

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.69

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T1

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 1850

Ended: (hh:mm) 1900

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: clouds, light breeze

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)	~~COND~~
Measurement:	8.21	~~36.95~~	15.93	~~46009~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.57

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T2

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 2100 Ended: (hh:mm) 2111

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: Overcast, cold

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

~~conductivity 45805~~

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.12	~~36.89~~	15.82

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: 33.63

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T3

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 2311 Ended: (hh:mm) 2320

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: Overcast, Cold

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

~~conductivity 45889~~

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.27	~~3702~~	15.74

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: 33.65

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-4

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 100 Ended: (hh:mm) 1:09

GPS: (WGS84) Lat. 32.71575 Long. 117.22977

Tide (ft):

Weather conditions: clear, cold

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

Conductivity
45943

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.23	~~37.09~~	15.72

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: 33.66

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-S

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 300 Ended: (hh:mm) 309

GPS: (WGS84) Lat. 32.71575 Long. 117.22977

Tide (ft):

Weather conditions: clear, cold

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

~~(conductivity) 4591.0~~

Physical Water Quality Measurements

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:	8.25	~~37.06~~	15.69

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: 33.70

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-6

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 0415

Ended: (hh:mm) 425

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft):

Weather conditions: cold, clear

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) calm

~~Conductivity~~
~~45868~~

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.30	~~37.04~~	15.67

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.69

Notes:

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T7

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 06:20

Ended: (hh:mm) 06:24

GPS: (WGS84) Lat. 32.71575 Long. -117.22977

Tide (ft): well fill this in later ☺

Weather conditions: calm, clear

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.26	~~37.05~~	15.63

conduct-
~~45~~ ~~44884~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.75

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T8

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 0820 Ended: (hh:mm) 8:33

GPS: (WGS84) Lat. 32.71578 Long. -117.229770

Tide (ft): + 5.2 r

Weather conditions: Sunny, Clear,

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection: 0820	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.36	~~56.92~~ 33.85	15.74

conduct 45783

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T9

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 10:27 Ended: (hh:mm) 10:36

GPS: (WGS84) Lat. 32.71350 Long. -117.224770

Tide (ft): + 6.4

Weather conditions: sunny, clear

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection: 1038	pH	Salinity (ppt)	Temperature (°C)	Conduct
Measurement:	8.32	~~36.90~~ 33.41	16.14	46.04

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

30min prior to sampling - slick from topside boat wash came thru, no obvious slick during sampling

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T10

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1300 Ended: (hh:mm) 1312

GPS: (WGS84) Lat. 32.71578[illegible] Long. -117.229770

Tide (ft): 5.0 ↓

Weather conditions: sunny clear

Wind (none, light, moderate, heavy): moderate N wind

Sea State Conditions (calm, ripples, small waves) small ripples

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.17	~~56.92~~	16.15

~~conduct~~ ~~46200~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.78

Notes:

FIELD WATER QUALITY DATA SHEET

Station Identification: TS - 2 - T 11

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 15:15 Ended: (hh:mm) 1523

GPS: (WGS84) Lat. 32.71575 Long. -117.229770

Tide (ft): -0.5 ↓ :

Weather conditions: sunny clear

Wind (none, light, moderate, heavy): light/mod N wind

Sea State Conditions (calm, ripples, small waves) small ripples

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.15	~~36.91~~	16.07

~~conduct~~
~~46107~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: 3354

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T12

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1729 Ended: (hh:mm) 1738

GPS: (WGS84) Lat. 32. 71578 Long. -11722[illegible]20

Tide (ft): -1.4 ft :

Weather conditions: twilight.

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:			

conduct

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-T12-REP

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1739

Ended: (hh:mm) 1749

GPS: (WGS84) Lat. 32.71598 Long. -117.229770

Tide (ft): -1.3 ft

Weather conditions: twilight

Wind (none, light, moderate, heavy): none

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:	8.10	~~36.88~~	15.99

conduct
46041

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.43

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
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FIELD WATER QUALITY DATA SHEET

Station Identification: TS-2-FB

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1750 Ended: (hh:mm) 1755

GPS: (WGS84) Lat. NA Long. NA

Tide (ft):

Weather conditions:

Wind (none, light, moderate, heavy):

Sea State Conditions (calm, ripples, small waves)

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	NA	NA	NA

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-ER

Date: (mm/dd/yyyy) 01/03/2018

Time Started: (hh:mm) 1600 Ended: (hh:mm) 1618.

GPS: (WGS84) Lat. NA Long. NA

Tide (ft): – 1.69' Falling :

Weather conditions: Overcast. ~~Wind >5mph~~

Wind (none, light, moderate, heavy): moderate to light

Sea State Conditions (calm, ripples, small waves) Ripples (wind)

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	NA	NA	NA

CONDUCTIVITY (mg/cm)

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T0

Date: (mm/dd/yyyy) 01/03/18

Time Started: (hh:mm) 1642 Ended: (hh:mm) 1708

GPS: (WGS84) Lat. 32. 71026 Long. -117 .23489

Tide (ft): -1.9 feet Low tide

Weather conditions: overcast

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.08	33.54 ~~33.24~~	15.99

Std. CONDUCT.
~~49,754~~ mS/cm
Std.

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: pilot Boat left slip PB2 @ ~ 1635
engine smell dissipating / No influence at time of sampling

minimal localized foam bubbles.
pressure washing of boat on Dock 1,
7B spot in (2 spots per Finger ~~per side~~)
~1710 - 1730.
1730 pilot Boat leaves

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T1

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 1850

Ended: (hh:mm) 1905

GPS: (WGS84) Lat. 32.71026

Long. -117.23449

Tide (ft): +0.03 Rising

Weather conditions: overcast / cloudy

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.12	~~35.28~~	15.93

CONDUCT.
44150

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

33.62

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T2

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 2100 Ended: (hh:mm) 2115

GPS: (WGS84) Lat. 32.71026 Long. -117 23.444

Tide (ft): +3.1 Rising

Weather conditions: clear/ semi overcast

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.10	~~33.29~~	15.92

SPC. CONDUCT
~~44,144.45~~/cm

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: No nearby activity. 33.67

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T3

Date: (mm/dd/yyyy) 1/3/18

Time Started: (hh:mm) 2311

Ended: (hh:mm) 2325

GPS: (WGS84) Lat. 32.71026 Long. -117.23449

Tide (ft): +4.7 High Tide

Weather conditions: Clear / Semi overcast

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

33.70

Time of collection:	pH	Salinity (ppt)	Temperature (°C)	CONDUCT
Measurement:	8.11	~~35.28~~	15.92	~~44,137~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: No nearby activity.

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T4

Date: (mm/dd/yyyy) 01/04/18

Time Started: (hh:mm) 0100 Ended: (hh:mm) 0111

GPS: (WGS84) Lat. 32. 71026 Long. -117 23449

Tide (ft): +3.54 Falling :

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

33.68

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.12	~~35.29~~	15.88

CONDMET
~~44,107~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: No Nearby activity

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T5

Date: (mm/dd/yyyy) 01/04/18

Time Started: (hh:mm) 0300 Ended: (hh:mm) 0310

GPS: (WGS84) Lat. 32. 71026 Long. -117 23449

Tide (ft): +1.96 Falling

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.13	33.68 ~~35.30~~	15.85

CONDUCT
~~44,083~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: No activity Nearby

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T6

Date: (mm/dd/yyyy) 01/04/18

Time Started: (hh:mm) 0415

Ended: (hh:mm) 0430

GPS: (WGS84) Lat. 32.71026 Long. -117.23499

Tide (ft): +1.6 Low tide

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) calm

Physical Water Quality Measurements

33.67

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.13	~~35.28~~	15.84

CONDUCT

~~[illegible]~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: No Nearby activity

Some scum/ sheen (organic?) drifting by / at sample.

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T7

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 0620 Ended: (hh:mm) 0640

GPS: (WGS84) Lat. 32.71026 Long. -117.23449

Tide (ft): +2.7

Weather conditions: Clear,

Wind (none, light, moderate, heavy): Light

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

33.57

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.15	~~35.23~~	15.83

CONDUCT
~~53,963~~

*Water quality measured at the same depth as sample collection (I.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T8

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 0820

Ended: (hh:mm) 0835

GPS: (WGS84) Lat. 32.71026 Long. -117.23449

Tide (ft): +5.2

Weather conditions: Clear

Wind (none, light, moderate, heavy): Light

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

33.59

Time of collection:	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.16	~~35.21~~	15.81

CONDUCT
~~43.851~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T9

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1024 Ended: (hh:mm) 1036

GPS: (WGS84) Lat. 32. 71026 Long. -117 23449

Tide (ft): +6.4

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:	8.04	~~35.20~~ 33.56	15.89

CONDUCT
~~44007~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T10

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 12:55 Ended: (hh:mm) 13:11

GPS: (WGS84) Lat. 32 71026 Long. -117 23449

Tide (ft): +5.0↓

Weather conditions: Clear

Wind (none, light, moderate, heavy): Moderate North West

Sea State Conditions (calm, ripples, small waves) Ripples

Physical Water Quality Measurements

33.58

Time of collection: 1310	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.10	~~<35.19~~	16.12

CONDUCT
~~4923~~6

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T11

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 15:13

Ended: (hh:mm) 15:24

GPS: (WGS84) Lat. 32.71026 Long. -117 23449

Tide (ft): -0.8↓

Weather conditions: Clear

Wind (none, light, moderate, heavy): Moderate NW

Sea State Conditions (calm, ripples, small waves) Ripples

Physical Water Quality Measurements

Time of collection: 1524	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.16	33.60 ~~35.22~~	16.16

CONDUCT
44307

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T12

Date: (mm/dd/yyyy) 01/04/2018

Time Started: (hh:mm) 1725 Ended: (hh:mm) 1740

GPS: (WGS84) Lat. 32.710126 Long. -117.23449

Tide (ft): -1.4

Weather conditions: Clear

Wind (none, light, moderate, heavy): light

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

32.63

Time of collection: 1726	pH	Salinity (ppt)	Temperature (°C)
Measurement:	8.10	~~35.23~~	16.18

CONDUCT
44328

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-T12-REP

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1745 Ended: (hh:mm) 1755

GPS: (WGS84) Lat. 32.710126 Long. -117.23449

Tide (ft): -1.3 ↑

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

33.67

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:	8.14	~~35.22~~	16.14

CONDUCT
~~44292~~

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

PORT OF SAN DIEGO
SIYB 24-Hour Water Quality Time Series Study
January 2018

FIELD WATER QUALITY DATA SHEET

Station Identification: TS-3-FB

Date: (mm/dd/yyyy) 1/4/18

Time Started: (hh:mm) 1800

Ended: (hh:mm) 1810

GPS: (WGS84) Lat. NA

Long. NA

Tide (ft): NA

Weather conditions: Clear

Wind (none, light, moderate, heavy): None

Sea State Conditions (calm, ripples, small waves) Calm

Physical Water Quality Measurements

NA

Time of collection:	**pH**	**Salinity (ppt)**	**Temperature (°C)**
Measurement:	NA	NA	NA

CONDUCT

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

APPENDIX F

CORRESPONDENCE AND AGENCY MEMORANDA

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CORRESPONDENCES

PORT COMMENTS ON 3 CCR SECTION 6190 COPPER-BASED ANTIFOULING PAINTS AND COATINGS

Unified Port
of San Diego

3165 Pacific Highway, San Diego, CA 92101
P.O. Box 120488, San Diego, CA 92112-0488
619.686.6200 • www.portofsandiego.org

January 31, 2017

Ms. Linda Irokawa-Otani
Regulations Coordinator
Department of Pesticide Regulation
1001 I Street, P.O. Box 4015
Sacramento, CA 95812-4015

Subject: San Diego Unified Port District Comments on 3 CCR Section 6190
Copper-Based Antifouling Paints and Coatings

Dear Ms. Irokawa-Otani,

The San Diego Unified Port District (District) appreciates your staff's efforts to update the regulations relating to copper-based antifouling paint and coating products (AFP), proposed as *3 CCR Section 6190 Copper-Based Antifouling Paints and Coatings*, and is providing the following comment letter in response.

For over a decade, the District has been encouraging statewide efforts to control copper-based AFPs to ensure their compatibility with the aquatic environment. The District has taken a leadership role in addressing this issue by developing model programs for hull paint research and policy-based copper reduction initiatives. We have worked closely with your agency during this time, and have been successful in establishing positive relations with the boating community locally and statewide.

More recently, the District sponsored Assembly Bill 425 (AB425). This bill, signed by Governor Brown in October 2013 directed your agency by February 1, 2014, "*to set a leach rate for copper-based antifouling paints used on recreational vessels and to make recommendations for appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of exposure to that paint if it is registered as a pesticide*".

In a letter dated February 24, 2015 (Attachment A) and co-signed by the District and the San Diego Regional Water Quality Control Board Executive Officer, it was further requested that the DPR expedite their implementation strategy to ensure that paints are reformulated and readily available to the public. Specifically it was requested that DPR (1) require paint manufacturers to reformulate their paints, (2) streamline the approval process to make these paints commercially available, and (3) move forward on other mitigation measures, especially those pertaining to in-water hull cleaning. Consistent with those comments, the District is respectfully submitting the following comments and we ask that you consider these comments on the recent draft rule.

1. The District Supports the Leach Rate Effective Date.

The District greatly appreciates DPR's efforts to address this state-wide issue with a state-wide leach rate rule. The proposed rule sets the date of July 1, 2018, for the 9.5 µg/cm^2/day leach rate to take effect. This leach rate was first identified in your January 30, 2014 Memorandum[1] (2014 Memo) in response to AB425. As such, registrants have had over four years to bring their products into compliance ahead of this deadline. Moreover, the proposed rule does not go into effect immediately, instead it identifies a delayed start date providing additional time after adoption for registrants to bring products into compliance.

The District supports this deadline. An expeditious timeline for eliminating high leach paints is critical for those marina basins faced with existing TMDL timelines.

