FINAL
2014 SHELTER ISLAND YACHT BASIN DISSOLVED COPPER TOTAL MAXIMUM DAILY LOAD MONITORING AND PROGRESS REPORT

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

Prepared by:
AMEC Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123

In Coordination with:
Port of San Diego

March 2015

March 2015

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.

Jason H. Giffen

Jason H. Giffen
Director, Environmental & Land Use Management
San Diego Unified Port District

TABLE OF CONTENTS

Page
ACRONYMS AND ABBREVIATIONS v
EXECUTIVE SUMMARY ES-1
1.0 INTRODUCTION 1-1
  1.1 Background 1-1
  1.2 SIYB TMDL Compliance Schedule 1-1
  1.3 Sources of Dissolved Copper 1-5
  1.4 Water Quality Objective Criteria 1-6
  1.5 Monitoring Purpose 1-6
  1.6 Implementation of Best Management Practices 1-7
  1.7 Review of 2013 Monitoring and Progress Report Recommendations 1-8
  1.8 Revision of Monitoring Plan 1-8
  1.9 Recent Studies and Initiatives 1-8
  1.10 Content of Report 1-11
2.0 METHODS 2-1
  2.1 SIYB Implementation of Best Management Practices 2-1
  2.2 San Diego Bay-Wide Implementation of BMPs 2-1
  2.3 Dissolved Copper Load Analysis 2-1
    2.3.1 Vessel Tracking 2-1
    2.3.2 Hull Cleaning 2-3
    2.3.3 Annual Dissolved Copper Load 2-4
  2.4 Water Quality Monitoring 2-6
    2.4.1 Sampling Locations 2-6
    2.4.2 Sampling Date 2-9
    2.4.3 Sample Collection 2-9
    2.4.4 Equipment Decontamination and Cleaning 2-10
    2.4.5 Chemical Analyses 2-10
    2.4.6 Toxicity Testing 2-13
    2.4.7 Toxicity Statistical Analyses 2-15
  2.5 Quality Assurance and Quality Control 2-16
  2.6 Chain-of-Custody Procedures 2-17
  2.7 Data Review and Management 2-18
    2.7.1 Data Review 2-18
    2.7.2 Data Management 2-19
3.0 RESULTS 3-1
  3.1 SIYB TMDL Implementation 3-1
    3.1.1 BMP Implementation 3-1
    3.1.2 Vessel Counts by Hull Paint Type 3-12
    3.1.3 Slip Count and Occupancy 3-13
    3.1.4 Aged-Copper Paint 3-13
    3.1.5 Hull-Cleaning BMPs and Regulations 3-13
    3.1.6 Estimated Copper Load Reduction 3-14
  3.2 SIYB TMDL Water Quality Monitoring 3-16
    3.2.1 Surface Water Chemistry 3-16
    3.2.2 Toxicity 3-19

TABLE OF CONTENTS (Cont.)

Page
4.0 DISCUSSION 4-1
  4.1 Dissolved Copper Load Reduction 4-1
  4.2 Water Quality Monitoring 4-3
    4.2.1 Dissolved Copper Levels 4-3
    4.2.2 Toxicity Tests 4-7
    4.2.3 Monitoring Program Summary 4-9
  4.3 Description of Ongoing Initiatives, Studies, and Reports Relevant to the SIYB TMDL 4-10
    4.3.1 Assembly Bill 425 4-10
    4.3.2 SPAWAR Study 4-10
    4.3.3 DPR Memorandum on AB 425 4-11
    4.3.4 USEPA Dissolved Copper Saltwater Criteria Using the Biotic Ligand Model 4-12
    4.3.5 Harbor Island Study 4-13
5.0 RECOMMENDATIONS 5-1
6.0 REFERENCES 6-1

LIST OF TABLES

Table 1-1. Loading Targets for SIYB TMDL Attainment 1-5
Table 1-2. Sources of Dissolved Copper per the SIYB TMDL 1-5
Table 1-3. 2013 Monitoring and Progress Report Recommendations 1-9
Table 2-1. Vessel Tracking Data Required by Monitoring Plan 2-2
Table 2-2. Low-Copper and Non-Copper Hull Paint Vessel Data 2-2
Table 2-3. Vessel Tracking Data Required Annually by Investigative Order 2-3
Table 2-4. Dissolved Copper Loading Calculation Assumptions 2-5
Table 2-5. Sampling Station Coordinates 2-6
Table 2-6. *In Situ* Analytical Methods and Detection Limits 2-9
Table 2-7. Laboratory Analytical Methods and Detection Limits 2-13
Table 2-8. Conditions for the 96-Hour Pacific Topsmelt Bioassay 2-14
Table 2-9. Conditions for the 48-Hour Mussel Development Bioassay 2-15
Table 2-10. Sample Holding Times 2-17
Table 3-1. 2014 Copper Load by Vessel Hull Type and Reported Occupancy 3-15
Table 3-2. 2014 Overall Estimated Copper Load Reduction Summary 3-16
Table 3-3. Chemistry Results for SIYB Surface Waters, August 2014 Event 3-17
Table 3-4. Results of the 96-Hour Pacific Topsmelt Bioassay 3-19
Table 3-5. Results of the 48-Hour Bivalve Larvae Bioassay 3-21
Table 3-6. Summary of Reference Toxicant Test Results for Pacific Topsmelt 3-22
Table 3-7. Summary of Reference Toxicant Test Results for Bivalve Larvae 3-22
Table 5-1. Status of 2013 Monitoring and Progress Report Recommendations[a] 5-3
Table 5-2. 2014 Monitoring and Progress Report Recommendations 5-6

TABLE OF CONTENTS (Cont.)

Page

LIST OF FIGURES

Figure 1-1. Location of Shelter Island Yacht Basin in San Diego Bay................................ 1-3
Figure 2-1. Shelter Island Yacht Basin TMDL Sampling Station Locations......................... 2-7
Figure 2-2. Field Sampling Photographs 2-11
Figure 3-1. Example Vessel Tracking Database Output from a 319(h) Grant Report 3-6
Figure 3-2. Response of SIYB Boaters to Outreach Strategy and Grant Revisions 3-8
Figure 3-3. Dissolved Copper Concentrations in SIYB Relative to Baseline Conditions ... 3-18
Figure 4-1. Approximate Relative Reduction by Load Category 4-2
Figure 4-2. Dissolved Copper Comparison by Sampling Station 4-4
Figure 4-3. Sea Surface Temperatures (SST) in San Diego Bay (2011-2014) 4-5
Figure 4-4. Sea Surface Temperatures (SST) by Sampling Station (2011-2014) 4-5
Figure 4-5. Comparison between Normal Straight-hinged and Slightly Curved-hinged Bivalve Larvae 4-8

LIST OF APPENDICES

APPENDIX A SIYB DISSOLVED COPPER TMDL MONITORING PLAN REVISION 1
APPENDIX B BEST MANAGEMENT PRACTICE PLANS
APPENDIX C VESSEL TRACKING DATA
APPENDIX D WATER QUALITY RESULTS
APPENDIX E CORRESPONDENCE WITH STATE AND FEDERAL AGENCIES
APPENDIX F REFERENCE INFORMATION ON NEW STUDIES

This page intentionally left blank

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
AFP	antifouling paint
AMEC	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
CMC	criterion maximum concentration
COC	chain-of-custody
CTR	California Toxics Rule
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
HAB	harmful algae blooms
HPB	Harbor Police Dock
Investigative Order	Investigative Order No. R9-2011-0036
L_h	hull-cleaning annual loading
L_p	passive leaching annual loading
L_v	average annual loading per vessel
LC_{50}	median lethal concentration
LID	low-impact development
LOEC	lowest observed effect concentration
MAM-PEC	Marine Antifoulant Model to Predict Environmental Concentrations
MAR	marine habitat
Monitoring Plan	SIYB Dissolved Copper TMDL Monitoring Plan
N_v	number of vessels
N/A	not applicable
Nautilus	Nautilus Environmental Laboratory
NOAA	National Oceanic and Atmospheric Administration
NOEC	no observed effect concentration
OAL	Office of Administrative Law
PDF	Portable Data Format
Port	San Diego Unified Port District
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
SCCWRP	Southern California Coastal Water Research Project
SIML	Shelter Island Master Leaseholders
SIYB	Shelter Island Yacht Basin
SM	Standard Methods
SoCal SETAC	Southern California Chapter of the Society of Environmental Toxicology and Chemistry

ACRONYMS AND ABBREVIATIONS (Cont.)

SOP	standard operating procedure
SPAWAR	Space and Naval Warfare Systems Center Pacific
SSO	site-specific objective
SST	sea surface temperature
SUSMP	Standard Urban Stormwater Mitigation Plan
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TMDL	San Diego Yacht Basin Dissolved Copper total maximum daily load
TOC	total organic carbon
TST	test of significant toxicity
USEPA	U.S. Environmental Protection Agency
Weck	Weck Laboratories
Weston	Weston Solutions, Inc.
WILD	wildlife habitat
WQO	water quality objective
YSI	YSI Incorporated

UNITS OF MEASURE

%	percent
°C	degree(s) Celsius
µ	micron(s)
µg	microgram(s)
µg/cm^2/day	micrograms per square centimeter per day
µg/L	microgram(s) per liter
cm^2	square centimeter(s)
ft	feet or foot
kg	kilogram(s)
kg/yr	kilograms per year
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
ppb	part(s) per billion
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 2014, 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 boat hulls with paint converted from copper-based antifouling paints to non-copper alternatives, and (2) monitoring dissolved copper concentrations and toxicity in the water column. Passive leaching of copper from boat hulls has been identified as the major source of copper in SIYB; it composes 93 percent of the total loading, according to the TMDL that the Regional Board incorporated into the *Water Quality Control Plan for the San Diego Basin—Region 9* (Basin Plan) in 2005 under Resolution Number R9-2005-0019.

Per the requirements of the Investigative Order, the *SIYB TMDL Monitoring Plan (*Weston, 2011*)* (Monitoring Plan) was submitted to the Regional Board in May 2011 to track the progress of implementing the SIYB Dissolved Copper TMDL and achieving the required dissolved copper load reductions. In 2014, the Monitoring Plan was revised and updated to incorporate revisions of the monitoring program that were approved by the Regional Board on the basis of recommendations made by the Port in the 2012 and 2013 SIYB TMDL Monitoring and Progress Reports (AMEC, 2013; AMEC, 2014). See Section 1.8 (Monitoring Plan Revision) for additional information.

This 2014 Monitoring and Progress Report follows the approach detailed in the 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 Practices Implementation

The Port and the Shelter Island Master Leaseholders (SIML) TMDL Group have been implementing a variety of BMPs over the year to reduce dissolved copper loading and improve water quality, including:

- Formulation of policies, regulations, and incentives to reduce copper loading, such as:
  - Implementing the San Diego Bay-wide regulations for in-water hull cleaning, which reduced the estimated copper load by 34 kilogram(s) per year (kg/yr) in 2014
  - Providing financial incentives for private boat owners to convert to non-copper hull paint alternatives
  - Giving wait-list priority for slips at marinas and yacht clubs for boats with hulls that have non-copper paint
- Sponsorship and implementation of studies of alternative hull paints
- Facilitation of hull paint transitions to non-copper and low-copper products
- Extensive education and outreach, such as hosting educational booths, developing brochures and educational materials, and presenting at conferences and workshops

- Leading and participating in multi-agency activities, such as the statewide copper sub-workgroup and the Regional Harbor Monitoring Program (RHMP)
- Sponsorship and support of Assembly Bill (AB) 425, which required the California Department of Pesticide Regulation (DPR) to (1) determine, no later than February 1, 2014, a leach rate for copper-containing antifouling paint used on recreational vessels, and (2) recommend appropriate mitigation measures to protect aquatic environments from the effects of copper-containing hull paints that are registered as pesticides
- Participation as an invited speaker at the 2014 Southern California Chapter of the Society of Environmental Toxicology and Chemistry Annual Meeting special symposium dedicated to copper in the marine environment

Vessel Conversions and Reduction of Dissolved Copper

Annual dissolved copper loading reduction was assessed by tracking conversions of hull paints from copper to non-copper or low-copper (i.e., less than 40 percent copper) products and aging of copper paints on vessels moored in SIYB. The data used to estimate the 2014 copper loading reduction were provided by the Port and the SIML TMDL Group. The Port provided information related both to the conversion of its vessels and to the numbers and types of vessels at Port-controlled slips and moorings.

Based on the assumptions of the SIYB TMDL, the transition of a vessel to non-copper hull paint[1] was assumed to reduce the annual loading of passive leaching by 0.9 kg/yr, and transition to low-copper hull paint was assumed to reduce loading by 50 percent (i.e., 0.45 kg/yr). Additional load reductions from converting a hull painted with copper paint to one painted with non-copper paint are gained throughout the year because no copper is released into the water each time a non-copper-painted vessel is cleaned. Vessel tracking indicates that there has been a reduction of nearly 34 percent (approximately 707 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[2].

The 2014 monitoring period is the second year in the second compliance period for the SIYB TMDL; consequently, there is no compliance target for 2014. As discussed in the *2012 Shelter Island Yacht Basin TMDL Monitoring and Progress Report* (AMEC, 2013), a reduction of 17.6 percent (approximately 370 kg/yr) in annual dissolved copper loading to SIYB from vessels was achieved in 2012. This load reduction exceeded the required first interim load reduction target of 10 percent[3].

---

[1] A total of 5 vessels have converted to non-copper paint in 2014. In all, the grant has converted 34 boats, resulting in a 32.3-kg/yr load reduction as of December 31, 2014.

[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 is not included in this total.

[3] In a letter dated July 26, 2013, the Regional Board stated that "*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 34 percent dissolved copper load reduction calculated for the 2014 monitoring period is a result of (1) continued improvements in the vessel tracking and reporting process, (2) continued transition of vessels to non-copper and low-copper hull paints, (3) classification of vessels with "aged-copper paint" as low-copper, and (4) implementation of hull-cleaning BMPs.

Water Quality Monitoring

Monitoring of water column dissolved copper and toxicity is required to determine whether and when water quality objectives have been attained and beneficial uses have been restored. In August 2014, 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. Relative to the 2013 monitoring event, the 2014 results show an increase in basin-wide dissolved copper levels; however, there was no corresponding increase in bivalve larvae toxicity.

The August 2014 monitoring program showed that the basin-wide average dissolved copper level was 7.0 microgram(s) per liter (µg/L), which was approximately 16 percent lower than the 2005–2008 baseline average (8.3 µg/L), but 43 percent higher than the 2013 basin-wide average (4.9 µg/L). Results at five of the six SIYB monitoring stations exceeded the criterion continuous concentrations (CCC) numeric water quality objective (WQO) of 3.1 µg/L. Although the basin-wide dissolved copper level was higher in 2014 compared to that in 2013, the number of stations with copper concentrations exceeding the dissolved copper CCC (five stations in both 2013 and 2014) remained the same. The WQO is defined by the National Recommended Water Quality for Aquatic Life of the U.S. Environmental Protection Agency (USEPA) and is incorporated into the California Toxics Rule (CTR). The 2014 monitoring event also showed that five of six stations had copper concentrations that exceeded the CTR acute criterion maximum concentration (CMC) water quality objective (4.8 µg/L). In 2013, only three of six stations had results that exceeded the CMC objective.