2. Use of a Conversion Factor is Discouraged.

DPR is required to ensure the products they regulate are used in a manner that is protective of the environment. During the development of the maximum leach rate (2014 Memo), DPR acknowledged that calculating leach rates using the International Organization for Standardization (ISO) Method 10890:2010 was an appropriate tool for modeling copper in marinas. However, DPR also acknowledged that the ISO Method may overestimate the real world release of copper.

The leach rate modeling effort considered several leach rate scenarios ranging from 1.12 to 24.60 µg/cm^2/day. Several model inputs were adjusted to achieve the wide range of leach rates. One such input included the use of a conversion factor to normalize the real world copper release rates. However, when initially setting the maximum allowable leach rate at 9.5 µg/cm^2/day, DPR acknowledged that this leach rate would bring most but not all marinas within water quality standards.

Given that some of the larger marina basins may not achieve water quality standards with the 9.5 µg/cm^2/day leach rate, the use of a conversion factor that allows for an increase in copper loading beyond what the ISO Method derives is not appropriate.

3. Use of Other Mitigation Measures Should Be Included in the Rule.

The DPR's 2014 Memo identified a list of mitigation measures to be used in conjunction with the AFPs, in addition to setting a maximum leach rate. In that

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[1] DPR Memorandum: Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints per AB425, January 30, 2014

Memo, DPR concluded that "*if product reformulation is to play a key part in the mitigation of copper in marinas, other critical activities need to also be implemented to ensure the overall success of this endeavor*".

As stated above, the modeling identified many scenarios and leach rates ranging from 1.12 to 24.60 μg/cm^2/day. Many of the leach rate scenarios factored in the use of mitigation measures such as limiting in-water hull cleaning frequencies and using specific cleaning tools. As such, for the 9.5 μg/cm^2/day leach rate to be effective, the mitigation measures themselves must also become part of the regulation.

It is presumptuous to assume that the boating community (boaters, hull cleaners, marina operators, etc.) is fully aware of the associated mitigation measures that should be used in conjunction with the copper-based AFPs. For one, the paint application process generally occurs at a boatyard, so labeling requirements for paint maintenance and cleaning likely do not reach the boat owner or hull cleaning companies. As such, that may lead to the misuse of copper-based AFPs and negatively impact the reductions in copper loading that were assumed when setting the maximum leach rate. Moreover, compliance with those mitigation measures, if not included in the state regulation, would be left with other entities or not enforced.

For any leach rate rule to be effective an implementation strategy must be in place to ensure that, when copper-based AFPs are reformulated and readily available to the public, they are properly used by boatyards and boaters. The District recommends that DPR adopt specific mitigation measures with the existing leach rate as part of this rule OR lower the allowable leach rate to ensure that legally available copper-based AFPs do not impair aquatic environments.

4. The New Leach Rates should apply to Commercial Vessels.

While many of the dissolved copper TMDLs identify recreational vessels as a primary source of the copper impairment in marina basins, it is likely that some commercial vessels are berthed in those same basins. Additionally, many commercial vessels are painted in the same boatyards as recreational vessels making the potential for misuse likely, especially given the general resistance by some boatyards to alternative paints.

During the District's numerous efforts to encourage the use of alternate or low copper paints, it has become clear that efforts to use other paints are clearly at an economic disadvantage and their use is not wholly supported by those in the boating community with opposing financial interests.

are not misused. This could occur through a requirement that paint applicators (or boatyards) submit certified reports on paint usage, however, the enforcement process alone would be labor intensive.

The District strongly recommends that the new leach rate standards apply to both recreational and commercial vessels. Fully regulating at the product level by completely removing AFPs that have been shown to exceed the maximum leach rate is the most effective and efficient option to ensure copper AFPs are not impacting marina waters.

On behalf of the District, I want to thank you for moving ahead with the intent of the AB425 legislation and proposing this rule formalizing the maximum leach set forth. As you state in your supporting documentation for this rule[2], we are pleased that you will continue monitoring for copper contamination and evaluate compliance with water quality standards and that you have positioned your agency to move ahead on additional measures if the proposed rule is not fully effective in protecting aquatic environments.

Thank you for considering these comments. We ask that your agency work closely with the District and other stakeholders to encourage a smooth and swift transition to the new regulation and will make our staff available to assist in any way possible. If you have questions or would like further information, please contact me at (619) 725-6073 or via email at kholman@portofsandiego.org.

Sincerely,

Karen Holman,
Principal, Planning & Green Port

Attachments:

Attachment A – February 24, 2015 Letter to DPR: Implementation of AB425 Measures and List of Hull Paints Meeting the AB425 Leach Rate Criteria

Cc via email
T. Scott Edwards, Jason H. Giffen, John Carter
Jeremy Haas, SDRWQCB
Deborah Pennell, John Adriany, Shelter Island Master Leaseholders Group
Sharon Cloward, SDPTA

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[2] DPR: Initial Statement of Reasons and Public Report, Nov 2016, Page 5

Attachment A

Unified Port
of San Diego

California
Water Boards
State Water Resources Control Board
Regional Water Quality Control Boards

February 24, 2015

Mr. Brian R. Leahy
Director
Department of Pesticide Regulation
1001 I Street
P.O. Box 4015
Sacramento, CA 95812-4015

Subject: Implementation of AB 425 Measures and List of Hull Paints Meeting the AB425 Leach Rate Criteria

Dear Mr. Leahy,

As you are aware, the San Diego Unified Port District (District) sponsored Assembly Bill 425 (AB425), authored by Assembly Speaker Toni Atkins. This bill, signed by Governor Brown in October 2013 directed the Department of Pesticide Regulation (DPR) by February 1, 2014, "*to set a leach rate for copper-based antifouling paints used on recreational vessels and to make recommendations for appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of exposure to that paint if it is registered as a pesticide*". We appreciate your staff's diligence to complete the task by the February 1, 2014, deadline and have reviewed the Memorandum dated January 30, 2014, (Report) that you completed in response to AB425.

However, completion of the Report cannot, by itself, affect the needed behavior change and wholesale conversion to new paints. An implementation strategy must be in place to ensure that paints are reformulated and readily available to the public. Given that there is an inherent amount of time that must occur to have a wholesale conversion of boats to new paints, we strongly encourage your agency to expedite efforts to (1) require paint manufacturers to reformulate their paints, (2) streamline the approval process to make low-copper paints commercially available, (3) move forward on the other mitigation measures identified in your Report, and (4) work with us to effectively communicate how best to achieve water quality goals.

Moreover, it is our understanding that some currently-available copper antifouling paints already meet the new leach rates. As such, we respectfully request DPR's assistance to publicize a list of paints that meet the new leach rates as soon as feasibly possible. Earlier product availability will enable more boats to convert in advance of the existing regulatory timelines, thereby improving the ability to achieve our regulatory targets; it is essential that this be expedited. Furthermore, we appreciate that DPR is working collaboratively with the State Water Board on a statewide strategy to address management of in-water hull cleaning activities. We recognize the benefits of that statewide approach, and our staffs are available for consultation as necessary from a local perspective.

The Shelter Island Yacht Basin Dissolved Copper Total Maximum Daily Load (TMDL)[1] is one of the leading regulatory drivers to reduce copper loading from boat hull paints. The TMDL has been in place since 2005 and stakeholders are making substantial efforts to identify copper reduction approaches to comply with this regulation. This TMDL mandates a 76-percent reduction in copper by 2022, a target that is exceedingly difficult while products containing large amounts of copper remain legally available.

For several years, the San Diego Water Board (Water Board) and the District have been at the forefront of this copper issue and have made significant progress in working to develop a core understanding of the concerns and the challenges of complying with water quality regulations that stem from the use of a legally available product, such as copper antifouling paint.

Both the Water Board and the District strongly support the use of sound science and advancements in scientific technologies. Water quality regulations are most effective when they rely on the latest, pertinent science. To that end, DPR's Report advances our collective ability to address copper impairments, and we agree the combination of less-toxic hull paints, practical management measures, and education is the right approach for guiding water quality regulations.

As indicated in the Report, the new leach rates set forth should help to decrease copper loading in our marinas. Coupled with the other mitigation measures identified in your Report, namely the product labeling and use of alternative (e.g., non-copper and non-toxic) paints, we believe that implementing the Report's findings will lead to long-term control of vessel-related copper pollution in San Diego Bay.

---

[1] SIYB TMDL: http://www.waterboards.ca.gov/sandiego/water_issues/programs/watershed/souwatershed.shtml#siybtmdl

Additionally, as your Report suggests, in some marina basins, conversion to the new leach rates may reduce copper to acceptable levels. However, in others, such as Shelter Island, it does not appear that the recommended leach rates coupled with the best management cleaning practices will achieve existing water quality objectives for dissolved copper. To that end, we echo the concerns that the Los Angeles and Santa Water Boards outlined in their August 15, 2014, letter to you.

Clearly, your Report is an important milestone toward protecting the marine environment from toxic effects of copper leached from recreational vessels. We are now requesting DPR expedite follow-up efforts because implementing the recommendations becomes even more crucial as our TMDL timeline progresses and other TMDLs are adopted across the state. We look forward to hearing about DPR's implementation plan and working with you to achieve our shared water quality goals.

On behalf of the Water Board and the District, we thank you for your involvement in AB425. We firmly believe that these efforts will set the pace for addressing copper in waters. Our staff is available to assist in any way possible; please contact Karen Holman, Department Manager, at the District at (619) 725-6073, or Jeremy Haas, Environmental Program Manager, at the Water Board at (619) 521-3009.

Sincerely,

John Bolduc
Acting President/CEO
San Diego Unified Port District

David Gibson
Executive Officer
San Diego Regional Water Quality Control Board

cc: San Diego Unified Port District Board of Port Commissioners,
Charles M. Andrews, Associate Director, Pesticide Programs Division, DPR
David Duncan, Environmental Program Manager II, DPR
Nan Singhasemanon, Sr Environmental Scientist, DPR
Vicky Whitney, Deputy Director, Division of Water Quality, SWRCB
Phillip Crader, Assistant Deputy Director, Division of Water Quality, SWRCB
Jeremy Haas, SDRWQCB
Jason H. Giffen, SDUPD
Ellen Gross, SDUPD
Karen Holman, SDUPD
Sharon Cloward, SDPTA
Shelter Island Master Leaseholders Group

CORRESPONDENCES

COMMENT- REGISTRATION REVIEW PROPOSED INTERIM DECISIONS BEING ISSUED FOR COPPER COMPOUNDS, CASE NUMBERS 0636, 0649, 4025, 4026 (EPA-HQ-QPP-2010-0212)

PORT of
SAN DIEGO

VIA EMAIL

November 16, 2017

U.S. Environmental Protection Agency
C/O OPP Docket Environmental Protection Agency Docket Center (EPA/DC)
1200 Pennsylvania Ave. NW
Washington, DC 20460-0001
Attn: Jordan Page and Kimberly Wilson

Subject: **Comment- Registration Review Proposed Interim Decisions Being Issued for Copper Compounds, Case Numbers 0636, 0649, 4025, 4026 (EPA-HQ-QPP-2010-0212)**

Dear Ms. Page and Ms. Wilson:

Thank you for the opportunity to provide comments on the registration review proposed interim decisions being issued for copper compounds (Case Numbers 0636, 0649, 4025, 4026; EPA-HQ-QPP-2010-0212). As one of the key stakeholders in Shelter Island Yacht Basin (SIYB; San Diego Bay, San Diego, CA), the San Diego Unified Port District (District) is currently faced with dissolved copper water quality impairments that have resulted in the assignment of a Total Maximum Daily Load (TMDL).

For several years, the District has been at the forefront of copper reduction efforts and has made significant progress in working to develop a core understanding of the concerns and challenges of complying with water quality regulations that stem from the use of a legally available product, such as copper antifouling paint. The District has taken a leadership role by developing model programs for hull paint research, as well as implementing policy-based efforts to address the impacts from in-water hull cleaning.

The SIYB Dissolved Copper TMDL[1] is one of the leading regulatory drivers to reduce copper loading from boat hull paints. The TMDL has been in place since 2005 and stakeholders are making substantial efforts to identify copper reduction approaches to comply with this regulation. This TMDL mandates a 76-percent reduction in copper by 2022. This target reduction is exceedingly difficult to achieve while products, such as anti-fouling coatings (AFCs), containing large amounts of copper remain legally available.

---

[1] SIYB TMDL:
http://www.waterboards.ca.gov/sandiego/water_issues/programs/watershed/souwatershed.shtml#siybtmd

November 16, 2017

U.S. Environmental Protection Agency
C/O OPP Docket Environmental Protection Agency Docket Center (EPA/DC)
Attn: Jordan Page and Kimberly Wilson

Subject: **Comment- Registration Review Proposed Interim Decisions Being Issued for Copper Compounds, Case Numbers 0636, 0649, 4025, 4026 (EPA-HQ-QPP-2010-0212)**

In that regard, the District respectfully provides the following comments on the proposed interim decisions, specifically in reference to Section 4. Ecological-Antimicrobial Uses-Anti-foulant Paints and Coatings:

1. The District strongly supports the use of sound science and advancements in scientific technologies. New information that has been scientifically validated should be taken into account and used when considering the registration of products that have the potential to adversely impact the environment. As the EPA moves forward on the registration review for copper compounds, the District encourages your agency to consider the scientific findings and water quality impacts, especially in regions with known impairments, to ensure that legally available products do not continue to contribute to those regions' impairments. This would include carefully reviewing leach rates (or product discharge rates) and ensuring the acceptable leach rates will not adversely impact water quality.

2. The EPA is proposing to issue a Data Call-In Notice (DCI) requiring the submittal of leach rate data for all end-use inorganic copper AFCs to determine the lowest possible efficacious copper release rates. The District strongly encourages the EPA to require the registrants to submit, as part of the DCI data package, the specific hull cleaning and maintenance expectations for each potential product under consideration.

   Copper AFCs have an approximate three-year life cycle, which includes routine paint application and ongoing associated hull maintenance. In-water hull cleaning is a standard hull maintenance practice in warmer regions of the United States where year-round boating occurs. In-water hull cleaning has been shown to increase the release of copper during the cleaning event and over an extended duration after a cleaning event, due to an increased copper release rate from accelerated surface refreshment (SIYB TMDL 2005; Earley 2013). As such, setting appropriate leach rate for copper AFCs must consider the additional contribution or accelerated release of copper associated with cleaning. If the cleaning information is not considered when setting leach rates, it is likely that practical use of such products would result in higher than expected real-time copper releases, thereby creating adverse environmental impacts. As such, it is critical that in-water hull cleaning contributions be considered when setting product leach rates.

November 16, 2017

U.S. Environmental Protection Agency
C/O OPP Docket Environmental Protection Agency Docket Center (EPA/DC)
Attn: Jordan Page and Kimberly Wilson

Subject: **Comment- Registration Review Proposed Interim Decisions Being Issued for Copper Compounds, Case Numbers 0636, 0649, 4025, 4026 (EPA-HQ-QPP-2010-0212)**

The District will continue to implement practices that will further reduce copper loading in SIYB. Coordinating with regulatory agencies on strategic source control efforts such as product registration and improving in-water hull cleaning practices is paramount to achieving healthy waters. We appreciate the opportunity to comment on this critical regulatory issue. Please contact Kelly Tait at (619) 686-6372, or via email at ktait@portofsandiego.org if you have any questions or require clarification on these comments

Respectfully,

Karen Holman
Director
Environmental Protection
Planning & Green Port

KH:te

cc: Jason Giffen, Assistant Vice President
John Carter, Deputy General Counsel

CORRESPONDENCES

REQUEST FOR CERTIFICATION LETTERS

PORT of
SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Bay Club Hotel & Marina
Attn: Mike Ardelt, General Manager
mike@bayclubhotel.com
2131 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Ardelt,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

2017 marks an important compliance milestone for the SIYB TMDL because there is an interim loading reduction requirement of 40% that must be achieved by the end of this year. The reporting of paint usage within each marina leasehold is essential in calculating this interim reduction. As such, providing accurate and timely information is critical to determining compliance with the 2017 interim copper reduction target.

Investigative Order No. R9-2011-0036 directs the Port to monitor and regularly report to the San Diego Water Quality Control Board on the progress being made in implementing the SIYB TMDL and achieving the required dissolved copper load reductions. Each year, as part of the annual reporting requirement, the Port compiles the data that was provided by the SIMLG. In addition to other requirements, the Investigative Order requires the Port to retain all reported information for a period of five (5) years and certify the accuracy of the data contained in the annual report.

Attached to this letter is an assessment of last year's vessel paint tracking data comparing your marina with the average for all marinas in SIYB for the 2016 calendar year (Attachment 1). Thank you for your efforts to this point in providing the paint usage and vessel occupancy data for your marina. However, while a good amount of data exists, there remains a large basin-wide fraction (23%) of vessels with unknown or incomplete paint records. For 2016, the Bay Club Marina reported 26% of records that were unknown or incomplete. This is higher than the basin average percent of incomplete records. Accurate and complete data is

needed from every marina to improve basin wide reporting. Please make every effort to improve your reporting percentage moving forward.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

1. Signed Marina Self-Certification Form Effective with this upcoming report (for the 2017 year), the Port will be requiring that all vessel data submittals be accompanied by a signed confirmation statement from each marina (Attachment 2), indicating that they have reviewed the data and verified the content to the best of their knowledge. These statements will be included in the submittal package provided in the TMDL Annual Report.

2. Records Retention The Investigative Order requires that records be retained for a period of five years following report submittal. As such, the Port is requesting that marinas keep and maintain the vessel tracking files, spreadsheets, and boater tracking forms from each reporting period for the same period of five years. This will ensure that marinas can properly respond to inquiries from the Port or Regional Board related to such data. This requirement is to become effective with the 2017 vessel data submittal.

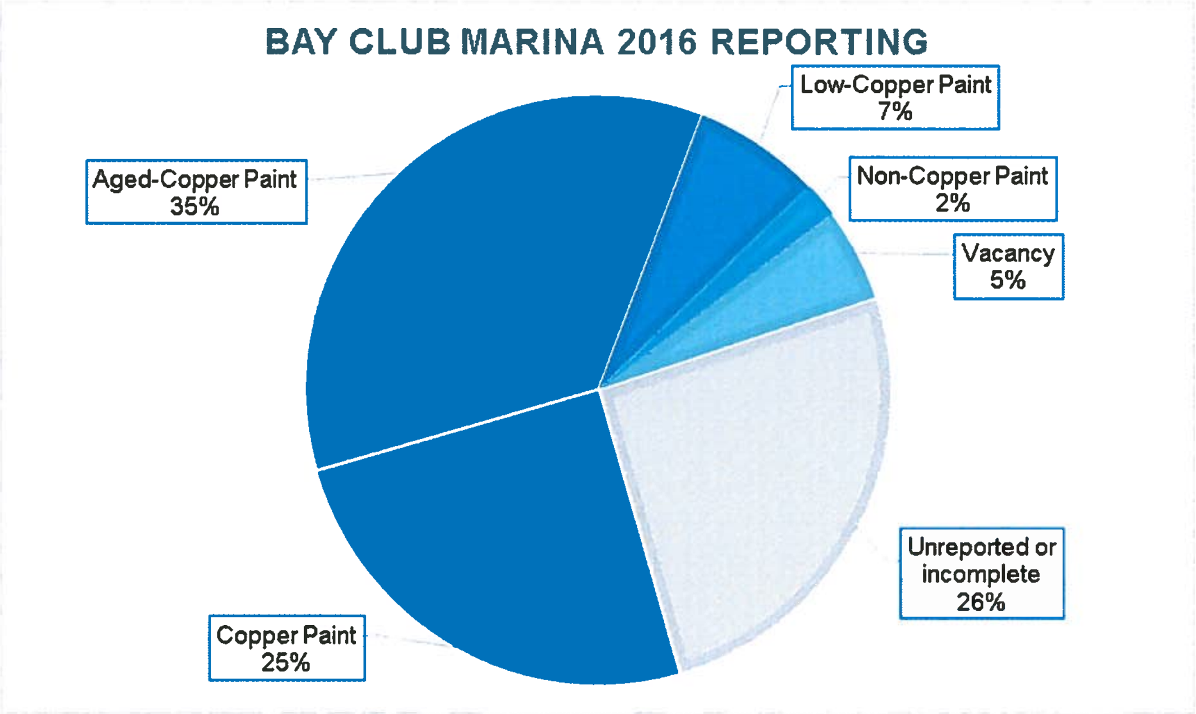
Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

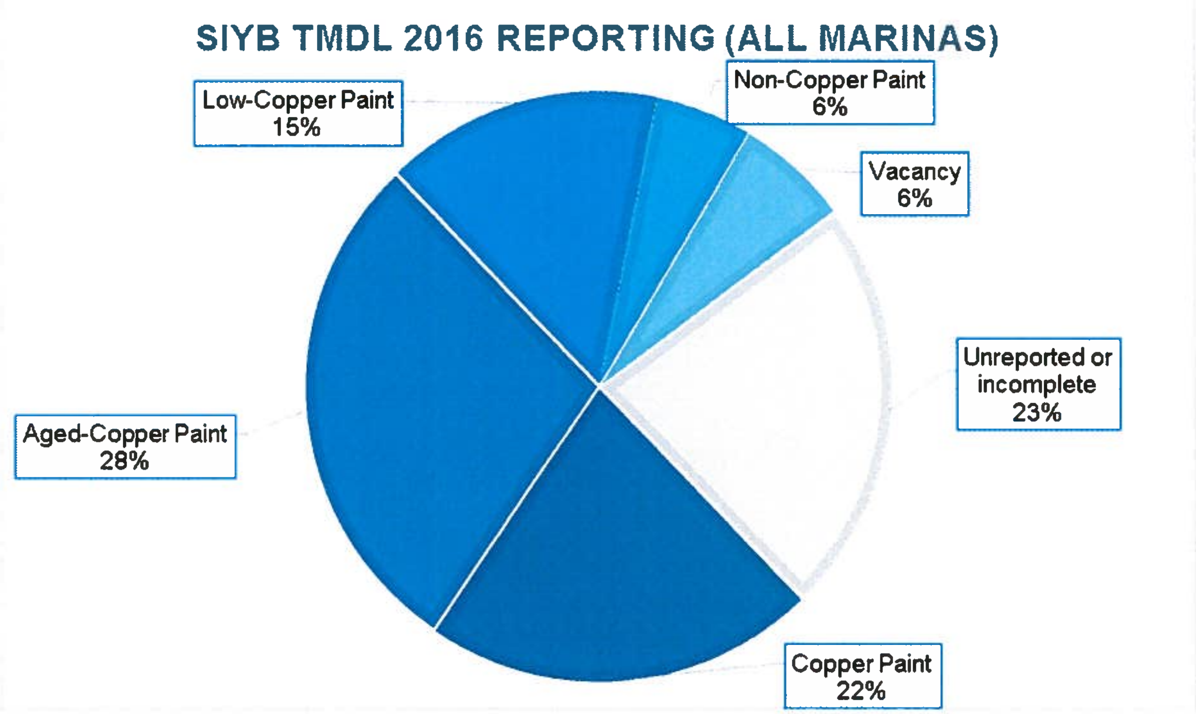
Sincerely,

Karen Holman
Director, Environmental Protection
San Diego Unified Port District

Attachments:
Attachment 1: 2016 Vessel Tracking Statistics for SIYB and Marinas
Attachment 2: Marina Self-Certification Form

2016 Reporting Comparisons; Marina vs Basin-Wide





Marina Self-Certification Form
[Add Date]

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

____

NAME
POSITION/TITLE
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Best Western Island Palms Hotel (Shelter Island Marina)
Attn: Richard Bartell, President and CEO
rbartell@bartellhotels.com
4875 N. Harbor Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Bartell,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

2017 marks an important compliance milestone for the SIYB TMDL because there is an interim loading reduction requirement of 40% that must be achieved by the end of this year. The reporting of paint usage within each marina leasehold is essential in calculating this interim reduction. As such, providing accurate and timely information is critical to determining compliance with the 2017 interim copper reduction target.

Investigative Order No. R9-2011-0036 directs the Port to monitor and regularly report to the San Diego Water Quality Control Board on the progress being made in implementing the SIYB TMDL and achieving the required dissolved copper load reductions. Each year, as part of the annual reporting requirement, the Port compiles the data that was provided by the SIMLG. In addition to other requirements, the Investigative Order requires the Port to retain all reported information for a period of five (5) years and certify the accuracy of the data contained in the annual report.

Attached to this letter is an assessment of last year's vessel paint tracking data comparing your marina with the average for all marinas in SIYB for the 2016 calendar year (Attachment 1). Thank you for your efforts to this point in providing the paint usage and vessel occupancy data for your marina. However, while a good amount of data exists, there remains a large basin-wide fraction (23%) of vessels with unknown or incomplete paint records. For 2016, the Shelter Island Marina reported 18% of records that were unknown or incomplete. Thank

you for your efforts, to date in collecting accurate vessel data. Please continue your efforts to obtain a high quality data set for the basin.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

1. Signed Marina Self-Certification Form Effective with this upcoming report (for the 2017 year), the Port will be requiring that all vessel data submittals be accompanied by a signed confirmation statement from each marina (Attachment 2), indicating that they have reviewed the data and verified the content to the best of their knowledge. These statements will be included in the submittal package provided in the TMDL Annual Report.

2. Records Retention The Investigative Order requires that records be retained for a period of five years following report submittal. As such, the Port is requesting that marinas keep and maintain the vessel tracking files, spreadsheets, and boater tracking forms from each reporting period for the same period of five years. This will ensure that marinas can properly respond to inquiries from the Port or Regional Board related to such data. This requirement is to become effective with the 2017 vessel data submittal.

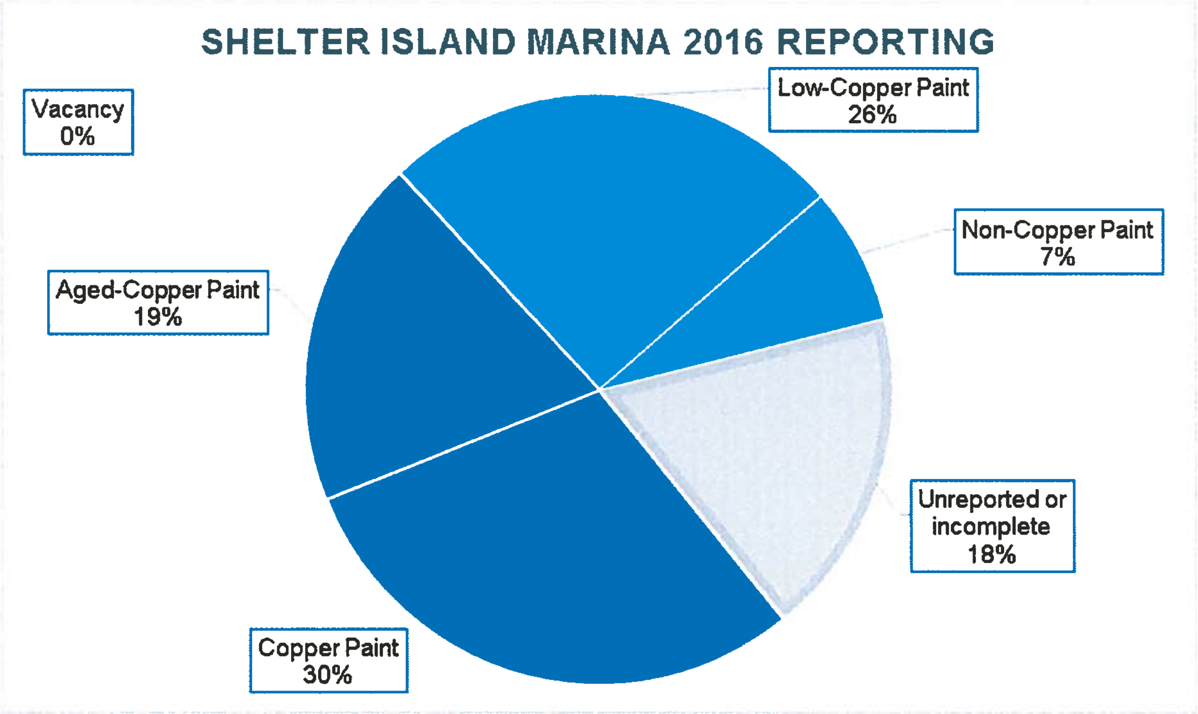
Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