Consistent with the 2013 monitoring event, the 2014 results indicate that only one station (SIYB-1, the station farthest inside the basin) had a statistically significant effect on developing mussel larvae[4]. While the 2014 toxicity results are in agreement with the 2013 results, the results from both years were an improvement over the 2012 results, which showed a statistically significant effect on mussel larvae development at two stations (SIYB-1 and SIYB-3). No toxicity was observed during the acute fish larvae survival tests conducted as part of the SIYB monitoring study.

---

[4] Most of the larvae scored as "abnormal" in 2014 had developed a shell; however, they had a slightly curved hinge rather than a straight hinge. There is a certain level of disagreement among regulators as to whether the larvae with curved shells should be scored as normal or abnormal. This issue is discussed further in Section 4.2.2 (Toxicity Tests) and Section 5.0 (Recommendations).

Summary

The 2014 TMDL monitoring findings indicate that the combined efforts undertaken to remain in compliance with the 2012 first interim load reduction target (10 percent) continue to reduce copper loads. Progress is being made in (1) vessel conversions to alternative low-copper or non-copper hull paints, (2) increased boater education and outreach, (3) better accounting practices and survey methods for determining hull paint types, and (4) continued implementation of hull-cleaning BMPs. A continuous, collaborative, and proactive approach will be necessary on the part of all stakeholders to continue reducing the copper loading and to meet future compliance goals for SIYB.

1.0 INTRODUCTION

This report is the annual Shelter Island Yacht Basin (SIYB) Dissolved Copper Total Maximum Daily Load (TMDL) Monitoring and Progress Report for 2014, 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 13225 of the Porter-Cologne Water Quality Control Act, requires that the Port provide technical reports on the progress of the SIYB Dissolved Copper TMDL (SIYB TMDL). SIYB TMDL implementation progress is to be determined by tracking data on the number of boat hulls converted from using copper-based antifouling paints 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 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 the biocide in antifouling boat paints because of its effectiveness in reducing fouling of boat hulls. It is currently legal to use copper in boat paints in the State of California. However, these paints leach copper into the water column, and, because of the reduced tidal flushing in SIYB, much of the copper remains. Copper is not only toxic to the targeted fouling organisms on boat hulls, but may also be toxic to other non-targeted organisms that inhabit the basin.

Levels of dissolved copper in SIYB have exceeded numeric water quality objectives for copper and narrative water quality objectives for toxicity and pesticides, and they threaten and impair the wildlife habitat and marine habitat beneficial uses in SIYB. 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.

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 520 kg/yr over a 17-year period (Regional Board, 2005). This time period extends to 2022, based on the official SIYB TMDL approval date[5] 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).

---

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

This page intentionally left blank

Source: ESRI - 2011

FIGURE

1-1

Location of Shelter Island Yacht Basin within San Diego Bay

Graphics/Aquatic Sciences/ShelterIsland/SDBay_v1.ai

This page intentionally left blank

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)	520

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 at least 10 percent 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

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 well exceeding the 10 percent goal. In a letter dated July 26, 2013, the Regional Board stated that "*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 next interim compliance goal is a 40 percent load reduction by the end of 2017.

1.3 Sources of Dissolved Copper

Based on the Regional Board's source analysis, the total mass load of dissolved copper to SIYB was 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 is not included in this total. This report evaluates the dissolved copper loading based on the vessel-related contribution, totaling 2100 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[a]	100	5
Urban Runoff	30	1
Background	30	1
Direct Atmospheric Deposition	3	<1
Sediment	0	0
Total	2,163	100

Notes:
a. As reported in a recent Space and Naval Warfare Systems Center Pacific (SPAWAR) study (Earley et al., 2013) conducted for the Department of Pesticide Regulation (DPR) in response to California Assembly Bill (AB) 425, the load contributions that result from passive leaching and hull cleaning may be hard to separate from other contributions because of the accelerated release of copper (i.e., leaching) that occurs following refreshment of the painted hull surface due to in-water hull cleaning. This issue is addressed in more detail in Sections 1.9 (Recent Studies and Initiatives) and 4.3 (Evaluation of New Data).

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 National Recommended Water Quality for Aquatic Life of the U.S. 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. Based on these numeric targets and existing monitoring data available at the time that the SIYB TMDL was implemented; the final waste load allocation was estimated to be 567 kg/yr. This includes a 10 percent margin of safety (57 kg/yr).

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 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 low-copper hull paints is being used as the primary method to assess compliance with interim and final SIYB TMDL load-reduction targets. In addition, water quality monitoring assesses long-term improvements in water quality, as measured by surface-water dissolved copper concentrations and toxicity. In addition, water quality monitoring will be used to determine final compliance with both numeric and narrative WQOs throughout the basin. 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 improvements. 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.

Results of the vessel tracking program will be used to assess both interim and final compliance with the SIYB 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 to determine progress toward final numeric and narrative objectives. These objectives are defined in the SIYB TMDL, which the Regional Board incorporated into the Basin Plan under Resolution Number R9-2005-0019.

1.6 Implementation of Best Management Practices

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

- Alternative hull paint testing and research
- Transition to non-copper hull paints
- Policy development and legislation (e.g., requiring permits for in-water hull-cleaning businesses)
- Education and outreach to boaters
- Monitoring and data assessment

The Shelter Island Master Leaseholders (SIML) TMDL Group was formed to represent the nine 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 with similar components.

Over the course of the SIYB TMDL program, multiple additional BMP 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, which included additional oversight of field procedures
- Review of methods used to track the type of bottom 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.

1.7 Review of 2013 Monitoring and Progress Report Recommendations

Over the past several years, the annual monitoring and progress report has included a “Recommendations Section.” The Recommendations Section includes recommended modifications or courses of action based upon the findings from the current year’s monitoring program. Recommendations made to date have included suggested changes or modifications to the monitoring program’s implementation based on observations during the collection of field samples, results of laboratory testing of samples, and techniques employed to analyze the test results. In addition, recommendations have been made in regard to new developments in the policy for and evaluation of copper biocide hull paints. In general, annual recommendations are intended to promote an adaptive management approach to planning and implementing the SIYB TMDL.

Five recommendations were proposed in the *2013 SIYB TMDL Monitoring and Progress Report* (AMEC, 2014). These recommendations are summarized in Table 1-3. The status of each 2013 recommendation is discussed in Section 5.0 (Recommendations). Execution of the 2014 SIYB TMDL monitoring program was modified, as needed, to incorporate these recommendations.

1.8 Revision of Monitoring Plan

The Monitoring Plan requires an update to incorporate the acceptance of any monitoring revisions noted in Table 1-3. The *Updated SIYB TMDL Monitoring Plan* is included as Appendix A to this document.

1.9 Recent Studies and Initiatives

Since the submittal of the *2012 SIYB TMDL Monitoring and Progress Report* to the Regional Board, there have been numerous recent studies and initiatives associated with copper boat paints and the establishment of site-specific water quality objectives that warrant further examination of their effects on the future implementation of the SIYB TMDL[6]. This information is summarized below and discussed in Section 4.3 (Description of Ongoing Initiatives, Studies, and Reports Relevant to the SIYB Dissolved Copper TMDL).

Assembly Bill 425 – In October 2013, Governor Brown signed Assembly Bill (AB) 425, which required the DPR by February 1, 2014, to (1) determine the existing leaching rate for copper-containing antifouling paint commonly used on recreational vessels, and (2) recommend appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of copper leached from hull paints. The DPR took the following actions:

- The DPR and the American Coatings Association funded a study (herein referred to as “SPAWAR study”) conducted by the Space and Naval Warfare Systems Center Pacific (SPAWAR) and Scripps Institution of Oceanography (Earley et al., 2013) to estimate the *in situ* leach rates of commonly used copper boat paints under various uses and environmental conditions.

---

[6] The recent studies and initiatives information summary presented in this report was also discussed in the *2013 SIYB TMDL Monitoring and Progress Report*. This information is being presented again here as it is important, pertinent, and applicable to the future direction of the SIYB TMDL.

Table 1-3.
2013 Monitoring and Progress Report Recommendations

2013 Report Recommendation	Recommendation Rationale
Issue 1: Implications of SPAWAR Study for SIYB TMDL – The Port recommends that the Regional Board, SIYB TMDL stakeholders (the Port and SIML TMDL Group), and the study scientists from SPAWAR assemble a working group to hold meeting(s) and specifically discuss how this new information affects the future direction of the SIYB TMDL. In particular, the objectives of this collaborative effort would include: • Discussions of the report's findings and agreement on the relevance of this new information to ongoing TMDL monitoring and assessment, and determination of the appropriate approach to work with the Regional Board to adjust load calculation and contribution estimates for assessing future compliance with TMDL targets • Development of a consensus on the degree to which this new information affects the direction of the SIYB TMDL as the stakeholders continue with the program during the second interim compliance period • Participation with the San Diego and other Regional Boards to develop consistency in how the data generated by these new studies are used in the future, both locally and in other locations (e.g., the dissolved copper TMDLs for Newport Harbor and Marina del Rey)	As part of its AB 425 assessment, the DPR contracted SPAWAR to conduct an evaluation of the leaching rates of copper hull paints. The SPAWAR study refined estimates of life cycle copper leach rates from ablative and epoxy copper hull paints as well as loading estimates of dissolved copper released to the water column as a result of in-water hull-cleaning employing BMP and non-BMP cleaning methods. The results of SPAWAR's study, in combination with other AB 425 findings, may be paradigm shifting with regard to the Regional Board's original dissolved copper loading assumptions identified in Resolution R9-2005-0019. Consequently, the Port recommended to the Regional Board that a working group be assembled that consists of the scientists that conducted the study, SIYB TMDL stakeholders, and the Regional Board to evaluate the results of the SPAWAR study and to determine how the results may affect the future of the TMDL.
Issue 2: Updating Loading Assumptions and Conceptual Model – The Port recommends that the conceptual model be revised to incorporate the applicable findings of the recent copper hull paint leaching studies, and that any revisions of the conceptual model be based upon the consensus of the working group described in Issue 1, above.	The loading assumptions presented in the 2011 SIYB conceptual model may require updating on the basis of the dissolved copper loading estimates presented in the SPAWAR study and the interpretation of these study data by the DPR.
Issue 3: Site-Specific Objectives – It is evident that site-specific objectives for copper in marinas or harbors, such as USEPA's saltwater copper biotic ligand model (BLM) currently in development, have broad support among California regulators. In preparation for the USEPA's completion of the saltwater copper BLM, the Port recommends that the SIYB TMDL stakeholders and Regional Board lay the groundwork necessary to implement this approach once it is adopted. This preparation would include evaluating existing data, identifying data gaps, and developing work plans for the potential studies needed to support the BLM approach for developing a site-specific dissolved copper water quality objective for SIYB. An example of such a potential study is a site-specific study to assess the levels of biotic ligands in SIYB and how these levels may vary seasonally and spatially. Such a water quality objective might apply to other locations within San Diego Bay. Additionally, the Port would encourage the Regional Board to submit a support letter to the USEPA for the development of the BLM consistent with the letter sent by Thomas Howard of the SWRCB.	The USEPA is continuing its development of a saltwater copper criteria document using the BLM. In its AB 425 memorandum and mitigation measures, the DPR stated "…*dischargers or TMDL responsible parties may consider pursuing site specific objectives (SSOs), which are allowed under the Water Boards' Basin Plans. Moreover, these parties could potentially rely on the Water Effects Ratio approach or on the marine Biotic Ligand Model (if and when it is accepted by U.S. EPA) as the basis for the SSOs.*"

Table 1-3.
2013 Monitoring and Progress Report Recommendations (continued)

2013 Report Recommendation	Recommendation Rationale
Issue 4: In-Water Hull Cleaning – The Port recommends that the Regional Board, SIYB TMDL stakeholders, the California Professional Divers Association, and other appropriate entities assess regulatory oversight responsibility for in-water hull cleaning in light of the DPR's recent higher estimates (compared with the TMDL estimate of 5 percent) of copper loading attributed to hull-cleaning. One objective of this assessment would be to evaluate the role of the Regional Board in developing a regulatory framework and implementing stricter standards for in-water hull cleaning. The DPR supports this idea by stating in its memorandum, *"DPR calculated that in-water hull cleaning attributes 41–62% of the dissolved copper in coastal marinas depending on the paint type and whether BMPs were used or not. Therefore, management (regulatory or non-regulatory) of in-water hull cleaning could significantly help to lower dissolved copper concentrations in marinas where these activities are common."*	In Appendix 2 of its AB 425 memorandum, the DPR recommends specific mitigation regarding in-water hull-cleaning practices. The recommendations are summarized as follows: • Improve the management of in-water hull-cleaning practices by relying on BMPs or certification programs to reduce the amount of copper leaching from boat hulls. • Explore the possibility of reducing in-water hull-cleaning frequency to no more than once per month. • As part of reformulation, include painted-hull maintenance information as part of their revised product labels for copper antifouling paint (AFP) registrants. Copper AFP registrants should develop a hull-cleaning brochure to be distributed to boaters via boatyards.
Issue 5: Presence of Harmful Organisms in Bay Water Samples – When collecting raw bay water samples, the toxicity laboratory should conduct microscopic observations of the samples prior to initiating toxicity tests. These visual observations should note the presence of any predatory species (such as the dinoflagellate *Noctiluca sp.* observed in the 2013 monitoring project) or other naturally occurring species (such as the phytoplankton that cause harmful algal blooms [HAB]). When possible, the laboratory should send images of the phytoplankton observed in the samples to HAB scientists at Scripps Institution of Oceanography to confirm observations. If predatory species or HAB species are observed, determine whether the samples should be filtered before testing to remove the threat and whether the samples need to be recollected. A standard operating procedure for this evaluation process should be included in the revised SIYB TMDL Monitoring Plan.	During the 2013 toxicity testing program, laboratory staff noticed the presence of a predatory dinoflagellate (*Noctiluca sp.*) in the test samples. A predatory dinoflagellate was affecting test organism survival. If unnoticed by laboratory staff, the result could have been a "false positive" toxic response. To mitigate this possibility, test samples were filtered for the bivalve larvae test prior to test initiation. False positive toxicity responses to sensitive test animals due to the presence of toxin-producing algae have also been noted in other studies. Based upon this evidence, the presence of potentially harmful organisms in the test samples needs to be evaluated before laboratory exposures are initiated.

Notes:
a· *2013 Shelter Island Yacht Basin TMDL Monitoring and Progress Report (AMEC, 2014)*

- The DPR prepared a memorandum (dated January 30, 2014) entitled "*Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints Per AB 425*."[7] This memorandum presented (1) the DPR's modeling approach and rationale for decision making, (2) the DPR's recommendations for mitigation, and (3) the selected maximum allowable leach rate.

The AB 425 legislation, required studies, and DPR findings will fill an important data gap associated with life cycle leaching estimates of dissolved copper from ablative and epoxy boat paints and will estimate the dissolved copper load attributed to passive leaching and in-water hull cleaning.

USEPA Saltwater Criteria – The USEPA is continuing to develop copper saltwater criteria with the biotic ligand model (BLM).

Once finalized and approved by all appropriate regulatory agencies, this approach for developing site-specific water quality objectives may be considered for SIYB as a tool to assess whether the current SIYB TMDL water quality objective of 3.1 µg/L for dissolved copper is overprotective, based on the ambient water quality characteristics within SIYB.

Mussel Larvae Toxicity – In 2013, Casey Elaine-Capolupo Bosse conducted a University of San Diego Master's thesis study entitled "Copper Bioavailability and Toxicity to *Mytilus galloprovincialis* in Shelter Island Yacht Basin, San Diego, CA."

This study provides paired dissolved copper concentrations and mussel larvae toxicity results for numerous locations in SIYB, and evaluates the bioavailability of dissolved copper in SIYB relative to the copper-binding capacity (i.e., ligands) of the ambient waters.