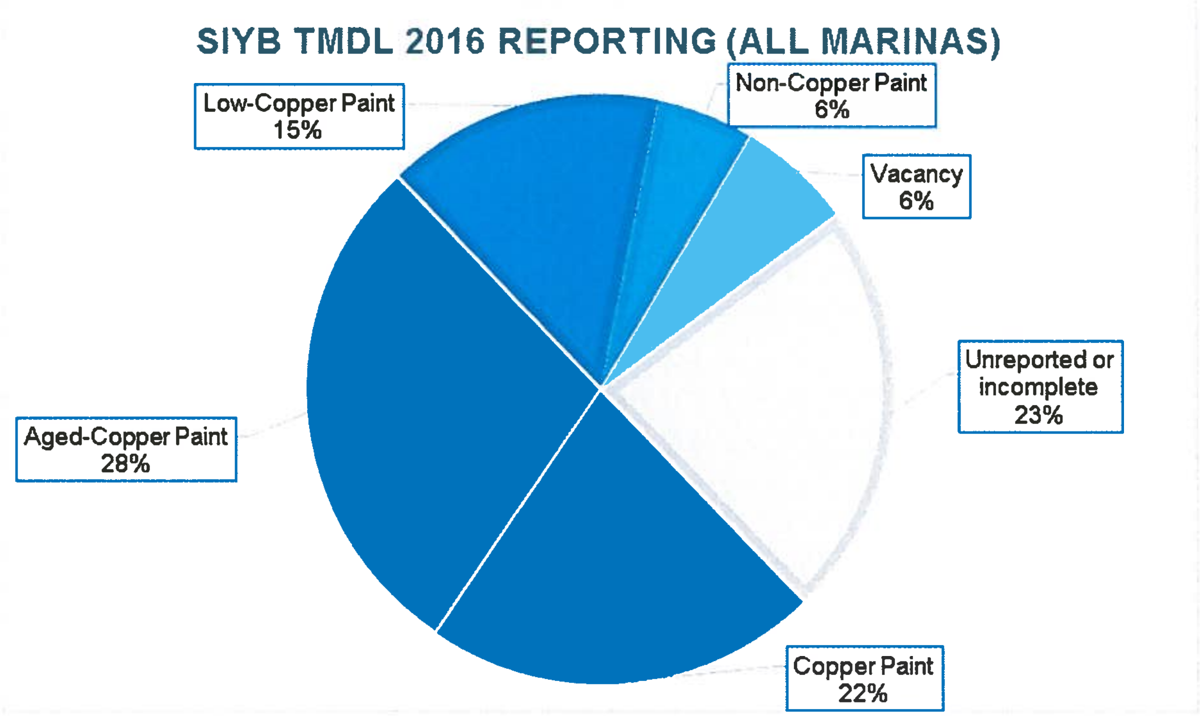
Sincerely,

Karen Holman
Director, Environmental Protection
San Diego Unified Port District

Attachments:
Attachment 1: 2016 Vessel Tracking Statistics for SIYB and Marinas
Attachment 2: Marina Self-Certification Form

2016 Reporting Comparisons; Marina vs Basin-Wide





Marina Self-Certification Form
[Add Date]

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

____

[NAME
[TITLE / POSITION]
[COMPANY NAME]

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Crow's Nest Yacht Sales and Ship Brokerage
Attn: Cathy Guino, General Manager
sandiego@crowsnestyachts.com
2515 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Ms. Guino,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

2017 marks an important compliance milestone for the SIYB TMDL because there is an interim loading reduction requirement of 40% that must be achieved by the end of this year. The reporting of paint usage within each marina leasehold is essential in calculating this interim reduction. As such, providing accurate and timely information is critical to determining compliance with the 2017 interim copper reduction target.

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Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

1. Signed Marina Self-Certification Form Effective with this upcoming report (for the 2017 year), the Port will be requiring that all vessel data submittals be accompanied by a signed confirmation statement from each marina (Attachment 2), indicating that they have reviewed the data and verified the content to the best of their knowledge. These statements will be included in the submittal package provided in the TMDL Annual Report.

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Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

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Karen Holman
Director, Environmental Protection
San Diego Unified Port District

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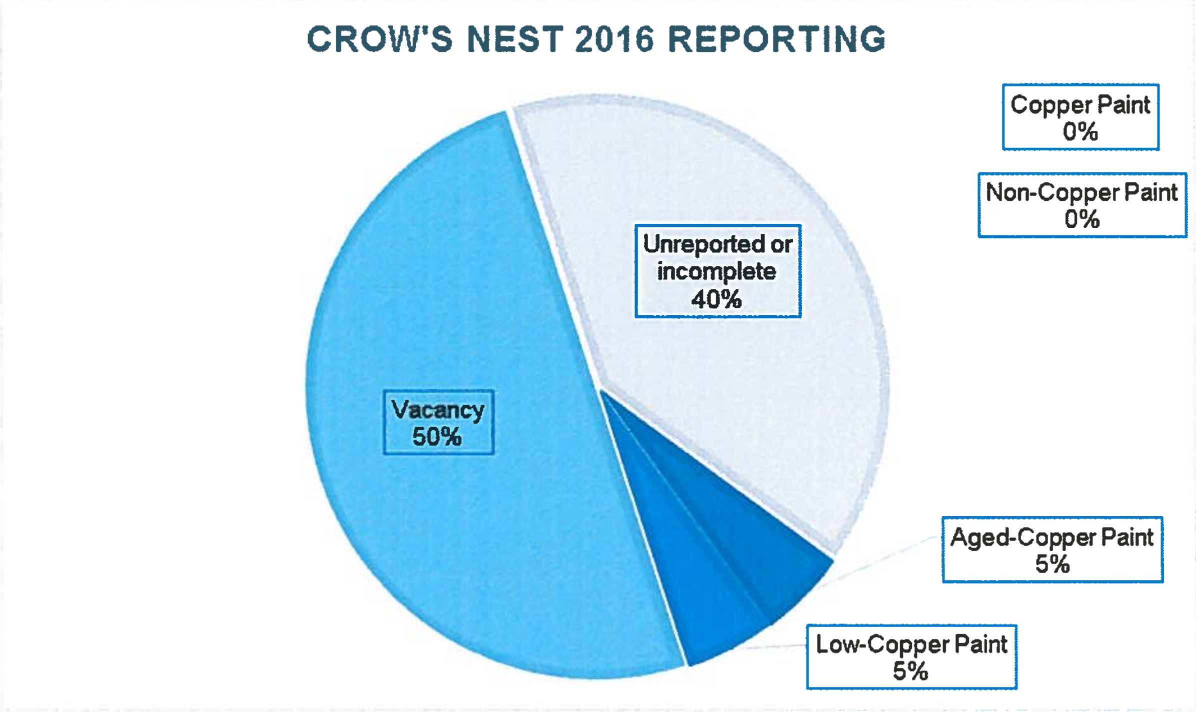

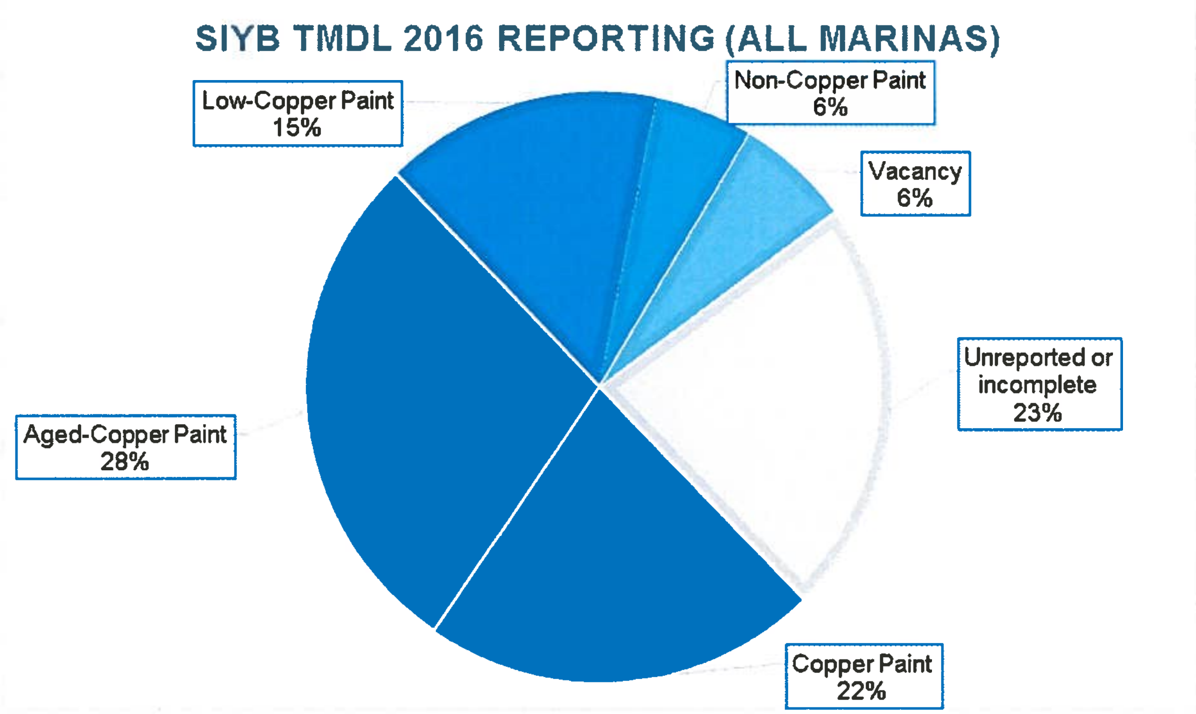

Marina Self-Certification Form
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____

[NAME
[TITLE / POSITION]
[COMPANY NAME]

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Gold Coast Anchoring Marina
Attn: Tom Nielsen, General Manager
tom@nielsenbeaumont.com
2353 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Nielsen,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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you for your efforts, to date in collecting accurate vessel data. Please continue your efforts to obtain a high quality data set for the basin.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

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Karen Holman
Director, Environmental Protection
San Diego Unified Port District

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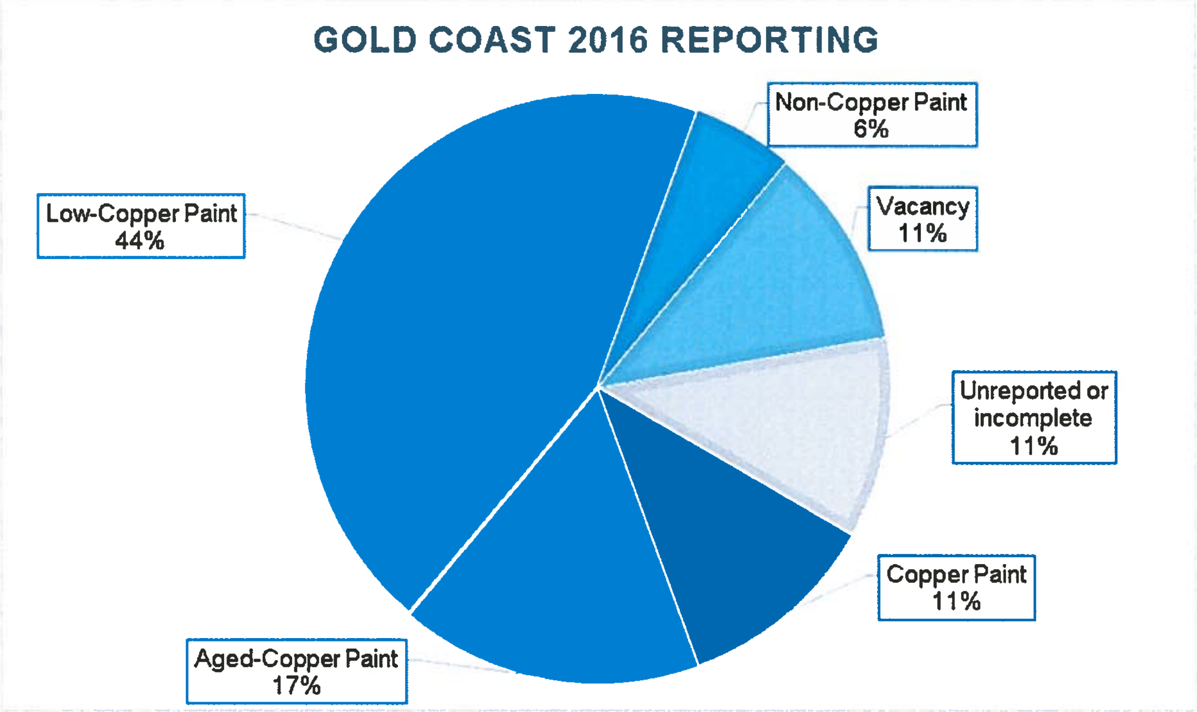

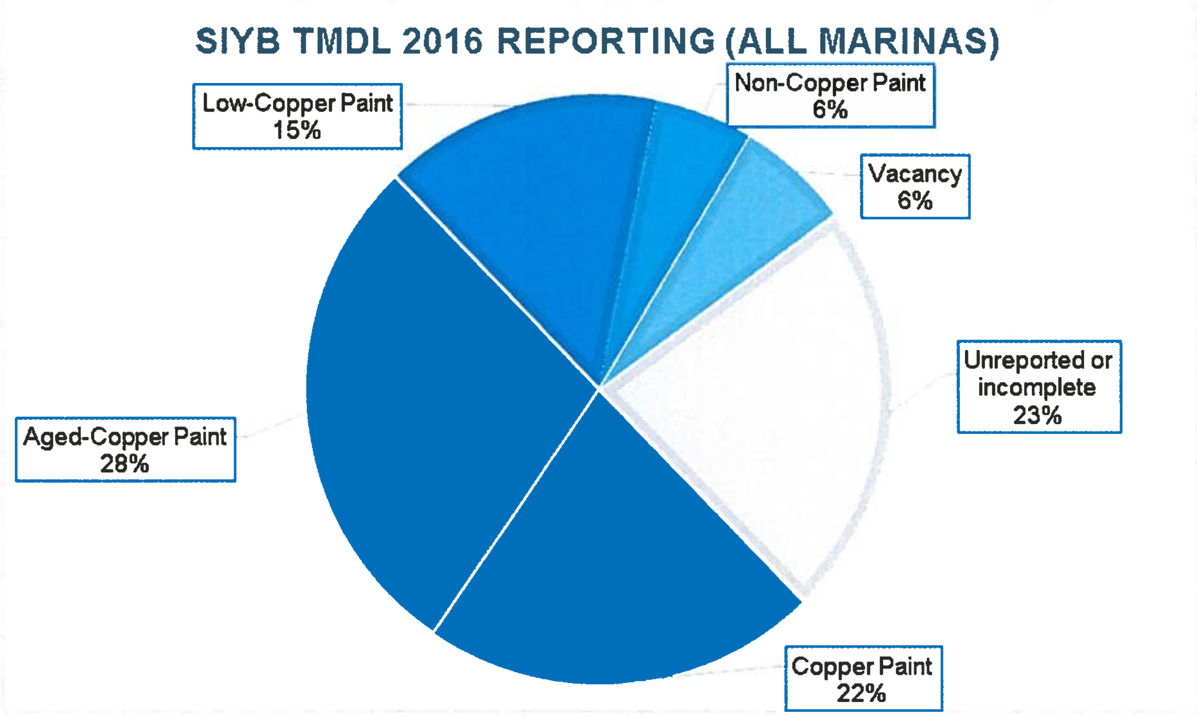

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____

NAME
TITLE/POSITION
COMPANY NAME

PORT of
SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Humphrey's Half Moon Inn and Suites
Attn: Richard Bartell, President and CEO
rbartell@bartellhotels.com
2303 Shelter Island Dr.
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Bartell,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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needed from every marina to improve basin wide reporting. Please make every effort to improve your reporting percentage moving forward.

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Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

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Director, Environmental Protection
San Diego Unified Port District

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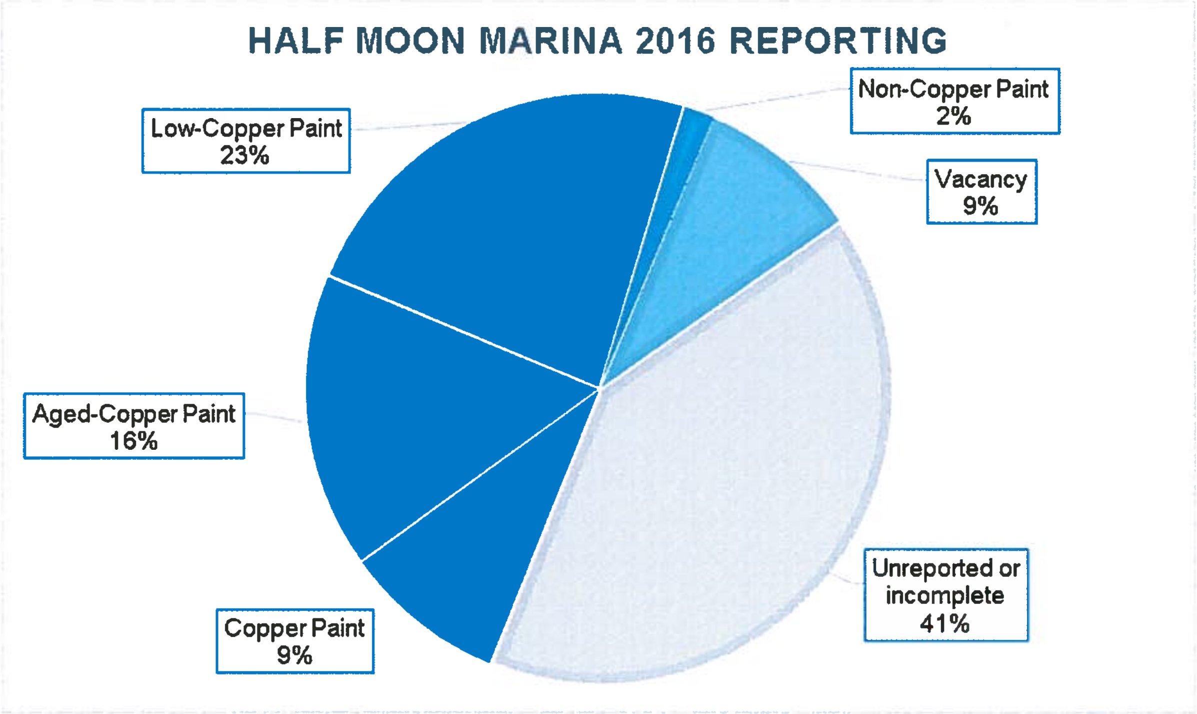

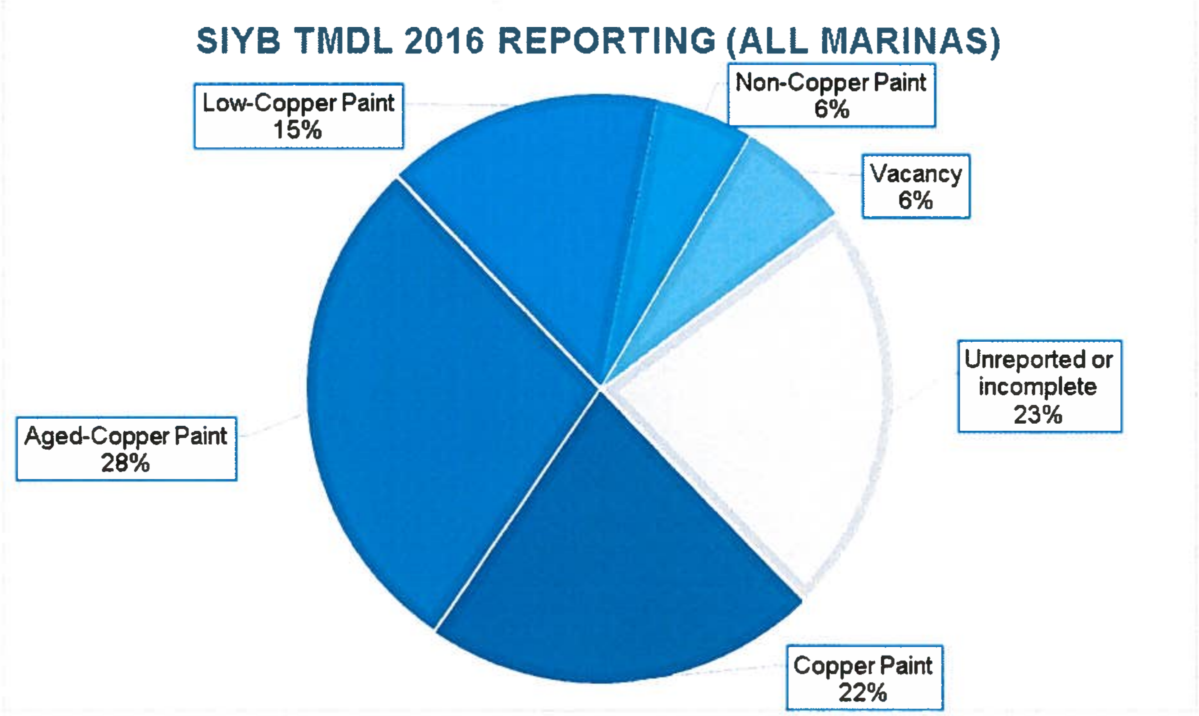

Marina Self-Certification Form
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____

NAME
TITLE/POSITION
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Kona Kai Marina
Attn: Hugh Hedin, General Manager
hhedin@sdkonakai.com
1551 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Hedin,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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needed from every marina to improve basin wide reporting. Please make every effort to improve your reporting percentage moving forward.

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Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

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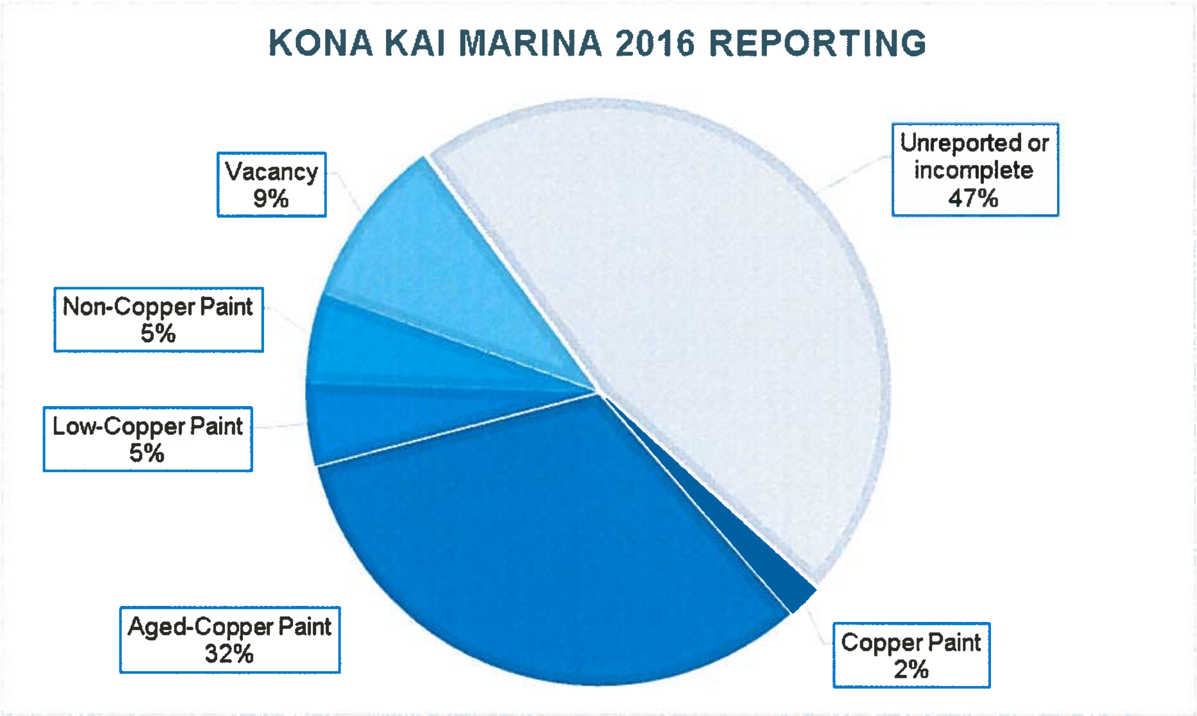

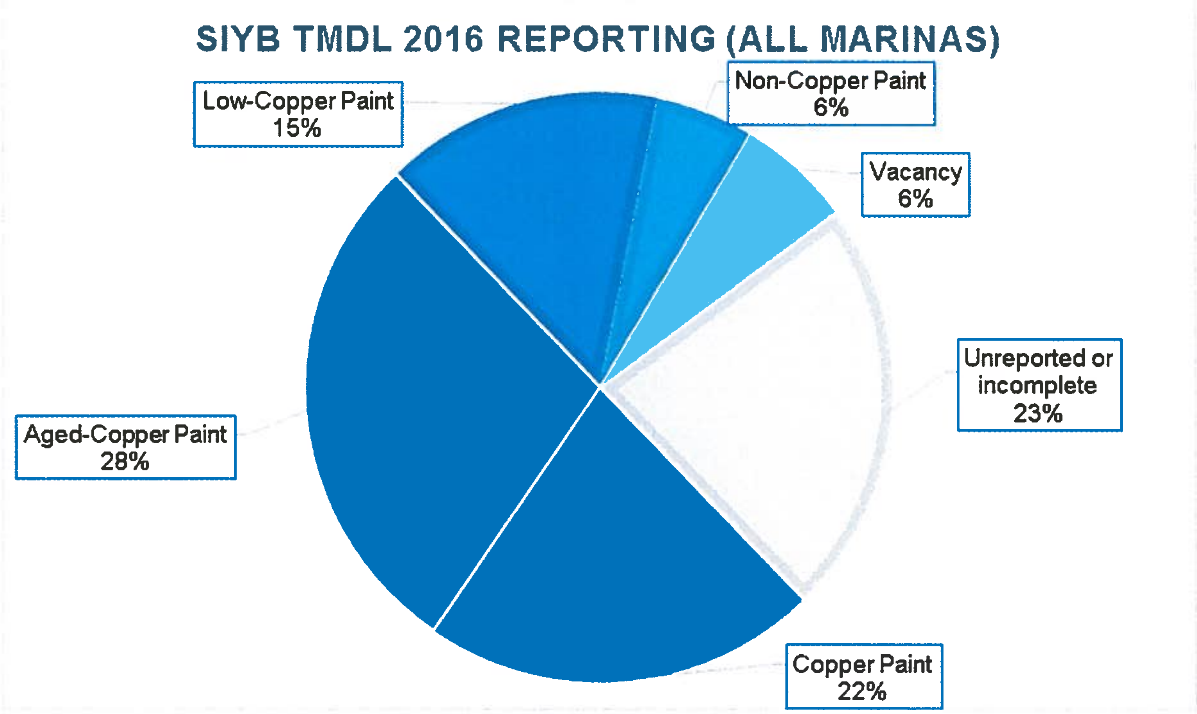

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____

NAME
TITLE/POSITION
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

La Playa Yacht Club
Attn: Frank Taliaferro, Commodore
elon@cox.net
P.O. Box 6691
San Diego, CA 92166

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Taliaferro,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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you for your efforts, to date in collecting accurate vessel data. Please continue your efforts to obtain a high quality data set for the basin.