Harbor Island Dissolved Copper Study – Dr. Alberto Zirino of Scripps Institution of Oceanography presented the results of a study entitled "Copper in Harbor Island East and West Inlets: Keys to Understanding Detoxification Processes?"

This study was conducted in Harbor Island's West and East Basins and suggests that wind speed and direction have the potential to dampen the tidal exchange of surface waters in marina basins, resulting in an increased level of dissolved copper in surface waters compared with that in deeper waters. While this study was not conducted in SIYB, the study findings are important and may assist in evaluating the behavior of dissolved copper in enclosed basins such as SIYB.

1.10 Content of Report

This TMDL monitoring and progress report for SIYB presents the monitoring results for 2014 (the second year of the second compliance target period, 2013–2017), and includes:

- Methods to assess, estimate, and reduce copper loads

---

[7] Data from the 2014 DPR memorandum will be taken into consideration in the SIYB TMDL Conceptual Model update that will be prepared and submitted to the Regional Board in 2015.

- TMDL implementation, including BMPs implemented by the Port in SIYB and throughout San Diego Bay
- BMP implementation by yacht clubs and marinas in SIYB
- Evaluation, interpretation, and tabulation by the Port and SIML TMDL Group of data collected by the Port, 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 2014
- Information about recent studies, initiatives, and legislation associated with the use of copper biocide boat paints and the establishment of site-specific water quality objectives
- Discussion of the 2014 TMDL monitoring program findings
- Specific issues related to implementation of the SIYB TMDL monitoring program and recommendations to address these issues

Appendix A is the updated 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 has all water quality monitoring results for the August 2014 sampling event, including field sample collection data, analytical chemistry reports, and the bioassay report. Appendix E includes SIYB-related correspondence that occurred during 2014 between the Port and other agencies. Appendix F provides reference information regarding new studies of paint materials and technologies.

2.0 METHODS

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

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. In addition, the SIML TMDL Group was involved in selecting and implementing BMPs that contribute to the dissolved copper load reductions in SIYB. Selection, implementation, and effectiveness assessments of BMPs were at the discretion of each Named 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, the SIML TMDL Group's BMP plans, and a calendar of 2013 BMP activities in SIYB are in Appendix B.

2.2 San Diego Bay-Wide Implementation of BMPs

The BMP report in Appendix B also describes BMPs or other actions implemented by the Port to reduce dissolved copper discharges from boat hulls into harbors or marinas within San Diego Bay. The Port also reported 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 2014. This information includes vessel tracking methodologies and estimates of the contribution of dissolved copper into SIYB as a result of in-water hull cleaning, and a discussion of how these two factors were combined to estimate the annual dissolved copper load from all sources to SIYB in 2014.

2.3.1 Vessel Tracking

Annual reduction of copper loading was assessed by tracking conversions of hull paints from copper to non-copper or low-copper (i.e., less than 40 percent copper) products for vessels moored in SIYB. Named Parties that house vessels in SIYB (i.e., marina and yacht club owners and operators) reported to the Port vessel tracking data collected from their operating facilities from January 1, 2014 through December 31, 2014.

Yacht club and marina operators collected vessel tracking data by distributing a survey form to all SIYB boat 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 boat owner response to the survey was not mandatory at all facilities, if no response was initially received, follow-up attempts to gather the information were made with telephone calls and emails.

Vessel tracking data requested as per the Monitoring Plan are listed in Table 2-1. Vessel tracking data submitted by the SIML TMDL Group are in Appendix C.

Table 2-1.
Vessel Tracking Data Required by Monitoring Plan

Vessel Tracking Data Fields	
1.	Name of marina or yacht club
2.	Date of report
3.	Total number of slips or buoys in facility available to be occupied by vessels
4.	Slip/mooring occupation data
	a. Percentage of time unoccupied
	b. Percentage of time occupied by vessel(s) with known copper hull paint
	c. Percentage of time occupied by vessel(s) with aged-copper hull paint
	d. Percentage of time occupied by vessel(s) with documented low-copper hull paint
	e. Percentage of time occupied by vessel(s) with documented non-copper hull paint
5.	Vessel-specific information
	a. Vessel type (sail or power)
	b. Vessel length
	c. Vessel beam width

As a data QA/QC and confirmation check, additional information on paint type was required for vessels with low-copper (less than 40-percent copper) or non-copper hull paints (Table 2-2).

Table 2-2.
Low-Copper and Non-Copper Hull Paint Vessel Data

Vessel Tracking Data Fields	
1.	Paint brand name
2.	Product number
3.	Name of boatyard that applied paint
4.	Painting date
5.	Percent copper if low-copper hull paint is indicated

Vessel tracking data from SIYB included the percentage of time that slips were unoccupied or were occupied by vessels with copper, aged-copper, low-copper, non-copper, or unknown hull paints, as required by the Investigative Order (Table 2-3). 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 2-3.
Vessel Tracking Data Required Annually by 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.	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 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 Per 2013 Regional Board letter
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. Low-copper and non-copper hull paints were considered to be confirmed if the required supporting data that were reported (i.e., all of the required data fields were completed) for a given hull paint confirmed the copper content of a reported paint type (Table 2-2). Vessels stored out of the water (e.g., on HydraHoists®), 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 containing aged-copper paints, the painting date submitted must have been on or before December 31, 2011, for the 2014 monitoring year. Otherwise, the paint type was listed as either unconfirmed low-copper or unconfirmed non-copper. To be conservative, loading calculations for unconfirmed low-copper and unconfirmed non-copper paint were performed, assuming that paint was copper-based if the boat owner did not know the paint type. 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 2.3.3.

2.3.2 Hull Cleaning

The copper load attributed to in-water hull cleaning for the 2014 monitoring year was calculated on the basis of the SIYB TMDL source analysis calculations and copper load per cleaning event provided in Appendix 2 of the SIYB TMDL (Regional Board, 2005). The SIYB TMDL calculation assumed that all vessels had copper hulls and were cleaned approximately monthly, with BMPs used on only half of the vessels. However, since the Port's adoption of in-water hull-cleaning regulations in October 2011, all hull cleaners working in SIYB are required to use BMPs for every cleaning event. Based upon this requirement, the 2014 load was calculated assuming that 100 percent of the in-water hull-cleaning events were conducted using BMPs to reduce copper emissions (compared with 50 percent assumed in the SIYB TMDL).

2.3.3 Annual Dissolved Copper Load

Starting with the 2013 monitoring year (and continuing in subsequent years during the second interim TMDL loading reduction period), SIYB TMDL copper load reduction has been assessed by tracking the number of vessel hulls with copper paint, low-copper paint, 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 be in the low-copper category, but are tracked separately.

As was done in previous years, the 2014 tracking program estimated 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 recently painted. 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 collected; therefore, all such 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 (Regional Board, 2005). Loading reductions for the 2014 SIYB TMDL monitoring program were calculated on the basis of comparisons to these baseline conditions:

- 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[8].
- 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 that there was an average loading reduction of 0.9 kg/yr for every vessel in SIYB that converted from copper-based to non-copper-based paints. The use of low-copper hull paints was also recognized in the SIYB TMDL as a viable means of reducing copper loading to the basin. Low-copper paints have been identified as those with copper content that is approximately 50 percent of the maximum commercial application content of up to 76 percent copper. Hull coatings were considered to have low-copper content if they were less than 40 percent copper, as described in the Monitoring Plan (May 2011). This loading reduction analysis also assumed that, on average, each vessel that transitioned to low-copper hull paints reduced annual dissolved copper loading by 50 percent (0.45 kg/yr). Aged-copper paints were considered as a

---

[8] The copper load estimate attributed to in-water hull cleaning used for the 2014 monitoring program differs from the estimate presented in the SIYB TMDL. The SIYB TMDL assumed that 50 percent of the in-water hull cleaning in SIYB would be conducted using BMPs. Based upon the Port's ordinance, the 2014 load calculations assumed that 100 percent of in-water hull cleaning is conducted using BMPs.

0.45-kg/yr load if they were applied prior to December 31, 2011. The assumptions for the calculations of annual dissolved copper loading are in Table 2-4.

Table 2-4.
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
3.	Vessels with unknown hull paints have copper paint
4.	Slips/moorings for which occupancy data were not provided were 100 percent occupied
5.	Annual dissolved copper load from a vessel with non-copper hull paint equals 0 kg/yr
6.	Low-copper hull paints include paints with less than 40 percent copper
7.	Average annual dissolved copper load from a vessel with low-copper paint equals 0.45 kg/yr
8.	Copper paints applied prior to December 31, 2011, have an annual dissolved copper load that equals 0.45 kg/yr
9.	Annual loads were normalized by the percent of time vessels were docked in SIYB

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

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 two 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 was calculated by multiplying the annual dissolved copper load (0.9 kg/yr) by the average number of vessels occupying the anchorage weekly in 2014 and the average percentage of time that slips were occupied.

Furthermore, the load reduction analysis was performed for in-water hull cleaning compared with the load determined in the SIYB TMDL per cleaning event, assuming that BMPs were used 50 percent of the time (8.5 μg per square centimeter [cm^2] per event). Using this load and the maximum vessel count in the SIYB TMDL (2,363 vessels), the load due to in-water hull cleaning was estimated to be approximately 100 kg/yr. Since the implementation of the Port's in-water hull cleaning ordinance and required use of hull-cleaning BMPs, the estimated load per cleaning event has been reduced to 6.2 $\mu g/cm^2$/event. Additionally, with the vessel tracking data that are now being collected annually, the known number of copper hulls and their average wetted hull size were used in the calculation rather than assuming that all hulls contain copper paint. The same number of events was used in the 2014 calculation as in the TMDL (14 cleaning events/year). The estimated dissolved copper load due to in-water hull cleaning for the 2014 monitoring year was then compared with the TMDL estimate of 100 kg/yr.

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 TMDL (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 Monitoring Plan (Weston Solutions, Inc. [Weston], 2011; AMEC, 2014).

As required in the SIYB TMDL, dissolved copper concentrations were compared with the baseline level of 8.28 ± 1.36 µg/L (mean ± standard error). This value was calculated using water quality data collected between 2005 and 2008 from stations in the immediate vicinity of the Regional Board monitoring station network (Weston, 2011). Prior to the 2013 monitoring event, measurement of free copper ion activity in SIYB was also a component of the monitoring program. The Port recommended removing free copper measurement from the monitoring program because measurement of free copper is a new research tool for which there is no certification or USEPA standard method guidance. Additionally, the calibration process for the instrument that measures free copper is very specialized and takes anywhere from several hours to overnight to perform properly. The Regional Board accepted the Port's recommendations and the measurement of free copper ion activity is no longer a required component of the monitoring program.

2.4.1 Sampling Locations

The SIYB water quality monitoring station network was composed of six stations within SIYB (i.e., SIYB-1 to SIYB-6) and one station in the main channel of San Diego Bay outside of the mouth of the basin (SIYB-REF) (Table 2-5 and Figure 2-1). To the greatest extent possible, samples were collected within approximately ±3 meters of the target coordinates.

Table 2-5.
Sampling Station Coordinates

Station	Target		Actual	
	Latitude	Longitude	Latitude	Longitude
SIYB-1	32.71821	-117.22601	32.71824	-117.22601
SIYB-2	32.71412	-117.22921	32.71419	-117.22929
SIYB-3	32.71550	-117.22989	32.71552	-117.22987
SIYB-4	32.71683	-117.23203	32.71684	-117.23203
SIYB-5	32.71217	-117.23297	32.71214	-117.23306
SIYB-6	32.70858	-117.23514	32.70875	-117.23513
SIYB-REF	32.70406	-117.23232	32.70411	-117.23224

R:\2012\Aquatics\SanPedro_Improvement\mxd\Report Figures\Fig2-1_Monitoring_Stations.mxd

amec

FIGURE 2-1

Shelter Island Yacht Basin TMDL Monitoring Station Locations

This page intentionally left blank

2.4.2 Sampling Date

Water at the seven monitoring stations (six SIYB stations and one San Diego Bay reference station) was sampled on August 12, 2014. In accordance with the Monitoring Plan, water sampling bracketed slack high tide during the summer. 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 antifouling 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.

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 Quality Assurance Project Plan (QAPP). All stations were located using the Differential Global Positioning System.

Samples were collected within one meter (m) of the surface and are referred to herein as “surface samples.” Field measurements were taken at each station for hydrogen ion concentration (pH), salinity, and temperature using a YSI Incorporated (YSI) Pro Plus data sonde. *In situ* analytical methods and detection limits are listed in Table 2-6.

Table 2-6.
***In Situ* Analytical Methods and Detection Limits**

Water Quality Measurement	Method	Reporting Limit
Salinity	YSI Pro Plus	0.1 ppt
Temperature	YSI Pro Plus	0.1 °C
pH	YSI Pro Plus	0.2 pH unit

Notes:
°C - degrees Celsius
pH - hydrogen ion concentration
ppt - part(s) per thousand
YSI - YSI Incorporated

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

Detailed field notes were recorded during sample collection at each station and all water 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. Both laboratories are accredited through the California Environmental Laboratory Accreditation Program (ELAP). Photographs taken during field sampling are in Figure 2-2.

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, water 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. The 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.

While the SIYB TMDL specifies the long-term monitoring of dissolved copper concentrations in the water column, general water quality measurements (of salinity, temperature, TOC/DOC, 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 antifouling 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 dissolved copper concentrations to determine basin-wide compliance with the CTR dissolved copper criteria continuous concentration (CCC) target (3.1 µg/L). In Section 3 (Results), the 2014 dissolved copper results are compared with the 2005–2008 baseline data as reported in the Monitoring Plan (Weston, 2011) to evaluate how dissolved copper levels are changing over time.

The laboratory analytical methods and detection limits are specified in Table 2-7.

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 using 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.

amec

Field Sampling Photos

FIGURE

2-2

This page intentionally left blank

Table 2-7.
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

Notes:
µg/L - microgram(s) per liter
mg/L - milligram(s) per liter
DOC - dissolved organic carbon
TOC - total organic carbon
SM - Standard Method
USEPA - U.S. 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 13, 2014, for all samples collected in SIYB and followed 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 dissolved oxygen (DO), temperature, pH, and salinity. Test conditions are summarized in Table 2-8. 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 samples 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 concentrations of 0, 50, 100, 200, 400 and 800 µg/L copper. The reference toxicant test was tested concurrent with the SIYB samples and used the same batch of test organisms. At test termination, the median lethal concentration (LC_{50}) was calculated and compared to historical laboratory reference toxicant test data for this species. Test organisms were considered to be responsive and appropriately sensitive when the test LC_{50} was within two standard deviations of the historical laboratory standard.

Table 2-8.
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 12, 2014
Test Dates	August 13-17, 2014
Test Species	Pacific topsmelt *(Atherinops affinis)*
Test Protocol	EPA-821-R-02-012 (USEPA, 2002)
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
Date Fish Received	August 10, 2013
Acclimation Time	3 days
Age at Test Initiation	13 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 - U.S. Environmental Protection Agency

2.4.6.2 Bivalve 48-Hour Bioassay

The 48-hour bivalve larvae tests were initiated on August 13, 2014, 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 2-9.