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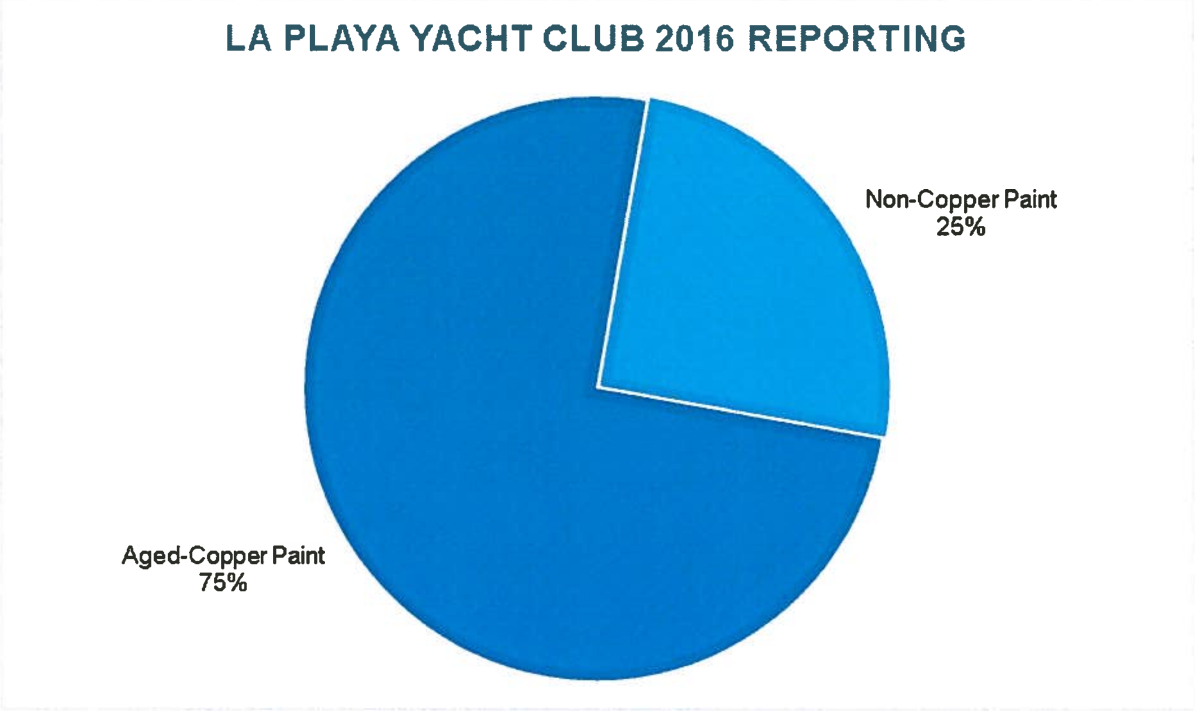

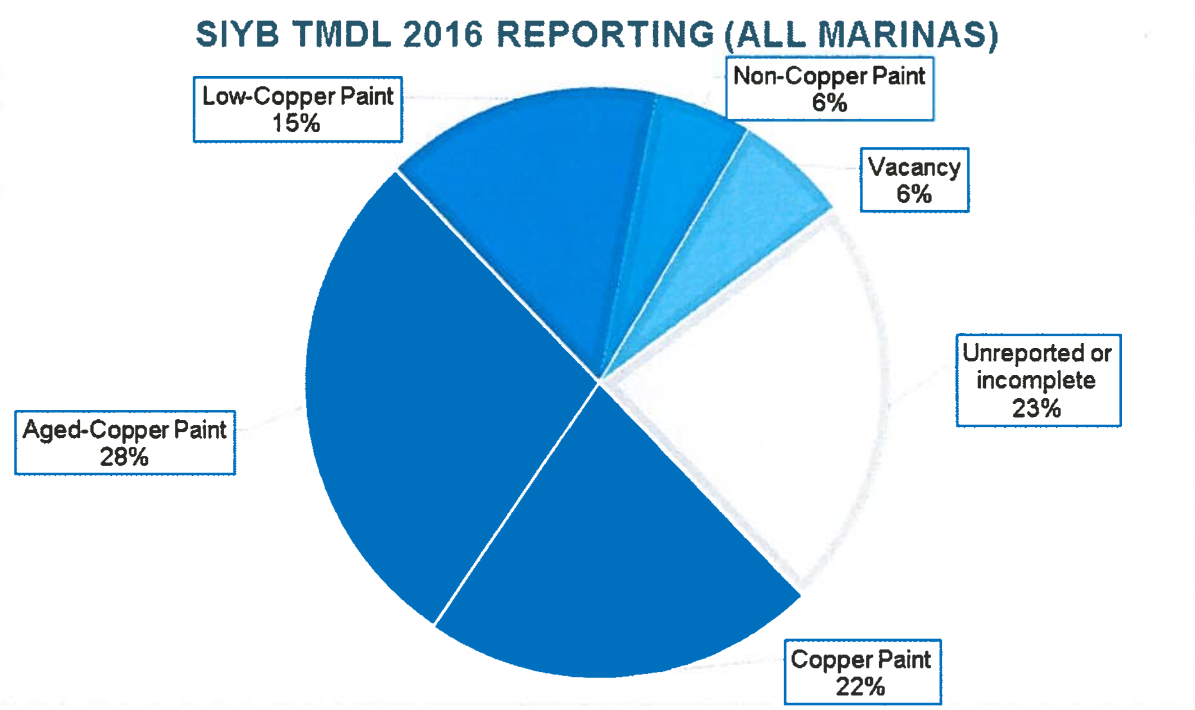

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[NAME
[TITLE / POSITION]
COMPANY NAME

PORT of
SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

San Diego Yacht Club
Attn: Terry Anglin, General Manager
terry@sdyc.org
1011 Anchorage Lane
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Anglin,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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you for your efforts, to date in collecting accurate vessel data. Please continue your efforts to obtain a high quality data set for the basin.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

1. Signed Marina Self-Certification Form Effective with this upcoming report (for the 2017 year), the Port will be requiring that all vessel data submittals be accompanied by a signed confirmation statement from each marina (Attachment 2), indicating that they have reviewed the data and verified the content to the best of their knowledge. These statements will be included in the submittal package provided in the TMDL Annual Report.

2. Records Retention The Investigative Order requires that records be retained for a period of five years following report submittal. As such, the Port is requesting that marinas keep and maintain the vessel tracking files, spreadsheets, and boater tracking forms from each reporting period for the same period of five years. This will ensure that marinas can properly respond to inquiries from the Port or Regional Board related to such data. This requirement is to become effective with the 2017 vessel data submittal.

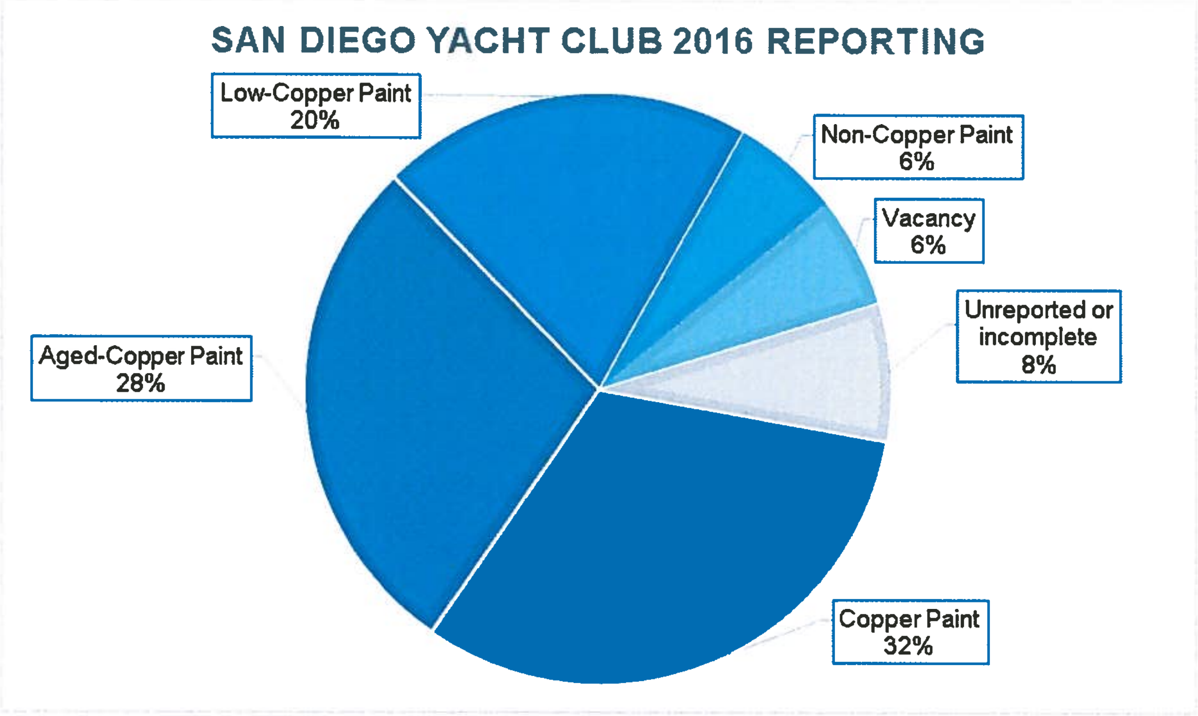
Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

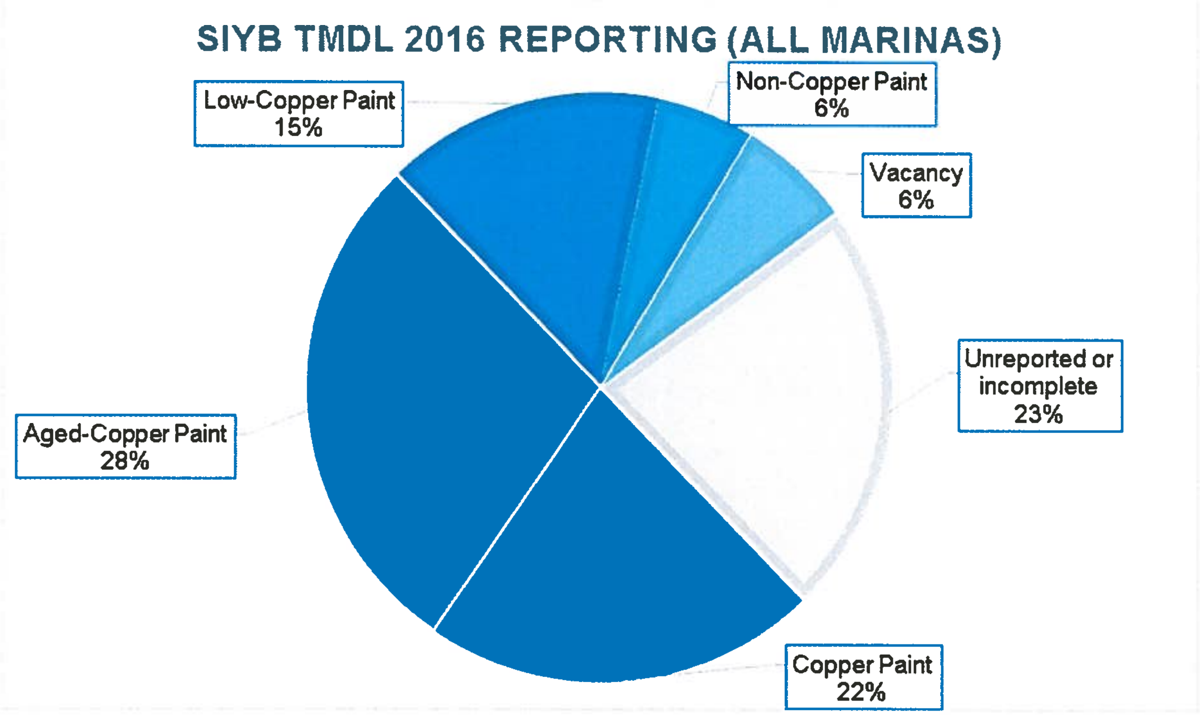
Sincerely,

Karen Holman
Director, Environmental Protection
San Diego Unified Port District

Attachments:
- Attachment 1: 2016 Vessel Tracking Statistics for SIYB and Marinas
- Attachment 2: Marina Self-Certification Form

2016 Reporting Comparisons; Marina vs Basin-Wide





Marina Self-Certification Form
[Add Date]

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

____

NAME
TITLE/POSITION
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Silver Gate Yacht Club
Attn: Terry Van Winkle, Commodore
commodore@sgyc.org
2091 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Van Winkle,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

2017 marks an important compliance milestone for the SIYB TMDL because there is an interim loading reduction requirement of 40% that must be achieved by the end of this year. The reporting of paint usage within each marina leasehold is essential in calculating this interim reduction. As such, providing accurate and timely information is critical to determining compliance with the 2017 interim copper reduction target.

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Sincerely,

Karen Holman
Director, Environmental Protection
San Diego Unified Port District

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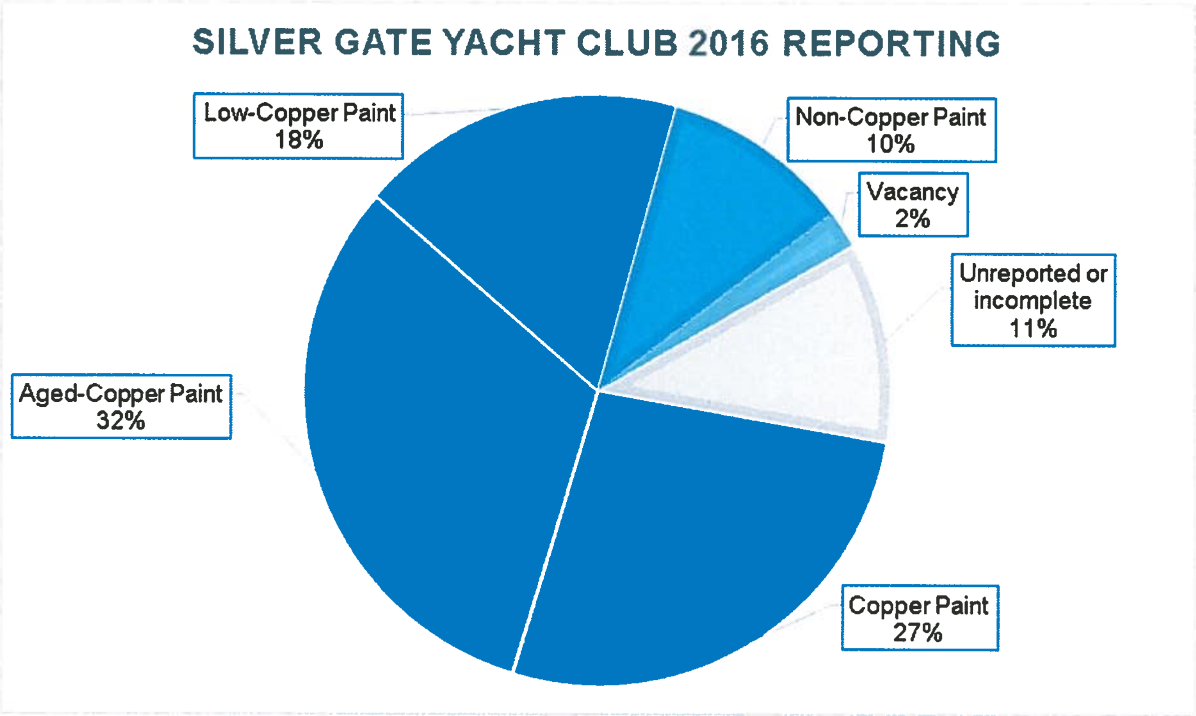
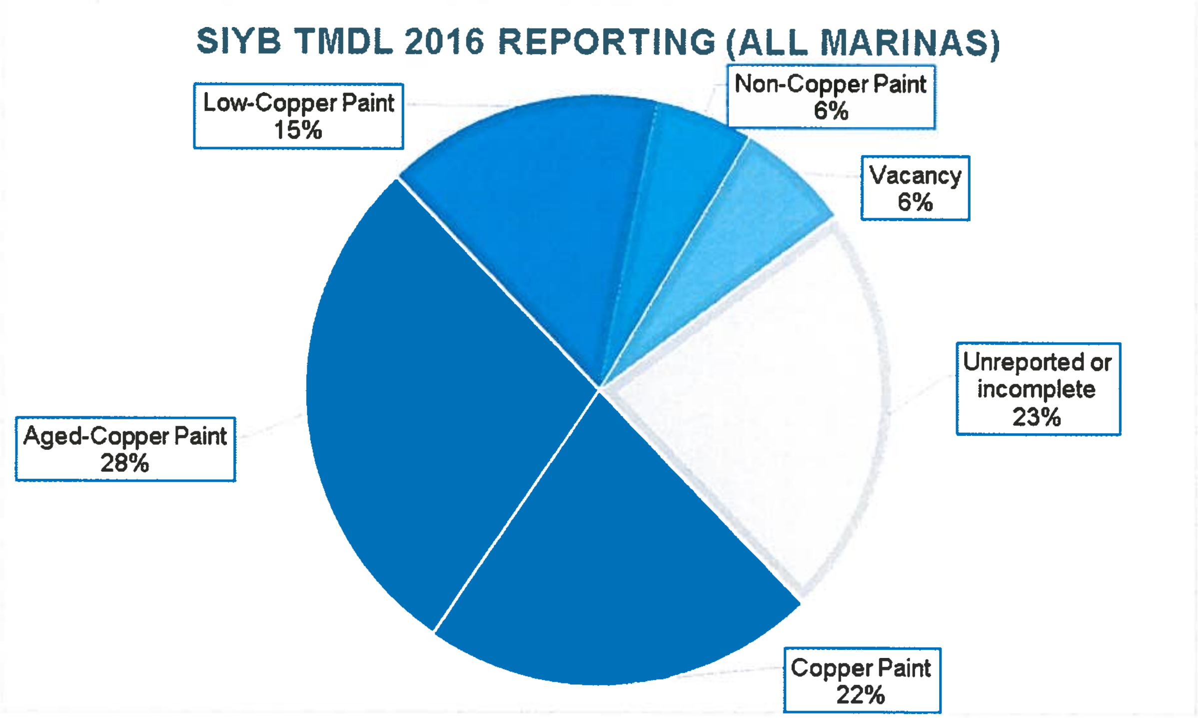
Attachment 2: Marina Self-Certification Form

2016 Reporting Comparisons; Marina vs Basin-Wide


SILVER GATE YACHT CLUB 2016 REPORTING


SIYB TMDL 2016 REPORTING (ALL MARINAS)

Marina Self-Certification Form
[Add Date]

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

____

NAME
TITLE/POSITION
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Southwestern Yacht Club
Attn: Craig Wong, General Manager
craig@southwesternyc.org
2702 Qualtrough Street
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Wong,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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Thank you for your efforts, to date in collecting accurate vessel data. Please continue your efforts to obtain a high quality data set for the basin.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

1. Signed Marina Self-Certification Form Effective with this upcoming report (for the 2017 year), the Port will be requiring that all vessel data submittals be accompanied by a signed confirmation statement from each marina (Attachment 2), indicating that they have reviewed the data and verified the content to the best of their knowledge. These statements will be included in the submittal package provided in the TMDL Annual Report.

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Thank you for your continued efforts to reduce copper loading into SIYB. We hope that these administrative changes will continue to improve the data reporting. If you have any questions, please do not hesitate to contact Kelly Tait, Senior Environmental Specialist at 619-686-6372 or ktait@portofsandiego.org.

Sincerely,

Karen Holman
Director, Environmental Protection
San Diego Unified Port District

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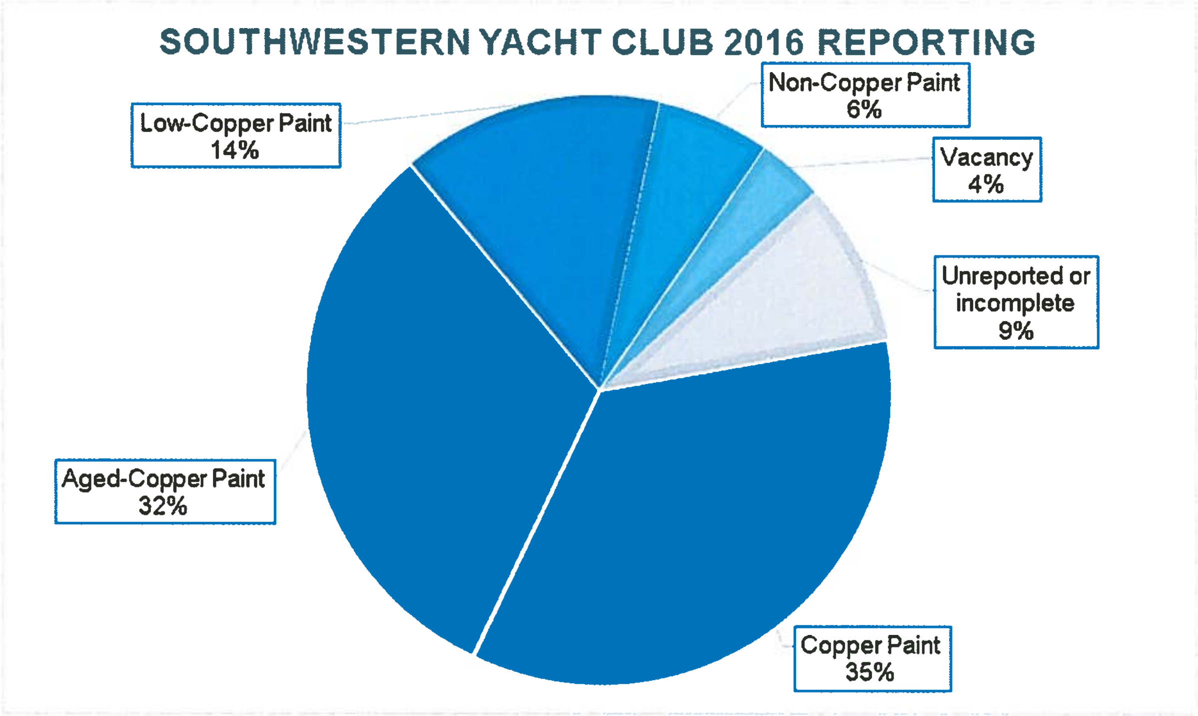

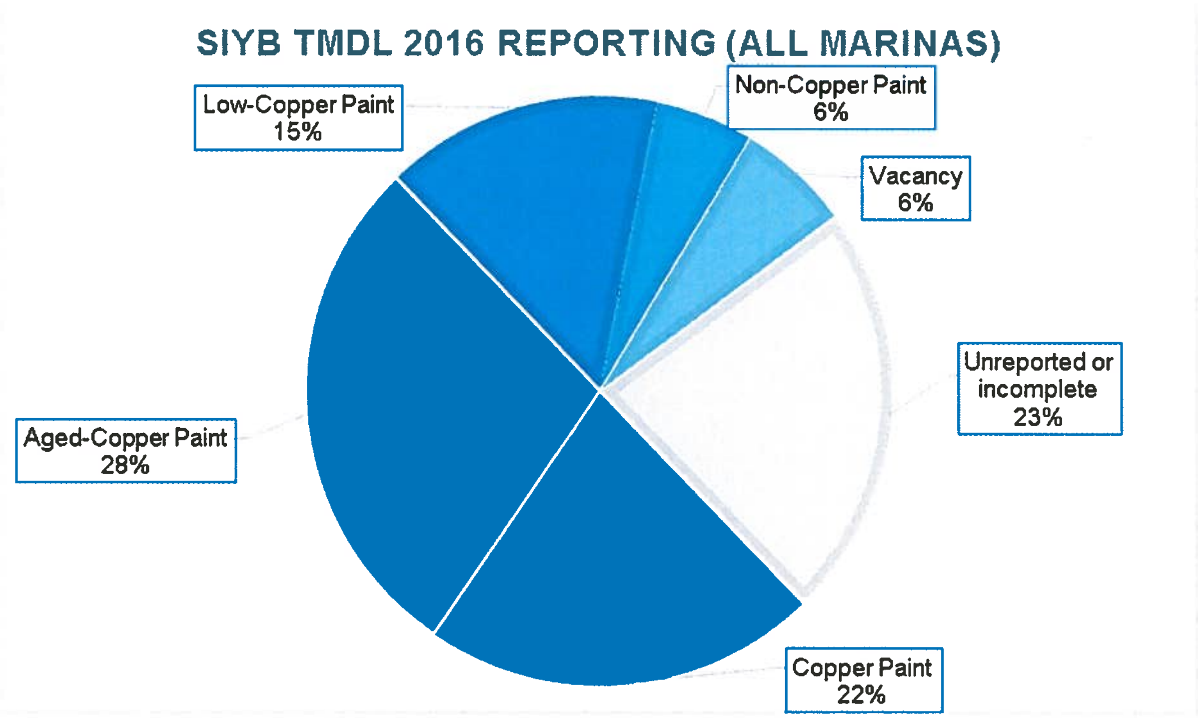

Marina Self-Certification Form
[Add Date]

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____

NAME
TITLE/POSITION
COMPANY NAME

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Tonga Landing
Attn: Tom Nielsen, General Manager
tom@nielsenbeaumont.com
2420 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Nielsen,

As you are aware, the Shelter Island Yacht Basin (SIYB) is under a Total Maximum Daily Load (TMDL) regulatory directive related to elevated levels of dissolved copper in the basin. The TMDL requires a 76% reduction of dissolved copper loading by the year 2022. To date, the Shelter Island Master Leaseholder Group (SIMLG) has been instrumental in gathering data on vessel hull paint, educating boaters on alternative paint options and coordinating with the Port on in-water hull cleaning permit oversight. The Port appreciates your assistance with these efforts.

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Attached to this letter is an assessment of last year's vessel paint tracking data comparing your marina with the average for all marinas in SIYB for the 2016 calendar year (Attachment 1). Thank you for your efforts to this point in providing the paint usage and vessel occupancy data for your marina. However, while a good amount of data exists, there remains a large basin-wide fraction (23%) of vessels with unknown or incomplete paint records. For 2016, the Tonga Landing Marina reported 67% of records that were unknown or incomplete. This is higher than the basin average percent of incomplete records. Accurate and complete data is

needed from every marina to improve basin wide reporting. Please make every effort to improve your reporting percentage moving forward.

Upon review of the data to date and the requirements set forth in the Regional Board Investigative Order, the Port is requesting the following changes take place to improve data collection and reporting:

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San Diego Unified Port District

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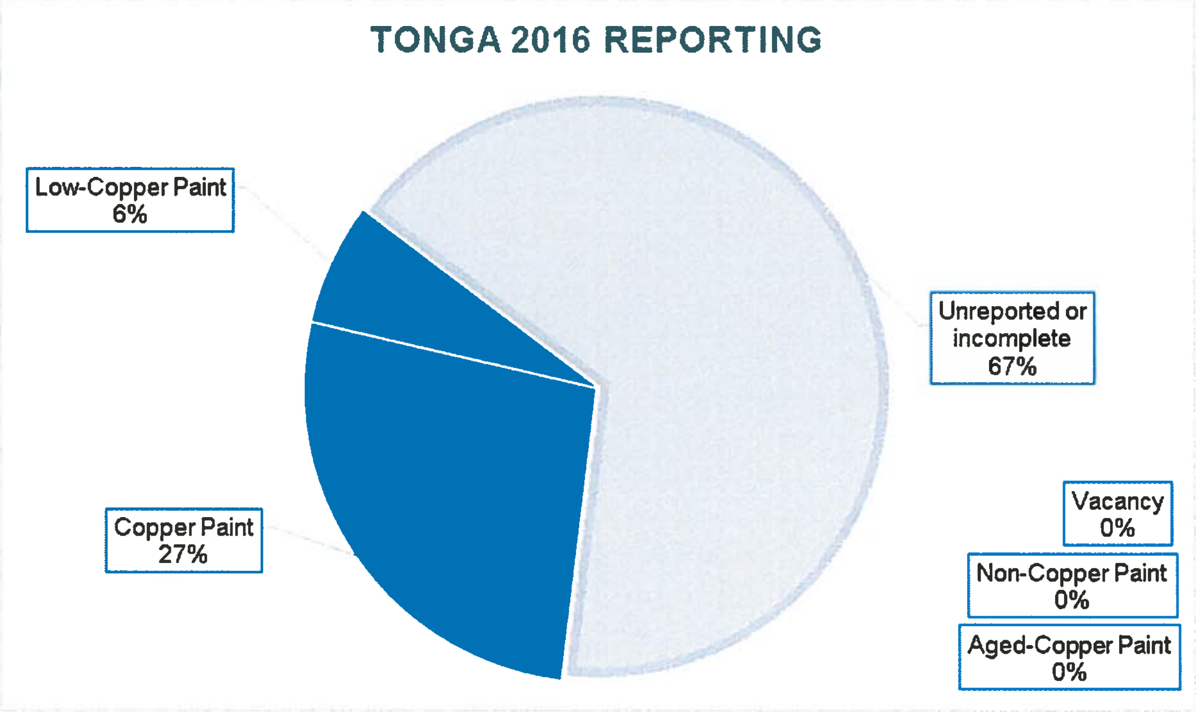