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 2-9.
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 12, 2014
Test Dates	August 13–15, 2014
Test Species	Mediterranean mussel *(Mytilus galloprovincialis)*
Test Protocol	EPA/600/R-95/136 (USEPA, 1995)
Test Acceptability Criteria	The test will be considered acceptable if (1) at least 50 percent of the control larvae survive, and (2) at least 90 percent of the surviving control larvae developed normally
Test Type/Duration	Bivalve larvae survival and development (endpoint reported as normal development of surviving embryos) – Static / 48 hours
Organism Supplier	Kamilche Seafarms (Shelton, WA)
Control Water Source	Scripps Pier seawater, 20-μm filtered
Date Adult Mussels Received	August 8, 2013
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 - micron
mL - milliliter(s)
USEPA - U.S. Environmental Protection Agency

A 48-hour reference toxicant test using copper chloride was conducted concurrently with the project samples 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 reference toxicant test was tested concurrently with the SIYB samples and used the same batch of test organisms. At test termination, the median effective concentration (EC_{50}) was calculated and compared to 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 non-toxic 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 collection of the samples 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, 2014). As part of the updated field collection protocol, QA/QC reviewers from the Port and AMEC Environment & Infrastructure, Inc. (AMEC) were on board the sample 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., boat 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 2014 monitoring year are summarized below:

- ✓ QAPP 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
- ✓ Onboard QA/QC oversight
- ✓ Observations for hull cleaning or other water-quality-impacting activities near sampling collection 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 monitoring locations (Station SIYB-1 in the 2014 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 2-10). AMEC 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 2-10.
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]
48-hour Acute Bioassay	36 hours
96-hour Chronic Bioassay	36 hours

Notes:
a. Holding time applicable to preserved sample; the sample was filtered in the field into a bottle with H_2SO_4 preservative for DOC analysis.
b. Holding time for metals after preservation is 180 days. The dissolved fraction was filtered at the laboratory immediately upon receipt from the AMEC courier on the same day as sample collection (August 12, 2014).
DOC - dissolved organic carbon
H_2SO_4 - sulfuric acid
TOC - total organic carbon

The QA objectives for chemical analysis conducted by the participating analytical laboratories are detailed 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 will be kept on file for review, as applicable.

2.6 Chain-of-Custody Procedures

Chain-of-custody 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 employee who had custody of the samples signed the form and ensured that the samples were not left unattended 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 into a plastic envelope and kept inside the cooler containing the samples. As previously noted, AMEC staff members physically couriered the bay water samples from the dock on SIYB to Weck and Nautilus on the same day that they were collected. This level of effort provided an additional security to the chain-of-custody process and also ensured that all holding times were met.

Upon 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.

Upon completion of analysis, any 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 COCs were checked against sample labels at the end of the day prior to samples being transported to the laboratories. In the laboratory, technicians documented sample receipt and sample preparation activities in laboratory logbooks or on bench sheets. Data validation included dated and signed entries by technicians on the data sheets and logbooks used for samples, use of sample tracking and numbering systems to track the progress of samples through the laboratory, and use of 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 for review and reporting. All laboratory records that were submitted, including any raw data, are included in Appendix D with each laboratory report.

This page intentionally left blank

3.0 RESULTS

This section reports the results of the 2014 SIYB TMDL monitoring program. The 2014 period is the second year of the second compliance phase of the SIYB TMDL as the Port moves toward the second compliance goal of 40 percent copper reduction. After having met the compliance goal for the first phase (10 percent), the Port will use the next five-year window for the second phase (2013–2017) to meet the next reduction goal. The effect of transition to the lower leach paints required by AB 425 on the ability to meet these load reductions targets still needs to be evaluated.

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 2014.

3.1 SIYB TMDL Implementation

An evaluation, interpretation, and tabulation of data and information on SIYB TMDL activities undertaken by the Named Parties are provided in the following subsections. Through enhanced activities and diligent outreach by marina and yacht club managers to survey boaters, approximately 66 percent of boat owners responded (based on the final combined 2014 survey). The 2014 survey response rate is a considerable and continued improvement over the rate of 34 percent achieved in the first year (2011) and the 55 percent response realized in 2013.

3.1.1 BMP Implementation

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

- Hull Paint Transition
- Hull-Cleaning BMPs
- Education and Outreach
- Grant Funding and Incentives
- Alternative Hull Paint Studies
- Monitoring
- Reporting
- Policy/Regulation
- 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 program is a pragmatic approach that complies with the interim and final goals of the SIYB TMDL. The program focuses on the largest source contributions, identifies a strategic approach for implementing projects over the short and long term, and most 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. In 2014, the Port was successful in conducting and/or completing the initiatives identified in the Port's Work Plan (Appendix B).

The main elements of the Port's copper reduction program are described below, along with highlights of some of the Port's key BMP successes in 2014. A complete list of the Port's BMPs, the status of each, and brief effectiveness assessments are in Appendix B. Unless otherwise footnoted, all of the following BMPs have been implemented for the SIYB TMDL.

Policies and Legislative Efforts to Reduce Copper Loading

Sponsorship of Copper Hull Paint Legislation – Assembly Bill (AB) 425

In 2013, the Board of Port Commissioners voted to sponsor AB 425, authored by Assemblywoman Toni Atkins and (in October 2013) signed by Governor Brown. This bill required the DPR to determine a leach rate for copper antifouling paints and recommended mitigation to protect aquatic environments from the effects of exposure to those paints. The bill required the DPR to complete this determination by February 1, 2014.

During 2013, the Port worked with Assemblywoman Atkins and her staff to address the questions and concerns of stakeholders, and to coordinate with the DPR. In November 2013, a key part of the DPR's reevaluation was completed with the public release of the SPAWAR study entitled "Life Cycle Contributions of Copper from Vessel Painting and Maintenance Activities" (Earley et al., 2013). This study evaluated the release of copper into the water from passive leaching and hull cleaning, starting with the initial paint applications and continuing over the course of a three-year life cycle of the paint. The Port staff has evaluated the study, and its findings relevant to the SIYB TMDL load allocations are discussed in Section 4.3 (Evaluation of New Data).

The final DPR report was completed on January 30, 2014. The report established a leach rate whose load reduction was protective of aquatic environments and limits hull paints to only those that met the leach rate. The report established the following:

- Maximum leach rate of 9.5 µg/cm^2/day for paints with a monthly cleaning with a soft carpet.
- Maximum leach rate of 13.4 µg/cm^2/day for paints on boats located where cleaning is prohibited.
- An additional 7 mitigation measures identified to be implemented.

In the 2013 Monitoring and Assessment Report (AMEC, 2014), the Port recommended that the Regional Board, SIYB TMDL stakeholders (the Port and SIML TMDL Group), and the study scientists from SPAWAR assemble a working group to hold meeting(s) and specifically discuss how this new information affects the future direction of the SIYB TMDL.

Correspondence with State and Federal Agencies

These communications occur to promote consistency in requirements being developed across the state and to discuss strategies for implementation of activities and lessons learned and to build upon successful activity models the Port.

In 2014, the Port sent a letter to the USEPA to request consideration of the Biotic Ligand Model for Marine Waters (January 8, 2014) and a letter to the California Regional Water Quality Control Board, Los Angeles District, providing comments on the proposed Harbor Toxic Pollutants TMDL for Marina del Rey (January 14, 2014). The contents of these letters are summarized below. Copies of the letters are contained in Appendix E.

- Consideration of Biotic Ligand Model for Marine Waters (dated January 8, 2014) – In this letter addressed to Dr. Elizabeth Behl, Director, Health & Ecological Criteria Division of the USEPA, the Port commended the USEPA for initiating the development of the biotic ligand model for marine waters, and conveyed its support for the expeditious completion of the model development effort and official release of the model to the public so that it can be used as a tool to help establish site-specific water quality objectives in impaired water bodies.
- Marina del Rey Harbor Toxics Pollutants TMDL Reconsideration (dated January 14, 2014) – In this letter addressed to Shana Rapoport of the California Regional Water Quality Control Board, Los Angeles District, the Port provided comments on the proposed amendment to the Los Angeles Basin Plan revising the Marina del Rey Harbor Toxic Pollutants TMDL. In the letter, the Port outlined its leadership role for copper reduction activities associated with the SIYB TMDL, and encouraged the Los Angeles District Regional Water Quality Control Board to consider the need for developing and using consistent methods to develop the regulations that impact impairments that are common throughout California.

Regulations for In-Water Hull Cleaning

Since October 2011, in-water hull-cleaning regulations have been in place that require hull-cleaning businesses to obtain Port-issued permits to do hull cleaning on 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 2014.

Diver cleaning a boat hull

Collaborative validation of the permits was undertaken by the Port, marinas, and yacht clubs by instituting a check-in process at the marinas and inspections. Port staff regularly inspected marinas and hull-cleaning practices, with 28 inspections and several call responses in 2014. Two warning letters and one citation were issued during the reporting period. Specifically, a diver working without a permit was issued a warning letter, and a diver working with an expired permit received a warning letter followed by a citation. In addition, several of the hull-cleaning permits had reached the end of the two-year permit term in 2014, so several businesses also renewed their permits during this reporting period.

Key permitting statistics are as follows:

- 68 permits have been issued since the onset of the regulation.

Boat hull before and after cleaning

- 53 hull cleaning permits are active (as of December 31, 2014).
- 3 new hull cleaning permits were issued in 2014.
- 49 hull cleaning permits had been renewed with 8 renewals occurring in 2014 (as of December 31, 2014).
- 128 divers currently have Port-issued identification cards.
- In 2014, one permit expired and the diver was either no longer in business or the permit was not renewed.

To date, the regulations helped to reduce copper loads from in-water hull cleaning. ***The requirement that all hull cleaners use BMPs has reduced the dissolved copper load by 34 kg/yr.***

Implementation of Hull Paint Testing/Evaluations of New and Emerging Hull Coatings and Technologies

Evaluation of the Port Fleet's Non-Copper Hull Paint Effectiveness

As part of the Port's ongoing research into understanding alternative paints, Port staff continued working with Port divers to assess the Port's fleet of vessels with non-copper paint. This included efforts to maintain the paints, conduct cleaning assessments, and evaluate the paints' effectiveness, both in terms of cleaning needs and durability. During this reporting period, Port staff also started gathering data on fuel use, paint costs, and other cost-related data to better understand the long-term cost effectiveness of the paints.

Ongoing Use of Application Technologies Identified in USEPA-funded "Safer Alternatives to Copper Antifouling Paints" Project

The Port continued to encourage boatyards to consider the industry shifts identified in its 2011 "Safer Alternatives" project (Port, 2010) for non-biocide application procedures that are occurring within other Port grant projects (see the Section 319(h) discussion below). Application techniques such as applying coatings with roller brushes rather than spraying and applying alternatives on top of existing copper paint were encouraged by boatyards as they applied non-biocide paints for the grant project.

Implementation and Facilitation of Hull Paint Transitions

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 13 of the Port's boats continue to use non-copper paints, resulting in an 9.9-kg/yr[9] copper load reduction.***

Implementing the State Water Resources Control Board (SWRCB) Clean Water Act Section 319(h) Non-Point Source Grant Program Hull Paint Conversion Project

---

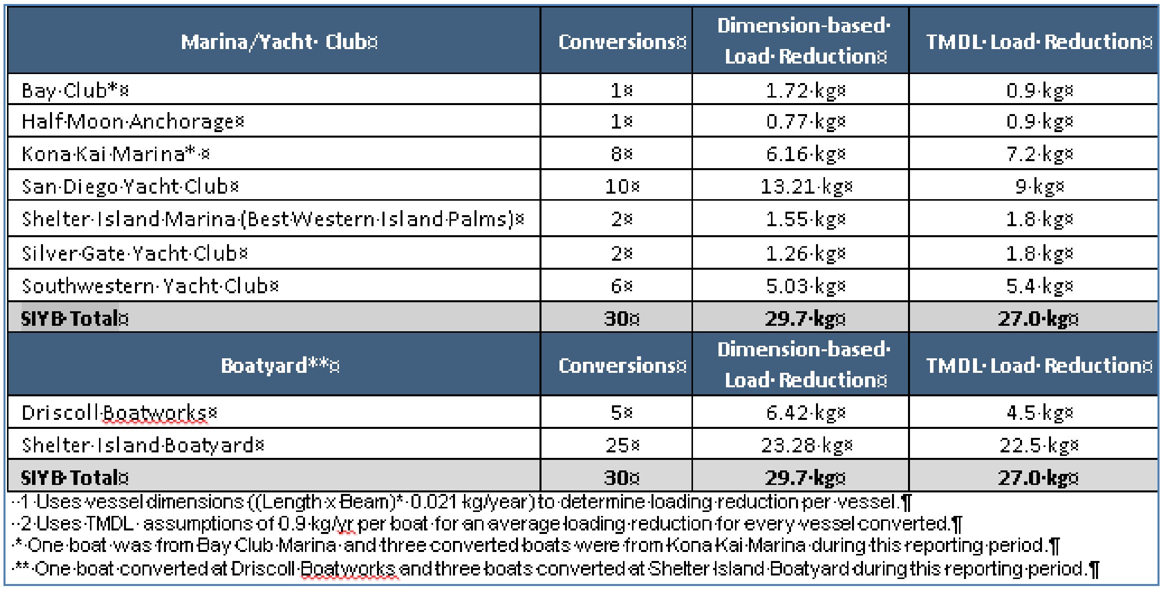
[9] The load reduction calculation for these values took into account actual vessel dimensions, rather than using the average size in the SIYB TMDL assumptions.

In 2011, the Port successfully secured a Section 319(h) grant from the SWRCB for $600,000 to help with hull paint transition. This grant is part of the Clean Water Act Section 319(h) non-point source program. The grant provides cost offsets for SIYB boaters who use non-biocide paints. In addition to assisting boat conversion, Port staff is using this grant as a gauge to (1) determine whether voluntary incentives are adequate to meet the TMDL targets, (2) identify an appropriate cost point to incentivize boaters to convert, (3) develop a system to track hull paint conversions, and (4) establish a grant project framework to use when seeking additional grant funding for bay-wide conversions. The 319(h) grant highlights for the 2014 reporting period are as follows:

- *During 2014, the 319(h) grant* ***successfully converted 5 boats, resulting in a 3.38-kg/yr load reduction. In all, the grant has converted 34 boats, resulting in a 32.3-kg/yr load reduction as of December 31, 2014.***
- During 2013, staff also reached out to the SWRCB and Regional Board to determine whether the grant could be extended to enable more boaters to take advantage of its revised cost incentives that went into effect in 2012. By the end of December 2013, all agencies had agreed to an extension of one year, with the new period of performance ending June 30, 2015, and all grant-related funding requests due to the SWRCB by July 31, 2015. The time extension was officially approved in 2014. This time extension is the maximum extension possible within the grant provisions.
- Four 319(h) progress reports were developed and submitted to the Regional Board as required. The reports documented progress on boat conversions, outreach activities, and fund expenditures.
- A vessel tracking database was completed for compiling data on the 319(h) grant conversions. The database incorporates the initial boater interest data, as well as the boatyard conversion data. Reporting outputs generated by the database identified the grant-related load reductions, both basin-wide and by marina (Figure 3-1). The Port and all 11 SIYB facilities are currently using a template to track hull paint. The Port worked with its IT Department and a consultant to implement enhancements to the database.

Vessel painted with the non-copper paint CeramKote in 2014

Figure 3-1. Example Vessel Tracking Database Output from a 319(h) Grant Report



Marina/Yacht Club	Conversions	Dimension-based Load Reduction	TMDL Load Reduction
Bay Club*	1	1.72 kg	0.9 kg
Half Moon Anchorage	1	0.77 kg	0.9 kg
Kona Kai Marina*	8	6.16 kg	7.2 kg
San Diego Yacht Club	10	13.21 kg	9 kg
Shelter Island Marina (Best Western Island Palms)	2	1.55 kg	1.8 kg
Silver Gate Yacht Club	2	1.26 kg	1.8 kg
Southwestern Yacht Club	6	5.03 kg	5.4 kg
SIYB Total	**30**	**29.7 kg**	**27.0 kg**
Boatyard**	**Conversions**	**Dimension-based Load Reduction**	**TMDL Load Reduction**
Driscoll Boatworks	5	6.42 kg	4.5 kg
Shelter Island Boatyard	25	23.28 kg	22.5 kg
SIYB Total	**30**	**29.7 kg**	**27.0 kg**

1 Uses vessel dimensions ((Length x Beam)* 0.021 kg/year) to determine loading reduction per vessel.

2 Uses TMDL assumptions of 0.9 kg/yr per boat for an average loading reduction for every vessel converted.

* One boat was from Bay Club Marina and three converted boats were from Kona Kai Marina during this reporting period.

** One boat converted at Driscoll Boatworks and three boats converted at Shelter Island Boatyard during this reporting period.

Boater Education and Outreach

Information being distributed at the 2014 Eco-Friendly Hull Paint Expo

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 in 2012, 2013, and into 2014; these tools were highly effective mechanisms to promote copper reduction. During 2014, the outreach program employed a variety of techniques to ensure that frequent and consistent messages were being delivered through multiple media avenues. This effort proved successful, with increased exposure and improved boater awareness on alternative paints and water quality. The following are education and outreach highlights of the 2014 reporting period.

Outreach Events

Hosting a booth at community and Port events geared toward boaters provided an excellent opportunity to interact with the pubic and disseminate information. During 2014, the Port hosted a boating-related booth at six events. ***These events reached about 60,700 people; approximately 1,300 printed materials were distributed, such as paint brochures, grant interest forms, frequently asked questions (FAQs), and boater guides.***

Annual Hull Paint Expo


Speaker panel at
the 2014 Eco-Friendly Hull Paint Expo

The Port began holding annual hull paint expo events that put boaters directly in contact with the boatyards, paint manufacturers, and hull cleaners. Boaters were able to learn about alternative products, grant incentives, and proper alternative paint hull cleaning. Additionally, the expos positively affected grant participation (Figure 3-2). There were two expos held in 2014. The first expo (March 2014) included a speaker panel of hull cleaners and boaters who use non-biocide paints. The panel enabled attendees to hear first-hand about local experiences with using alternative paints. The second expo (October 2014) included a presentation by a professional hull cleaner about the alternative hull paints available to boaters and proper hull cleaning methods. Two local boaters who had participated in the Port's grant funding were also on hand at the Port's booth to answer questions from other boaters about the grant process and their discuss their experience with alternative hull paints. During both expos, boaters were able to view a live, customized demonstration of the Alternative Hull Paint Cost Calculator to see how much money they could save by participating in the Port's grant. ***The 2014 hull paint expos were attended by 175 boaters, most of whom were local to San Diego Bay, with some attendees traveling from the Los Angeles area. Approximately 100 brochures and 50 grant-related forms were distributed.***

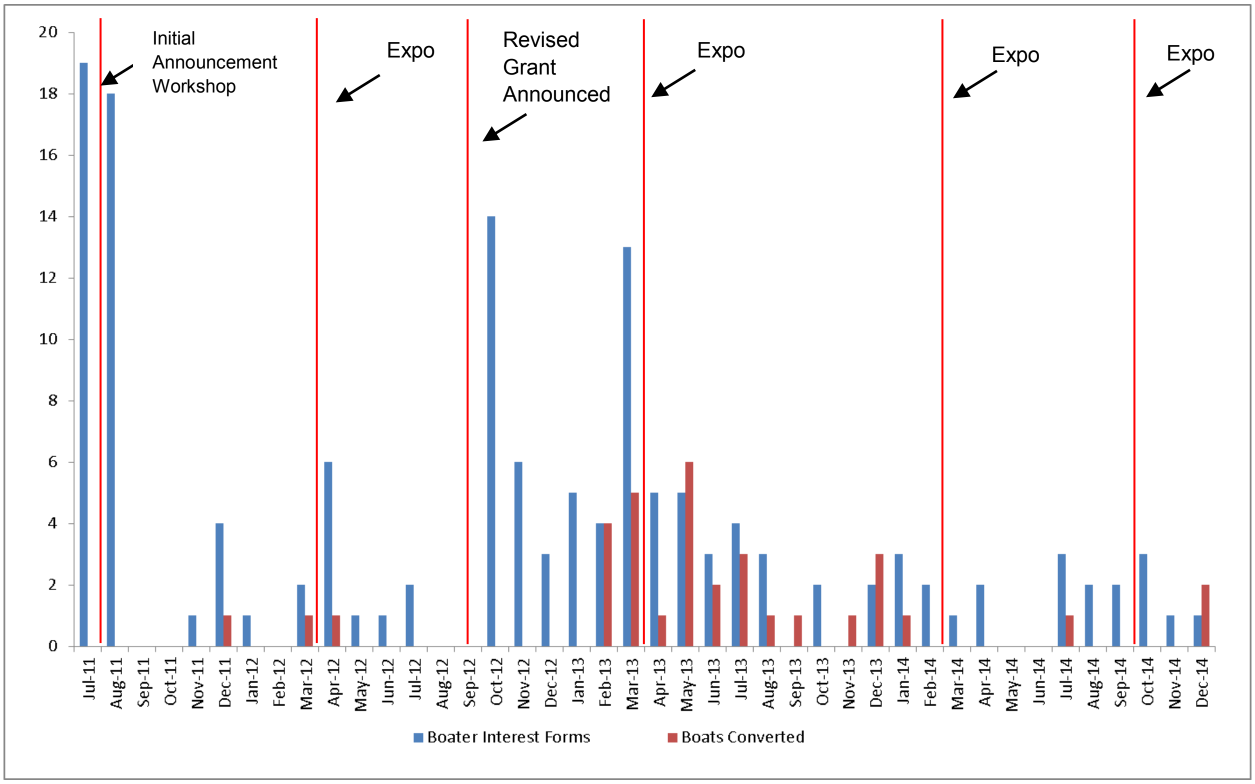
Conference Attendance

Ongoing public education and outreach also occurs in the form of speaking engagements at conferences. Not only is information provided on alternative hull paints, but valuable input is gained from others with similar experiences. ***In 2014, Port staff participated in two conferences.*** The first conference, held in January 2014, was the California Marine Affairs & Navigation Conference. It included Port staff as a SIYB TMDL panel speaker with approximately 50 attendees at the discussion.

The second conference was the Southern California Chapter of the Society of Environmental Toxicology and Chemistry (SoCal SETAC) Conference held in April 2014. SoCal SETAC hosted Karen Holman of the Port as an invited speaker at a special workshop on copper in the marine environment. In addition to the Port's presentation, John Adriany of ChemMetrics gave a presentation at the same copper workshop. There were approximately 120 people in attendance.

Karen Holman delivering a presentation on the
Port's copper reduction program at the
2014 SoCal SETAC Conference

Figure 3-2. Response of SIYB Boaters to Outreach Strategy and Grant Revisions



Outreach Expos Positively Affect Grant Participation

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 produced two new print materials*, in addition to making numerous distributions of its existing print materials.***

Printed announcement to help spread consistent messages about hull paint

Informational Packet for Boatyards

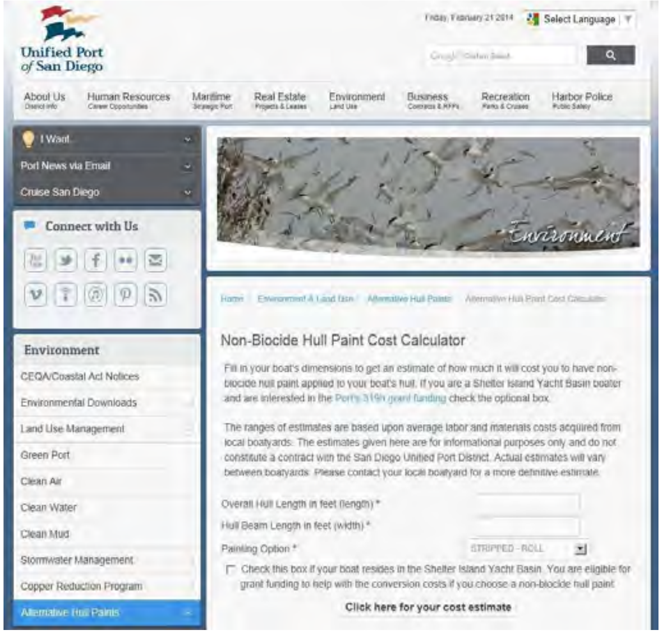
Changing a boater's opinion on alternative paints relies on having information about these products readily available. Recognizing this fact, the Port worked with several paint manufacturers to compile paint brochures, product specifications, and other product-specific literature on the non-biocide paints that are currently available for use. Once compiled, these information packets were distributed to local boatyards and marinas so that they could be given to boaters interested in the 319(h) grant project. ***Five-hundred boater information packets were assembled and distributed in 2013, and additional packets were provided to boatyards in 2014 as needed.***

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. The Port has developed a dedicated site, www.sandiegobaycopperreduction.org, which links viewers to all elements of its copper reduction program. The site provides information on the 319(h) grant, hull-cleaning regulations, and general paint-research information. The site also contains downloadable materials to apply for the 319(h) grant, obtain a hull-cleaning permit, and read recent press releases relevant to copper reduction. Monitoring studies are also available on the website, which was started in 2010***. During the 2014 reporting period, Port staff continued to evaluate the content and provided regular updates to ensure that the website was readily available and that its information remained current and easy to find.***

Cost Calculator

A web-based hull paint cost calculator was released in June 2013 on the Port's copper reduction website. The cost calculator helps boaters understand the costs of converting to alternative hull paints. The cost calculator uses boat dimensions and the application method (stripped or not stripped, or rolled or sprayed) to provide a range of estimates based upon average labor and materials costs provided by the boatyards and paint manufacturers. In addition, the cost calculator provides an option to boat owners interested in participating in the 319(h) grant that allows them to obtain an estimate of the available cost offsets. Customized demonstrations of the cost calculator were given at both expos in 2014. Overall, feedback on the Port Website's hull paint cost calculator continues to be positive. ***As of December 2014, the cost calculator has received approximately 378 hits.***



Non-Biocide Hull Paint Cost Calculator

Fill in your boat's dimensions to get an estimate of how much it will cost you to have non-biocide hull paint applied to your boat's hull. If you are a Shelter Island Yacht Basin boater and are interested in the Port's 319h grant funding check the optional box.

The ranges of estimates are based upon average labor and materials costs acquired from local boatyards. The estimates given here are for informational purposes only and do not constitute a contract with the San Diego Unified Port District. Actual estimates will vary between boatyards. Please contact your local boatyard for a more definitive estimate.

Overall Hull Length in feet (length) *
Hull Beam Length in feet (width) *
Painting Option * STRIPPED - ROLL
☐ Check this box if your boat resides in the Shelter Island Yacht Basin. You are eligible for grant funding to help with the conversion costs if you choose a non-biocide hull paint.

Port of San Diego hull paint cost calculator

Peer-Based Testimonials

Another media tool is peer-based marketing, with local boaters discussing their experiences with 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 and other written testimonials were added so that readers could learn about other local boaters' experiences***. As of December 31, 2014, the video had been viewed 837 times.***

Press Releases

Press releases are another effective media tool 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. Additionally, repeat messaging has 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.). ***During the 2014 reporting period, seven press releases were issued.***

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 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. On April 15, 2014, Port staff provided an update on the TMDL and 319(h) grant at the Board of Port Commissioners' meeting. At the April 15, 2014, meeting, Port staff also briefed the executive team on relevant copper-related topics such as the hull paint expo, recently released monitoring studies, and compliance milestones. On August 20, 2014, Port staff provided an update on the SIYB TMDL and 319(h) grant to approximately 30 people who attended the Port's Environmental Advisory Committee meeting.

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 2014, the Port has participated in seven collaboration opportunities with groups within San Diego and throughout the California boating and regulatory community. These groups include Hornblower Cruises, San Diego Yacht Club and Southwestern Yacht Club, the SIML TMDL Group, Newport and Marina del Rey jurisdictions, the Interagency Coordinating Committee, and the Regional Board.

Agency-Wide Activities

The Port has several ongoing bay-wide practices that incorporate BMPs to help decrease copper loading into the SIYB. The three main categories of agency-wide programs are as follows.

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.

Commercial Business Inspection Program

Per the requirements of the Municipal Permit, the Port inspects commercial facilities in the SIYB and bay-wide. One particular component, the Port's marina inspection program, is an effort to educate boat owners about pollution prevention, focusing on visual observations designed 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 two facilities during 2014.***

Standard Urban Stormwater Mitigation Plan (SUSMP) and Development of Regulations

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 as low-impact development (LID). All efforts aid in the reduction of copper loading into San Diego Bay. Since 2009, the Port has had eight existing bay-wide projects overall with metals as priority pollutants, with

39.37 acres treated bay-wide***. Two of the projects occurred in SIYB during 2014 with metals as a priority pollutant. This resulted in post-construction BMP implementation treatment of 1.69 acres.***

<u>Monitoring and Reporting</u>

Updates to SIYB TMDL Conceptual Model
The SIYB TMDL Conceptual Model identifies the physical and chemical factors that control the fate and transport of dissolved copper within SIYB and receptors (i.e., biota) that could be exposed to copper in the water and sediment. The model is required to be updated as new information is obtained. As of December 2014, the data from the California DRP Report was being evaluated for inclusion into the conceptual model. This process is still ongoing.

Regional Harbor Monitoring Program
The bay-wide monitoring program assesses the conditions found in San Diego Bay on the basis of comparisons with historical data and on comparison of contaminant concentrations with known surface water and sediment thresholds. The program samples water, sediment, and a variety of fish species through San Diego Bay and a comprehensive report is generated. Sampling for the Regional Harbor Monitoring Program was completed in 2013 and the report is expected to be completed in 2015. During 2014, sediment chemistry, toxicity, and benthic infaunal data were being analyzed.

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 2014 as a part of their TMDL BMP activity. These BMP actions are described in more detail in Appendix B.

- Formation of the SIML TMDL Group
- Attendance at SIYB TMDL stakeholder meetings since 2005 (including 16 meetings in 2014)
- Completion of (or in-process) certification of SIMLs as Clean Marinas

Posted sign informing hull cleaners and boat owners about BMPs

- Collection and reporting of data to track vessel hull painting, as required by the Investigative Order
- Development and oversight of hull cleaner 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 dockmaster's office to the Port
  - Reporting hull cleaners who do not use proper BMPs or who create visible paint plumes during hull cleaning to the Port
  - Posting diver BMP signs on leaseholds

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

- Boater education and outreach through newsletters, flyers, workshops, and readily available literature
- Bottom paint survey mailed to tenants and members and returned to the Port
- Requirement for boaters to use only Port-permitted hull cleaners
- Ongoing training for yacht club and marina staff
- Planning alternative paint incentive programs, which include slip wait list priority for boats with non-copper paints and financial incentives for boats converting to non-copper alternatives

The BMP Committee is also discussing promotions with other boat yards and paint manufacturers. Some marinas are facilitating dry sailing boats with no bottom paint and a high-capacity hoist has been built to store more dry vessels. The SIML TMDL Group is also promoting the "one stop shop" non-copper promotion from one of the local boatyards.