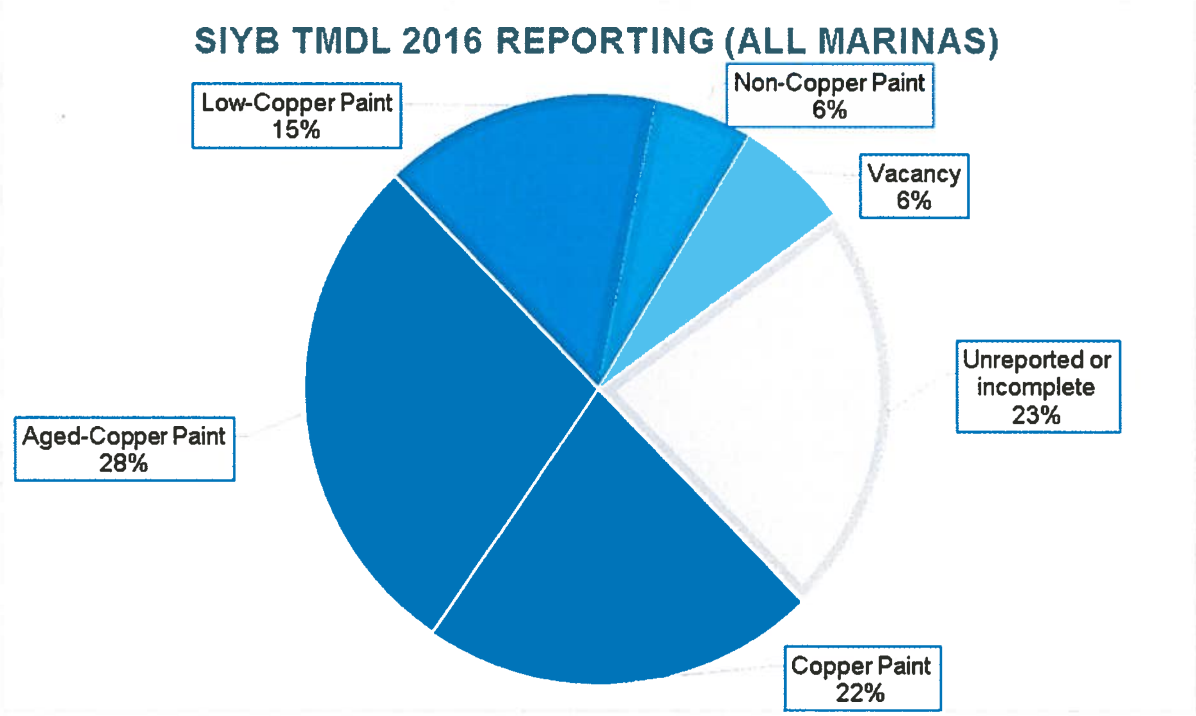

Marina Self-Certification Form
[Add Date]

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____

NAME
TITLE/POSITION
COMPANY NAME

CORRESPONDENCES

SIYB MARINAS AND YACHT CLUBS

SIGNED CERTIFICATION LETTERS

Marina Self-Certification Form
12/28/2017

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Shelley Griffin

Shelley Griffin
Director of Marina and Food & Beverage Operations
Bay Club Hotel & Marina

- Crows nest yachts

Attachment A
SIYB Dissolved Copper TMDL
Vessel Tracking Template Form

Facility (Marina or Yacht Club)	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type (Copper, Low, or Non, No Paint)	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	DPR Category I Registration Number
Crows Nest	1	10	Power	82	19	Interlux	Ulta Coat	3639U			2015	Low	
Crows Nest	2	0											
Crows Nest	3	10	Power	58	18	Prolene	01 Blue	1088			2014	Low	
Crows Nest	4	10	Power	35	12	Interlux	Ulta Coat	3696U			2016	Low	
Crows Nest	5	0											
Crows Nest	6	50	Sail	42	12	Low			Koehler	November	2017	Low	
Crows Nest	7	10	Power	50	14	Copper	Zspar		Seattle	December	2012	None	
Crows Nest	8	0											
Crows Nest	9	10	Power	54	15	Interlux					2015		
Crows Nest	10	50	Power	35	12	Micron Non				September	2017	None	
Crows Nest	11	0											
Crows Nest	12	10	Power	32	12	Interlux		3449			2013	Low	
Crows Nest	13	90	Sail	42	10	Low	Bilox Gr	5490	Walsh	July	2012	Low	2693-181-AA
Crows Nest	14	10	Power	48	15								
Crows Nest	15	0											
Crows Nest	16	10	Power	36	13	Prolene	01 Blue	1088			2014	Low	
Crows Nest	17	0											
Crows Nest													

Marina Self-Certification Form
[Add Date] 1/12/18

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Cathy Guerino - offici manager
Crows nest yachts

[NAME
[TITLE / POSITION]
[COMPANY NAME]

Gold Coast Anchorage

Marina Self-Certification Form
December 22, 2017

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Katherine Leisey

KATHERINE LEISEY
MARINA MANAGER
GOLD COAST ANCHORAGE

PO BOX 6633 • SAN DIEGO, CALIFORNIA 92166 • OFFICE: (619)222-4255 • FAX: (619)222-9109
MARINA LOCATED AT 2353 SHELTER ISLAND DR • SAN DIEGO, CALIFORNIA 92106

Half
Moon
MARINA

January 9, 2018

Re: Marina Self-Certification Form

To Whom It May Concern,

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Brad Oliver
Marina Manager
Half Moon Marina

2303 Shelter Island Drive, San Diego, Ca 92106 - 619.224.3401

Marina Self-Certification Form
[Add Date]

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[NAME Adam Veres
[TITLE / POSITION] Dockmaster
COMPANY NAME Kona Kai Marina

Marina Self-Certification Form
[Add Date] 1-5-18

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NAME Terry Anglin
TITLE/POSITION COO/GM
COMPANY NAME San Diego Yacht Club

SHELTER ISLAND MARINA
AT THE ISLAND PALMS HOTEL

Marina Self-Certification Form
January 17, 2018

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Joe Ravitch
Dockmaster
Shelter Island Marina

PORT of SAN DIEGO
Waterfront of Opportunity

VIA US MAIL AND ELECTRONIC MAIL

December 20, 2017

Silver Gate Yacht Club
Attn: Terry Van Winkle, Commodore
commodore@sgyc.org
2091 Shelter Island Drive
San Diego, CA 92106

Subject: New SIYB Vessel Tracking Submittal Requirements effective January 2018

Dear Mr. Van Winkle,

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Director, Environmental Protection
San Diego Unified Port District

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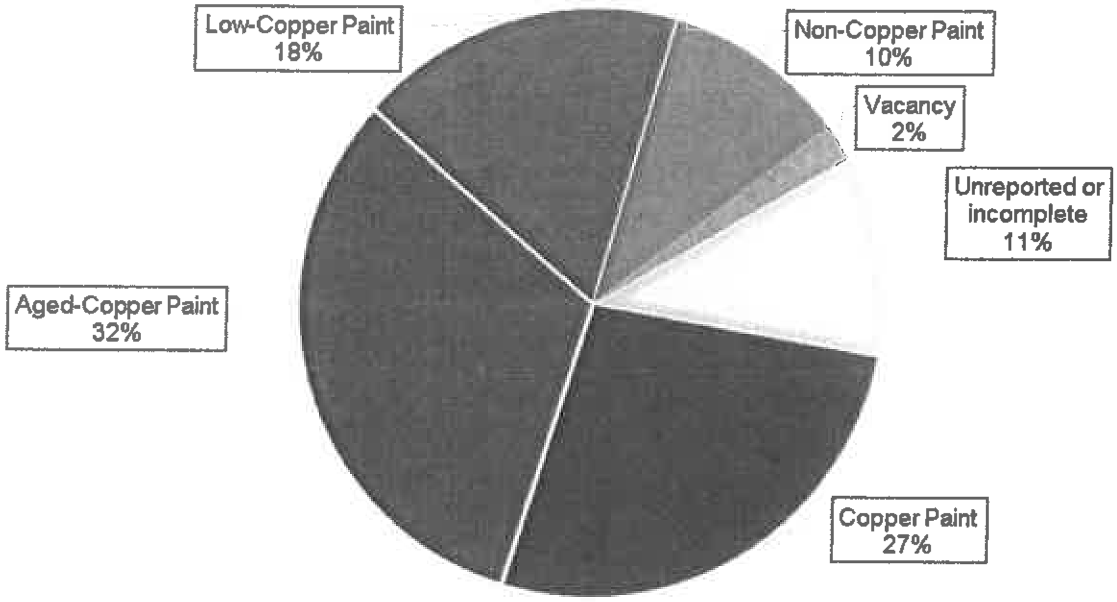
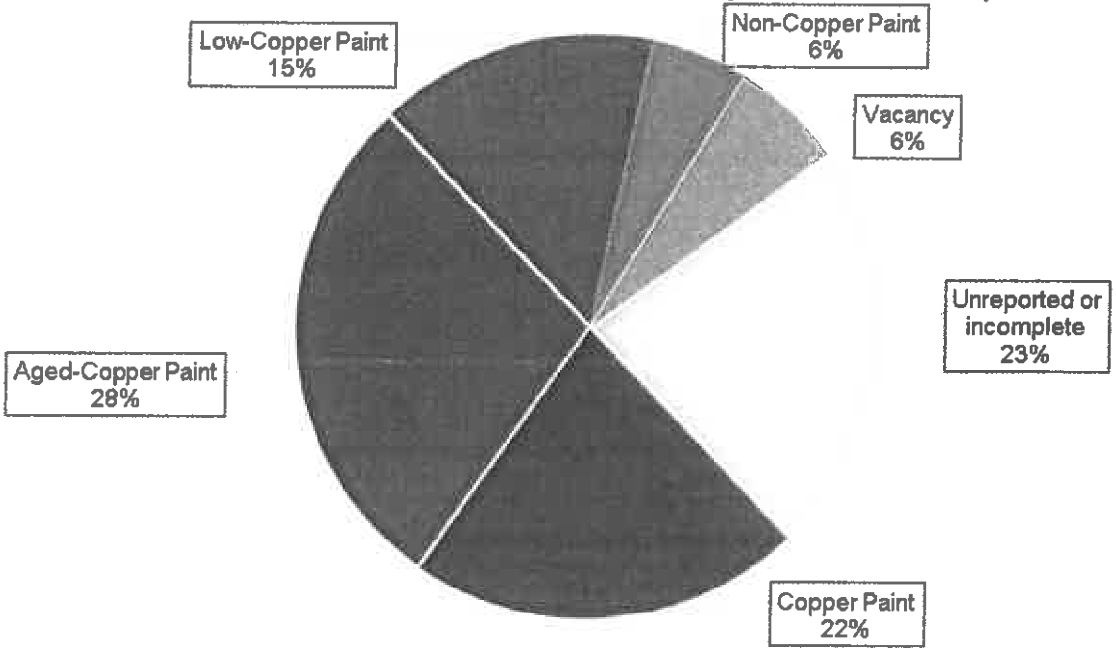
2016 Reporting Comparisons; Marina vs Basin-Wide

SILVER GATE YACHT CLUB 2016 REPORTING



SIYB TMDL 2016 REPORTING (ALL MARINAS)



Marina Self-Certification Form
[Add Date] 1/15/18

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Terry VanWinkle / COMMODORE

NAME
TITLE/POSITION SILVER GATE YACHT CLUB
COMPANY NAME

Marina Self-Certification Form
January 18, 2018

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Craig Wong
General Manager
Southwestern Yacht Club

Marina Self-Certification Form Tonga Landing
[Add Date] Dec-22-2017

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NAME Cortland Berlin
POSITION/TITLE manager
COMPANY NAME Silver Seas Yachts

Attachment I
SIYB Dissolved Copper TMDL
Hull Tracking Template Form

Facility	Slip/Mooring Reference Number	Percent of Time Occupied	Vessel Type (Power or Sail)	Vessel Length	Vessel Beam	Paint Type Copper, Low or Non	Paint Product Name	Product Number	Boatyard Name or Purchase Date	Painting Date Month (mm)	Painting Date Year (yyyy)	% Copper	Name of Owner
Tonga	Crusiers	100	Power	41		Copper	Cukote Black GL	Seahawk 3445GL				47	NEW SSY inventory
Tonga	Cruisers	100	Power	39		Copper	Cukote Black GL	Seahawk 3445GL				47	NEW SSY inventory
Tonga	Tiara	100	Power	44	15	Low Copper	micron	YBC583				35	New / Haynes
Tonga	Chaparral	100	Power	33			unknown						Used SSY Inventory
Tonga	Hatteras	100	Power	68			unknown						Putman
Tonga	Sea Ray	100	Power	42			unknown						Winnett
Tonga	Cruisers	100	Power	33			unknown						MacFarlane
Tonga	Marquis	100	Power	65			unknown						Owens
Tonga	Formula	100	Power	40			unknown						Steding
Tonga	Sea Ray	100	Power	34			unknown						Bemis
Tonga	Tiara	100	Power	29			unknown						Engle
Tonga	Fourwinns	100	Power	32			unknown						Bahour
Tonga	Sea Ray	100	Power	47			unknown						Murray
Tonga													
Tonga													

All hulls with paint greater than 40% copper are counted as high-copper
All hulls equal to zero are counted as non-copper
All hulls between 1 and 39.9% copper are counted as low-copper
Non and low-copper paint types are considered "confirmed" if the paint brand and product number is listed and can be cross checked with the SIML TMDL Group and/or Port paint list
Hulls with aged-copper paint are considered low-copper