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 2014 census of the hull paint types reported in SIYB is as follows:

- 1,296 vessels (59.8 percent) have copper or unknown (assumed to be copper) hull paint.
- 141 vessels (6.5 percent) have low-copper paint (confirmed [113 vessels] + unconfirmed [28 vessels]).

- 158 vessels (7.3 percent) have either non-copper paints or no paint at all (confirmed [139 vessels] + unconfirmed [19 vessels]).
- 574 vessels (26.4 percent) have aged-copper hull paint.

3.1.3 Slip Count and Occupancy

The survey results showed that 2,300 slips[10] in SIYB were available to be occupied by vessels in 2014, including a Port-operated anchorage with a capacity of up to 40 guest vessels, 27 transient docks, and 15 slips at the harbor police dock. This was a decrease in total slip count by 80 compared with the count in the 2013 monitoring year, and a decrease of 63 slips as compared to the 2,363 maximum available slips and moorings reported in the SIYB TMDL (see Table 3-1).

Of the 2,300 slips and moorings in SIYB during 2014, 131 slips were reported to be vacant year round (or at least at the time the survey was conducted), leaving 2,169 slips that were occupied for at least a portion of time in 2014. Slip occupancy rates for each hull paint type are also shown in Table 3-1. On average, slips and moorings in SIYB were occupied 85 percent of the time.

3.1.4 Aged-Copper Paint

As reported in Section 1.7 (Incorporation of Previous Recommendations), in the 2012 Monitoring and Progress Report, the Port recommended using similar load calculation (0.45 kg/yr) coding for vessels with aged-copper paint and vessels with low-copper paints for future loading calculations. This recommendation was based upon numerous studies that show copper leaching rates are significantly diminished over the life cycle of hull paints. The Regional Board agreed with this concept, and stated, "*To more accurately calculate the amount of copper loading to SIYB, allow the assumption that vessels with aged-copper AFPs have a copper release (i.e., leaching or loading) rate similar to low-copper AFPs (0.45 kg/yr) because the research (provided in Appendix E in the 2012 Shelter Island Yacht Basin TMDL Monitoring and Progress Report) indicates copper leach rates degrade over time, particularly after the first 2–3 years after application.*"

A total of 574 boats were identified as having aged-copper paint (i.e., vessels with copper paint applied to the hull prior to December 31, 2011). The 2014 total is an increase of 112 compared with the number of vessels identified with aged-copper paint in 2013 (462 vessels). For the purposes of calculating the estimated copper load in SIYB for TMDL compliance in 2014, these hulls used the loading rate associated with low-copper paints (0.45 kg/yr).

3.1.5 Hull-Cleaning BMPs and Regulations

The copper load due to in-water hull cleaning in 2014 was calculated as 64 kg/yr, a reduction of 34 kg/yr (1.6 percent) as a result of the Port requiring permits and BMP use all for in-water hull-cleaning activities in SIYB. This value was calculated with the assumption that all hull

---

[10] At several locations is 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 2, not 1. Efforts to improve consistency on this issue remain ongoing.

cleaners are now using BMPs, based on average loading rates provided in Appendix 2 of the SIYB TMDL (Source Analysis Calculations). This number is similar to that calculated for the 2013 monitoring year (68 kg/yr), the first year that BMPs were in use during 100 percent of cleaning events in SIYB.

3.1.6 Estimated Copper Load Reduction

The average size vessel in SIYB in 2014, based on reported hull lengths and beam widths, was 38 feet (ft) (11.7 m, total length) by 12 ft (3.7 m, beam width) (Appendix C). The average wetted hull surface area of 2014 SIYB vessels was calculated to be 36.4 square meter(s) (m^2), which was nearly equivalent to the wetted hull surface area used in loading calculations in the SIYB TMDL (i.e., 35.3 m^2), validating the use of the SIYB TMDL per-vessel loading of 0.9 kg/yr.

Conversion of vessels to non-copper paints reduced the annual dissolved copper load by 125 kg/yr (6.0 percent), compared with the SIYB TMDL assumption (2,100 kg/yr) of 100 percent occupancy and each hull containing full-copper paint. This load reduction was calculated by taking the product of confirmed non-copper vessels (139 vessels) and the annual loading reduction of 0.9 kg/yr/vessel (Table 3-1). Low-copper hull paints were calculated to reduce annual dissolved copper loads by up to 48 kg/yr (2.3 percent). This amount was calculated by taking the product of the number of confirmed low-copper paint vessels (113 vessels) and multiplying it by the actual average percent occupancy for these specific vessels and annual load reduction from the SIYB TMDL assumption (2,100 kg/yr) of a full-copper load from 0.9 kg/yr to 0.45 kg/yr. The 574 hulls determined to have aged-copper paints also accounted for a reduction by 0.45 kg/yr per vessel, which further reduces the total copper load by 240 kg/yr (11.4 percent). Therefore, vessels painted with non-copper, low-copper, and aged-copper hull paints reduced the copper load in SIYB by up to 413 kg/yr (19.7 percent) compared with the SIYB TMDL assumption (2,100 kg/yr) with 100 percent occupancy.

A total of 131 slips within the SIYB yacht clubs and marinas were reported to be vacant year-round, and so were not loading copper into the basin. Therefore, the estimated load reduction because of year-round vacancies was 118 kg/yr, calculated by multiplying the number of slips (131 slips) by the SIYB TMDL loading estimate of 0.9 kg/yr, assuming full copper and 100 percent occupancy.

Additionally, the copper load due to in-water hull cleaning was 64 kg/yr, a reduction of 34 kg/yr, as a result of BMPs requiring permits for hull cleaning. This value was calculated assuming all hull cleaners are now using BMPs, based on average loading rates provided in Appendix 2 of the SIYB TMDL (Source Analysis Calculations). The hull-cleaning load was calculated using the actual number of vessels coated with copper paint in SIYB for 2014 (2,030) and the calculated average wetted hull size of those vessels.

Including Port-operated boats and guest docks, the 2014 annual dissolved copper load from vessel hull paints was calculated to be 1,393 kg/yr. Annual dissolved copper loads from vessel hull paints (passive leaching and hull-cleaning load allocations) calculated in the SIYB TMDL was 2,100 kg/yr. Therefore, including the 64-kg/yr load from in-water hull cleaning, **the 2014 estimated copper load is 707 kg/yr (34 percent) lower than the SIYB TMDL-established loading rate**.

Table 3-1.
2014 Copper Load by Vessel Hull Type and Reported Occupancy

Vessel Hull Paint Category	Number per Category	Average Time Occupied	Copper Load per Vessel (kg/yr/vessel)[a]	Total Copper Load (kg/yr)
Copper or Unknown (Assumed Copper)	1,229	89%	0.9	984
Low-Copper (Confirmed)	113	95%	0.45	48
Low-Copper (Unconfirmed)[b]	28	92%	0.9	23
Non-Copper (Confirmed or Not Painted)	126[e]	90%	0	0
Non-Copper (Unconfirmed)[b]	19	96%	0.9	16
Aged-copper Paint[c]	574	93%	0.45	241
Subtotal (Yacht Clubs and Marinas)	*2,089*	--	--	*1,312*
Port HPD Fleet (Confirmed Non-Copper)	13	100%	0	0
Port Transient Dock[d] (Copper or Unknown and Assumed Copper)	27	31%	0.9	7
Port Weekend Anchorage[d] (Copper or Unknown and Assumed Copper)	40	28%	0.9	10
Subtotal (Port-Operated Facilities)	*80*	--	--	*17*
Grand Total Hulls	**2,169**	**--**	**--**	**1,329**
Vacant Slips (Yacht Clubs and Marinas)	129	0%	0	0
Vacant Slips (Port HPD Dock)	2	0%	--	0
Grand Total Slips	**2,300**	**85%**[f]	--	--

Notes:
a. Based on the TMDL assumption for the average amount of copper leached per vessel.
b. Low- or non-copper paints that were not confirmed are counted as high-copper paint, per the Monitoring Plan.
c. As of the 2014 monitoring year, calculations for aged-copper paints are similar to low-copper paints (0.45 kg/yr load), as agreed to by the Regional Board 2013 letter (Regional Board, 2013).
d. Calculated as an average, based on total number of days a slip was occupied by a guest vessel.
e. This total includes the five 319(h) grant vessel conversions completed in 2014.
f. The average total occupancy was derived by the count within each vessel hull paint category multiplied by the average percent occupancy for that category.

kg/yr - kilogram(s) per year
N/A - not applicable
HPD - Harbor Police Dock

The overall 2014 copper load and reduction from the SIYB TMDL is reported in Table 3-2.

Table 3-2.
2014 Overall Estimated Copper Load Reduction Summary

Copper Loading Category	Total Copper Load (kg/yr)[a]
SIYB Vessels in Yacht Clubs and Marinas with Copper or Unknown Paint (Assumed Copper)	1,023
SIYB Vessels in Yacht Clubs and Marinas with Confirmed Low-Copper Paint	48
SIYB Vessels in Yacht Clubs and Marinas with Confirmed Non-Copper Paint or No Paint	0
SIYB Vessels in Yacht Clubs and Marinas with Aged-copper Paint	241
Port-Operated Docks in SIYB	17
SIYB Yacht Club and Marina Year-Round Vacancies	0
Hull Cleaning	64[b,c]
Grand Total	1,393
Load Reduction from TMDL	707 (34%)

Notes:
a. The total copper load from the TMDL equals 2,100 kg/yr from vessel paints. The estimated load reduction due to background, urban runoff, and atmospheric deposition is not included in this total.
b. Based on the TMDL loading calculation for in-water hull cleaning, assuming 100-percent compliance with BMPs.
c. The hull cleaning load is not represented in Table 3-1.
kg/yr - kilograms per year

3.2 SIYB TMDL Water Quality Monitoring

This section discusses and summarizes the results of the 2014 annual analytical chemistry and toxicity monitoring program conducted in SIYB. Detailed laboratory reports are in Appendix D.

3.2.1 Surface Water Chemistry

The required yearly water quality monitoring survey of SIYB was performed on August 12, 2014. Surface water samples were tested for concentrations of total and dissolved copper and zinc, and for TOC and DOC. Results of the monitoring survey are presented in Table 3-3, including the *in situ* water quality measurements; a QA/QC summary of all analytical laboratory data is in Section 3.2.1.2 (Analytical Chemistry QA/QC). The chemistry results reports submitted by each analytical laboratory are in Appendix D.

Dissolved Copper – Dissolved copper levels within SIYB ranged from 1.8 to 12 µg/L. The lowest concentration within the basin occurred at the outermost station (SIYB-6); the highest level was recorded at the innermost station (SIYB-1). The concentration of dissolved copper at the reference site (SIYB-REF) was 0.62 µg/L. Five of the six SIYB stations exceeded the dissolved copper USEPA National Recommended Water Quality CCC criterion of 3.1 µg/L.

Total Copper – Total copper concentrations measured in SIYB followed a similar spatial pattern, ranging from 2.8 µg/L at the outermost station in the basin (SIYB-6) to 13 µg/L at the innermost station (SIYB-1). Total copper at the reference location (SIYB-REF) was 1.3 µg/L.

Table 3-3.
Chemistry Results for SIYB Surface Waters, August 2014 Event

Station	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	DOC (mg/L)	TOC (mg/L)
SIYB-1	**12**	13	33	33	1.3	1.4
SIYB-2	**7.3**	9.4	19	21	1.2	1.3
SIYB-3	**7.7**	9.5	20	21	1.3	1.3
SIYB-4	**7.2**	8.8	19	19	1.3	1.5
SIYB-5	**6.0**	7.2	17	17	1.3	1.3
SIYB-6	1.8	2.8	4.9	5.7	1.2	1.3
SIYB-REF	0.62	1.3	1.7	2.4	1.1	1.2

Notes:
Values in **bold** are above the EPA National Recommended Water Quality 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 08/12/2014 was +6.2 feet at 12:00pm; tidesandcurrents.noaa.gov
µg/L - micrograms per liter
DOC - dissolved organic carbon
mg/L - milligrams per liter
TOC - total organic carbon

Dissolved Zinc – Dissolved zinc levels in SIYB followed a spatial pattern similar to that of dissolved copper. Concentrations ranged from 4.9 to 33 µg/L within SIYB (lowest at SIYB-6 and highest at SIYB-1). The concentration at SIYB-REF was 1.7 µg/L. Levels of dissolved zinc in SIYB have remained well below the USEPA CCC of 81 µg/L during all SIYB TMDL monitoring events.

Total Zinc – Total zinc concentrations followed a similar spatial pattern, with values ranging from 5.7 µg/L at SIYB-6 to 33 µg/L at SIYB-1. The concentration of total zinc at the SIYB-REF station was 2.4 µg/L.

DOC – DOC levels in the water column, which have been shown to affect the bioavailability of free copper, maintained relatively consistent levels, ranging from 1.1 at the SIYB-REF station to 1.3 milligram(s) per liter (mg/L) at four of the six SIYB stations.

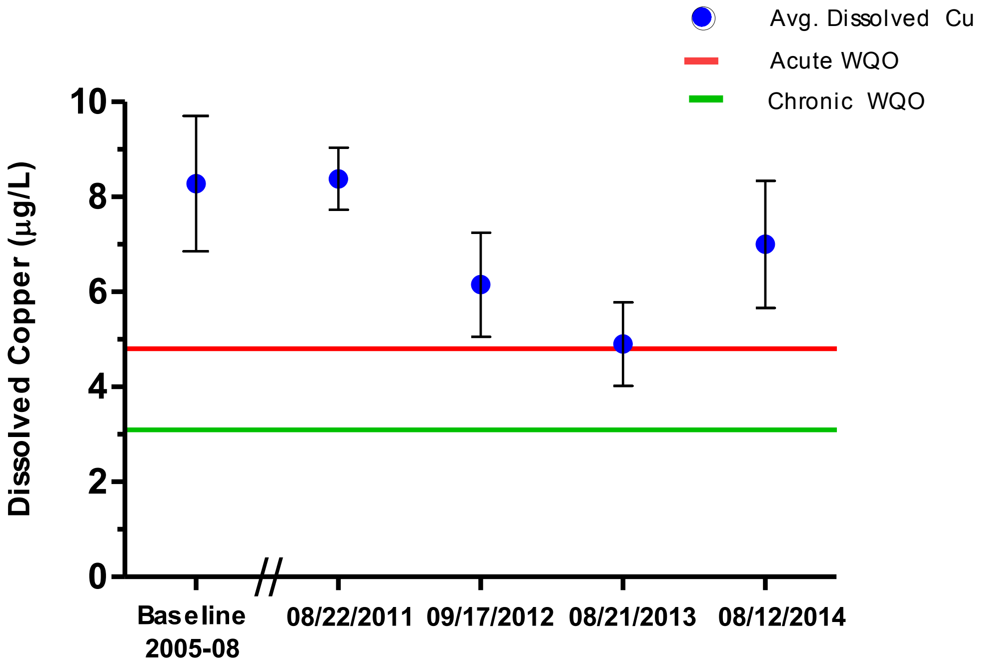
TOC – Measured concentrations of TOC levels were relatively consistent for all samples, ranging from 1.2 mg/L at the SIYB-REF station to 1.5 mg/L at Station SIYB-4.

3.2.1.1 Comparison of 2011–2014 SIYB Dissolved Copper Levels to Baseline

An average basin-wide dissolved copper concentration was calculated (excluding the reference site) for comparison to the prior SIYB TMDL monitoring results (Figure 3-3). The basin-wide average concentration of dissolved copper measured in 2014 (7.0 µg/L ± 1.3 µg/L [mean ± standard error]) is 42.9 percent higher than that measured in 2013 (4.90 µg/L ± 0.9 µg/L) and13.8-percent higher than that measured in 2012 (6.15 µg/L ± 1.1 µg/L). The 2014 level was 16.7 percent lower than the 2011 basin-wide average (8.4 µg/L ± 0.7 µg/L), and 15.5 percent lower than the 2005–2008 baseline level (8.28 µg/L).

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

(Average ± Standard Error)



3.2.1.2 Analytical Chemistry QA/QC

All samples collected were submitted to the analytical laboratories on the same day that they were collected (August 12, 2014). The samples were received in good condition at Weck, at 2.9 °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 and summarized below. The analytical laboratory reports in Appendix D have specific QA/QC sections that highlight any qualified data. The following information summarizes the two relevant data QA/QC-related findings associated with the 2014 SIYB TMDL study.

Dissolved Metals Data

- **Issue** – A trace level of zinc (0.108 µg/L) was detected in the method blank.
- **Explanation and Resolution** – As reported in the 2012 report, the analytical laboratory (Weck) performed a filter blank study (n=3) to investigate the potential for low-level

concentrations of zinc to leach from their filtration equipment. Weck's 2012 filter blank study identified trace levels of zinc (0.99 to 2.41 µg/L) in the filter media. A new procedure for acid washing filters prior to conducting dissolved metals preparation had been implemented at Weck. Regardless of the new procedure, trace levels of zinc (0.108 µg/L) were still detected in the method blank for the 2014 study. An almost identical level of dissolved zinc was detected in the blank during the 2013 TMDL monitoring event (0.109 µg/L). This issue was reported to the laboratory so that it can take appropriate actions for future analyses. The zinc level in the blank was marked as estimated (J-flagged) in the laboratory report in Appendix D. The trace level of zinc observed in the blank was determined to have a negligible impact on study results and conclusions. No trace levels of copper were observed in the blank.

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).

3.2.2.1 Pacific Topsmelt 96-Hour Acute Bioassay

Pacific topsmelt survival ranged from 97 to 100 percent in all laboratory controls, which meets the minimum acceptable mean control criterion of 90 percent (Table 3-4). 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 site were nontoxic to topsmelt.

Table 3-4.
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	100	100	100	97	97	100	100
25	97	100	100	100	83	100	100
50	100	100	100	100	97	100	100
100	100	100	100	100	100	100	100
TST (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass	Pass
NOEC (%)	100	100	100	100	100	100	100
LOEC (%)	NA	NA	NA	NA	NA	NA	NA
LC_{50} (%)	>100	>100	>100	>100	>100	>100	>100

Notes:
% - percent
LC_{50} - concentration estimated to be lethal to 50 percent of the organisms
LOEC - lowest observed effect concentration
NOEC - no observed effect concentration
TST - test of significant toxicity
TST Pass - sample is non-toxic according to the TST calculation
TST Fail - sample is toxic according to the TST calculation
NA - not applicable (since all test treatments had an NOEC of 100%)

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 3-5 and details are provided in Appendix D. Results are presented as a combined endpoint of survival and development per the USEPA 1995 protocol.

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 2014 tests ranged from 88.7 percent (SIYB-4) to 97.5 percent (SIYB-6); average control survival was 92.8 percent (which exceeds the test acceptability criteria of 50 percent survival). Bivalve larvae normality in the controls ranged from 90.8 percent (SIYB-REF) to 96.4 (SIYB-4); average control normality was 93.4 percent (which exceeds the test acceptability criteria of 90 percent normal development). Based upon these high levels of control survival and normal development, the 2014 SIYB bivalve larvae tests met the required acceptability criteria and the tests were deemed valid.

A statistically significant decrease in the combined survival and development endpoint was observed in one of the six samples tested: SIYB-1. The undiluted unfiltered SIYB-1 sample (i.e., 100 percent concentration) resulted in 41 percent combined normal development, while combined normal development in the undiluted and filtered SIYB-1 sample was 51 percent.

The undiluted (100 percent) SIYB-1 sample was determined to have a statistically significant reduction compared with the lab control for both the unfiltered and filtered samples using the TST calculation.

The need to filter the samples prior to conducting the bivalve larvae test is discussed in detail in Section 3.2.2.3 (Toxicity QA/QC).

3.2.2.3 Toxicity QA/QC

On the day prior to sample collection (August 11, 2014), a reconnaissance survey was conducted in SIYB to evaluate the study area for the presence of algal blooms and for general waster 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. Plankton samples were also collected on the actual day of sample collection (August 12, 2014) to be evaluated for the presence of harmful algae in the samples. These samples were collected with a plankton net at two stations (SIYB-REF and SIYB-4). No harmful algae were observed in these SIYB samples. 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.

Table 3-5.
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	84	86	84	86	89	92	91
6.25	77	88	82	82	90	89	90
12.5	83	87	88	80	92	88	86
25	83	89	84	81	92	93	91
50	78	85	84	83	93	92	88
100	**41***	86	89	85	93	89	92
100 (0.45-µm filtered)[a]	**51***	87	88	82	88	89	89
TST (Pass/Fail) unfiltered sample	Fail	Pass	Pass	Pass	Pass	Pass	Pass
TST (Pass/Fail) filtered sample	Fail	Pass	Pass	Pass	Pass	Pass	Pass
EC_{50} (% Sample)	98.7	>100	>100	>100	>100	>100	>100

Notes:

The reference toxicant EC_{50} value (14.5 µg/L copper) for this test was within two standard deviations of the historical mean (9.6 ± 6.5 µg/L copper) for this test at Nautilus, indicating typical organism sensitivity to copper.

* An asterisk indicates a statistically significant decrease compared to control.

a. Each undiluted sample was also tested filtered through a 0.45 µm-filter to remove potentially harmful native algae that could affect test organism survival and/or development; mean normal survivors in the filtered control was 85 percent.

% - percent
µm - micrometer
EC_{50} - concentration estimated to cause an adverse effect on 50 percent of the organisms
NOEC - no observed effect concentration
TST - test of significant toxicity
TST Pass - sample is non-toxic according to the TST calculation
TST Fail - sample is toxic according to the TST calculation

Samples were received in good condition on the same day that they were collected (August 12, 2013). 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. 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.

Concurrent topsmelt and bivalve reference toxicant test results are summarized in Table 3-6 and Table 3-7, 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 indicates that the test organisms used during this round of testing were of 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 were of typical sensitivity to copper.

Most of the larvae (approximately 70 percent) scored as "abnormal" in 2014 had developed a shell; however, they had a slightly curved hinge as opposed to a straight hinge. There is certain level of disagreement between regulators as to whether the larvae with curved shells should be scored as normal or abnormal. This issue is discussed further in Section 4.2.2 (Toxicity Tests).

Table 3-6.
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	157 [a]	123 ± 96.2
50	100		
100	95		
200	20*		
400	0*		
800	0*		

Notes:
* An asterisk indicates a significant decrease in survival compared to the laboratory control.
a. The reference toxicant LC_{50} value was more than two standard deviations above the historical mean for this test at Nautilus, indicating these organisms were less sensitive to copper than typical.
µg/L - microgram(s) per liter
LC_{50} - concentration estimated to be lethal to 50% of the organisms

Table 3-7.
Summary of Reference Toxicant Test Results for Bivalve Larvae

Copper Chloride Reference Toxicant Test			
Concentration (µg/L copper)	**Mean Percent Normal Development of Surviving Larvae**	**EC_{50} (µg/L copper)**	**Historical Mean ± 2 Standard Deviations (µg/L copper)**
Laboratory Control	83.1	14.5[a]	9.6 ± 6.5
2.5	75.2		
5.0	76.6		
10	74.9		
20	0.0*		
40	0.0*		

Notes:
* An asterisk indicates a significant decrease in development compared to the laboratory control.
a. The reference toxicant EC50 value was within two standard deviations of the historical mean (12 ± 6.5 mg/L copper) for this test at Nautilus, indicating typical organism sensitivity to copper.
µg/L - microgram(s) per liter
EC_{50} - concentration estimated to cause an adverse effect on 50% of the organisms

4.0 DISCUSSION

The 2014 SIYB TMDL monitoring program indicated that copper loading into SIYB is continuing to decrease when compared with TMDL-specific baseline and 2011–2013 loads. The continued reduction in dissolved copper loading was the result of a combination of factors, including vessel conversions to alternative non-copper or low-copper hull paints, the Port's continued outreach and education activities, the BMP implementation by the Port and SIML TMDL Group, more thorough vessel tracking by the SIML TMDL Group with a higher response rate by boaters, and continuation of in-water hull-cleaning regulations and required BMPs.

Average basin-wide surface water dissolved copper levels on the day of collection in August 2014 were higher compared to 2013 and 2012 levels, but below both the 2011 and baseline levels. The copper concentrations measured in 2014 exceeded the CMC (acute) and CCC (chronic) CTR ambient water quality criteria at several SIYB stations. Potential factors that may have contributed to the observed increase in water column dissolved copper levels in SIYB on the August 2014 collection date are discussed in Section 4.2.3 (2014 Water Quality Monitoring Summary).

No acute toxicity to fish larvae was observed, while only the station closest to the head of SIYB (SIYB-1) displayed a statistically significant chronic effect on mussel larvae development (the statistically significant effect was observed on bivalve normal development but not survival). This finding was essentially identical to the bivalve response noted during the 2013 TMDL monitoring program, and an improvement over the results observed in 2012 when significant bivalve larvae toxicity was observed at two separate locations in the basin.

4.1 Dissolved Copper Load Reduction

The vessel tracking programs implemented by the Port and SIML TMDL Group indicated that there was a nearly 34 percent reduction (707 kg/yr) in annual dissolved copper loading from vessels to SIYB in 2014 compared with the SIYB TMDL baseline load level of 2,100 kg/yr[11]. The 2014 load reduction estimate was determined by adding together the estimated load contributions from all sources (1,393 kg/yr) and subtracting it from the SIYB TMDL baseline level (i.e., 2,100 kg/yr minus 1,393 kg/yr equals 707 kg/yr).

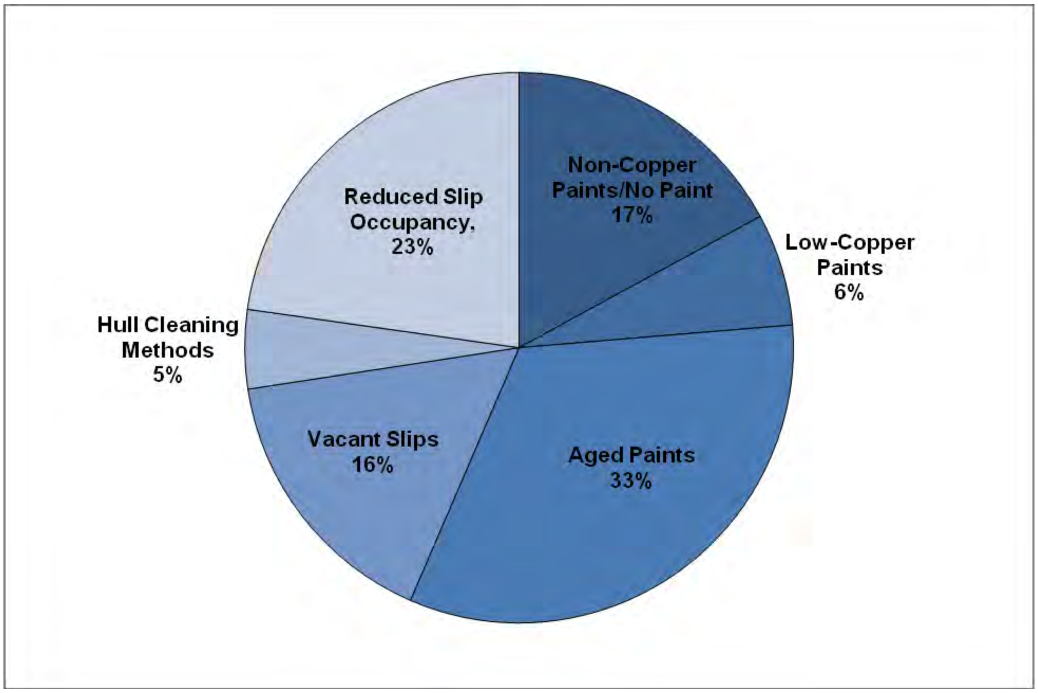
The TMDL baseline load estimate was determined using very conservative assumptions, namely that all vessels in SIYB are painted with copper paint 100 percent of the time, and that load reductions primarily are a result of vessel conversions. In reality, there are numerous ways for load reduction to occur (e.g., conversions to no copper/low-copper paints, more time between repainting (i.e., aged paint), slip vacancies, hull cleaning BMPs, etc.). With implementation of the comprehensive tracking program and updating of the vessel tracking database on a yearly basis, dissolved copper loading attributable to the various sources can be better quantified. The program-specific vessel tracking approach implemented by the Port and SIML TMDL Group provides for more realistic loading estimates than the highly conservative approach taken in the TMDL.

---

[11] The TMDL baseline load assumes that all recreational vessels moored within SIYB have copper-based paints 100 percent of the time and there is a 100 percent occupancy rate; see Section 2.2.3 (Annual Dissolved Copper Load).

Figure 4-1 depicts the approximate relative load reduction contribution from the various SIYB loading sources that comprise the 2014 load reduction estimate of 707 kg/yr. As AB 425 is implemented in future years, the load reduction contribution attributed to low-copper paints should steadily increase as high-leach-rate copper paints are phased out and replaced with lower-leach-rate alternatives. Additionally, hull-cleaning load allocations may also change on the basis of new information provided in the SPAWAR study. Continuing to conduct a thorough and rigorous annual vessel tracking program will be vital to capture the phase-in of acceptable low-leach rate paints as well as any substantial changes in the other loading categories.

Figure 4-1. Approximate Relative Reduction by Load Category



Load reduction calculations for the 2014 monitoring year were based only on confirmed non-copper or low-copper reported hulls. There were 47 unconfirmed transitions, which included vessels that were reported to have non-copper or low-copper hull paint, but lacked supporting information on hull paint name, product number, name of the boatyard that applied the paint, and/or painting date. As a result of continually improving vessel hull paint data, these vessels may be placed in the confirmed categories in the future. If they were included in the confirmed categories for non-copper and low-copper hull paints for the 2014 SIYB TMDL monitoring, the copper loading would have been further reduced by up to 17 kg/yr and 13 kg/yr, respectively, assuming 100 percent occupancy.

As discussed earlier, marked improvements in the 2014 vessel tracking program were made as compared to the first year of SIYB vessel tracking in 2011. The response rate to the SIML TMDL Group's vessel survey in 2014 was 66 percent, which is considerably higher than the 56 percent achieved in 2013. In addition, the types of information provided by each boater were more thorough, complete, and accurate. However, it is possible that some of the boaters who did not respond have low-copper, non-copper, or aged-copper paints on their boat hulls. Because very conservative assumptions are used for the load calculations (i.e., unknown and uncertain paint types are considered to be high-copper), a 100 percent response rate may reduce the number of unknown vessels and reclassify them into the proper category.

Vessel reporting improvements were primarily the result of standardization of the survey form and the follow-up efforts made by the SIML TMDL Group to obtain accurate data in the case where forms were incomplete or no initial response was received. Although continuing improvements have been made in collecting accurate and complete vessel tracking information, it is understood by the Port and SIML TMDL Group that there is still room for improvement. Any additional improvements will be made through the proactive and collaborative efforts of all SIYB TMDL stakeholders to achieve a higher percent response rate in the future. With the focus on collecting complete data to accurately characterize copper loading and providing education and outreach, a major goal is to continue to reduce copper loads in SIYB, even as the economy improves and marina and yacht club occupancy approaches 100 percent.

4.2 Water Quality Monitoring

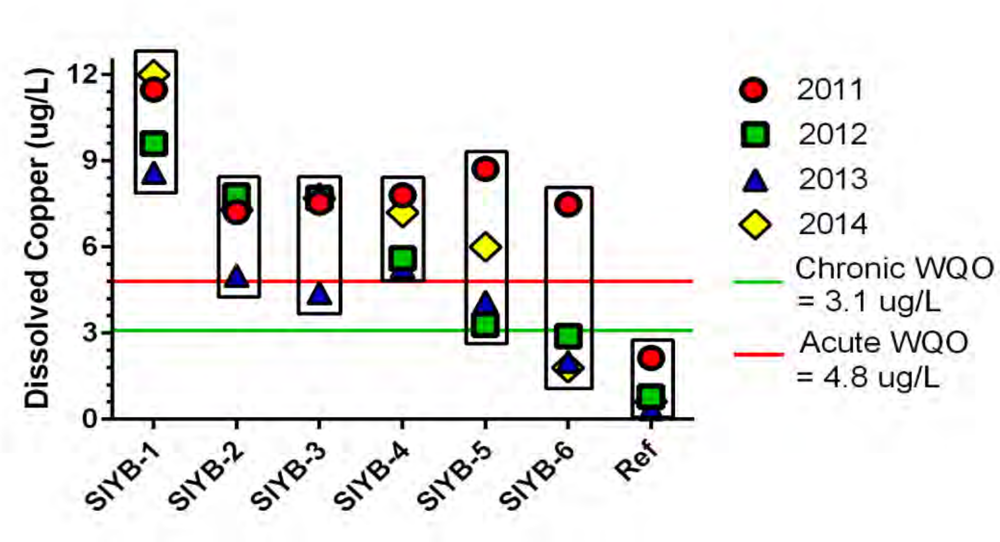
4.2.1 Dissolved Copper Levels

The August 2014 monitoring program showed the basin-wide average dissolved copper level to be 7.0 µg/L, which was approximately 16 percent lower than the 2005–2008 baseline average (8.3 µg/L), but 43 percent higher than the 2013 basin-wide average (4.9 µg/L). Five of the six SIYB monitoring stations exceeded the CCC numeric WQO of 3.1 µg/L. The WQO is defined by the National Recommended Water Quality for Aquatic Life of the USEPA and is incorporated into the CTR.

Although the basin-wide dissolved copper level was higher in 2014 compared that in 2013, the number of stations exceeding the dissolved copper CCC (five stations) remained the same. The 2014 monitoring event also showed that five of six stations exceeded the CTR acute criterion maximum concentration (CMC) water quality objective (4.8 µg/L). In 2013, only three of six stations exceeded the CMC objective.

Figure 4-2 depicts the dissolved copper levels measured at each station from 2011 through 2014. This figure shows a clear gradient of dissolved copper levels in SIYB (i.e., higher concentrations at the head of the basin, with decreasing levels moving toward the mouth). The figure also shows the higher average basin level in 2014 compared with that in 2013, and the trend of lower levels in 2013 relative to 2011 and 2012.

Figure 4-2. Dissolved Copper Comparison by Sampling Station

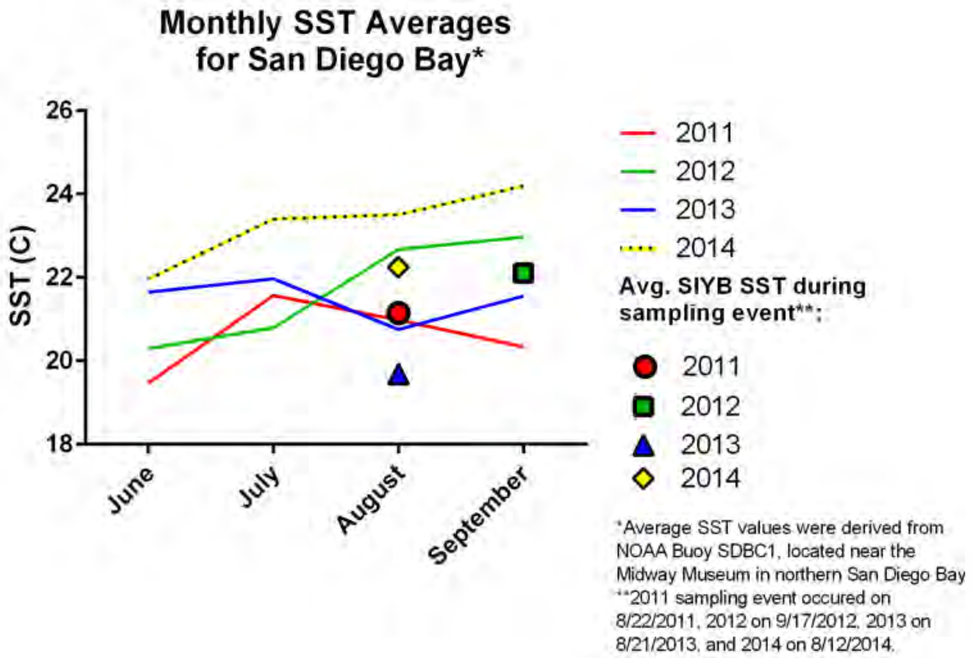


Several factors may have contributed to the increased copper levels in SIYB on the collection day in August 2014. These factors and the likelihood of their impacts are discussed below.

Elevated Surface Water Temperatures

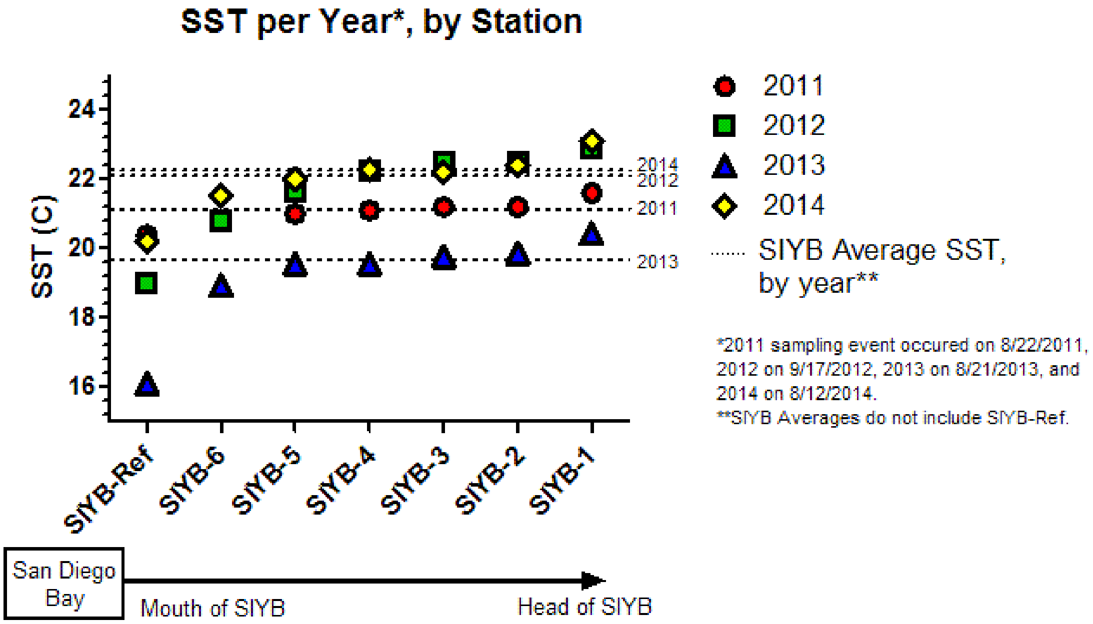
Surface water temperatures in the region were considerably warmer during the summer of 2014 compared to recent years. Figure 4-3 displays San Diego Bay surface water temperatures between June and September for the period from 2011–2014. These readings were recorded by National Oceanic and Atmospheric Administration (NOAA) from a buoy located near the Midway Museum approximately 3 miles east of SIYB. Figure 4-3 also identifies the average basin-wide surface temperature (the average of the six SIYB monitoring locations, excluding the reference location) on each day of sample collection dating back to 2011. This figure clearly indicates that the 2014 surface water temperatures in San Diego Bay and SIYB were elevated compared with temperatures in the first three years of the program. Figure 4-4 shows how the SIYB surface temperatures varied (by year) at each monitoring location (including the reference location) on the day of sample collection from 2011 to 2014.

Figure 4-3. Sea Surface Temperatures (SST) in San Diego Bay (2011-2014)



*Average SST values were derived from NOAA Buoy SDBC1, located near the Midway Museum in northern San Diego Bay
**2011 sampling event occured on 8/22/2011, 2012 on 9/17/2012, 2013 on 8/21/2013, and 2014 on 8/12/2014.

Figure 4-4. Sea Surface Temperatures (SST) by Sampling Station (2011-2014)



*2011 sampling event occured on 8/22/2011, 2012 on 9/17/2012, 2013 on 8/21/2013, and 2014 on 8/12/2014.
**SIYB Averages do not include SIYB-Ref.

Elevated surface water temperatures in a semi-enclosed basin such as SIYB have the potential to increase dissolved copper levels in bay waters. Several direct and indirect factors had the potential to influence or increase dissolved copper levels as a result of elevated surface water temperatures including:

1. Changes to in-water hull-cleaning strategies – The extent and degree of marine fouling, during times of elevated water temperatures, may result in the need for more in-water hull-cleaning activity. In addition, the types of fouling organisms that attach to and grow on vessels change with increasing temperature, which may result in additional cleaning pressure needed to remove organisms that have attached to boat (Johnson et al., 2004).

   The amounts and types of fouling that occurred in SIYB in 2014 were particularly problematic for boat owners. According to Wayne Morrison of Shelter Island Boatyard, San Diego Bay experienced an unprecedented amount of marine fouling in the summer of 2014 compared to previous years (personal communication with Michelle Bowman of AMEC, February 26, 2015). In addition, during the 2014 SIYB sampling event (August 12, 2014), the field collection team witnessed a heightened level of in-water hull-cleaning activities (as well as general vessel maintenance of all kinds). Compared with cleaning and maintenance in previous years, the field team reported more in-water and out-of-water cleaning and maintenance activity than during previous collection events.

   According to Hull Cleaner Data Analysis in the report entitled *Staying Afloat with Nontoxic Antifouling Strategies for Boat* prepared by the Sea Grant Extension Program, UC Cooperative Extension (Johnson et al., 2004), marine fouling growth was reported to be heavier when the water was warmer, which necessitated more frequent cleaning events and more effort for the divers. The report concluded that, “Although we cannot change the water temperature or prevent a coating from aging, we can control the interval between cleanings. Cleaning more frequently prevents fouling growth from accumulating to high levels. This is especially important when water is warmer.”
2. Presence of a thermocline – Another unknown is the potential effect that higher surface water temperatures had on vertical mixing within the basin. Warmer surface waters and a strong thermocline may act to prevent vertical mixing, thus concentrating dissolved copper at the surface.
3. Temperature and other physical parameters – In addition to higher surface water temperatures, both salinity and pH were consistently higher on the day of collection in August 2014 compared with 2013. The effect that the combination of higher water temperatures, salinity, and pH has on copper leach rates is unknown, but could factor into the increased average dissolved copper levels observed in 2014 compared with the levels for the two previous years.

Given that the load of copper into the SIYB continues to decrease, it is possible that the increase in the level of dissolved copper was influenced by some or all of the factors above. Moreover, it is important to note that the increase in the copper level is correlated with the levels of other constituents commonly present in hull paints (zinc), all of which were elevated as well. As discussed in Section 4.3.2 (SPAWAR study), the DPR completed a study on the life cycle of copper paints that suggested that hull cleaning may contribute greater than the 5 percent allocation identified in the SIYB TMDL. The observations noting the increased in-water hull cleaning may support the DPR's finding. Moving forward, the Port will continue to track water temperatures during annual sampling events and to determine whether further investigations are needed. Nonetheless, a greater look at the overall contribution of in-water hull cleaning to copper loads needs to be acknowledged as part of an ongoing SIYB TMDL adaptive management process to ensure that loading models represent the accurate load allocations.

Winds, Tides, and Currents

At the annual Southern California Chapter of the Society of Environmental Toxicology and Chemistry meeting held in San Diego in April 2014, Dr. Alberto Zirino of Scripps Institution of Oceanography presented the results of a study entitled "Copper in Harbor Island East and West Inlets: Keys to Understanding Detoxification Processes?" Several slides pertaining to winds, tides, and currents from Dr. Zirino's presentation are included in Appendix F.

Dr. Zirino's study suggests that wind speed and direction have the potential to dampen the tidal exchange of surface waters in marina basins. In his study, the angle of the wind in relation to the Harbor Island West basin resulted in pushing surface waters to the head of the basin, thus preventing normal tidal exchange with fresh bay waters. One result of pushing the surface waters toward the head of this enclosed basin was a measured increase in the dissolved copper levels in the surface waters compared with levels deeper in the water column and in the adjacent Harbor Island East Basin. Dr. Zirino concluded that the tidal dampening effects of the winds blowing across the Harbor Island West Basin resulted in higher copper levels in surface waters due to reduced tidal exchange with the Bay. While Dr. Zirino's study was not conducted in SIYB, the implication of his study may have validity when assessing the factors that may affect dissolved copper levels in the basin as well as other similar basins in San Diego Bay. Based up his finding, this phenomenon should be evaluated further with regard to the SIYB.

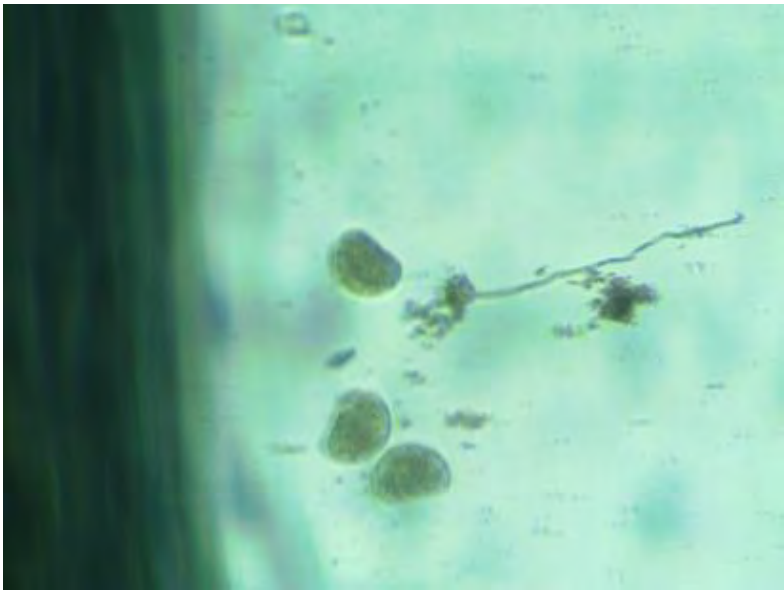
4.2.2 Toxicity Tests

Only one station (SIYB-1), the station farthest inside the basin, showed a statistically significant effect on developing mussel larvae. The 2014 results are similar to the 2013 results, and an improvement over the 2012 results in which two stations (SIYB-1 and SIYB-3) showed a statistically significant effect on mussel larvae development. There was no toxicity observed in the acute survival test using fish larvae at any of the stations tested.

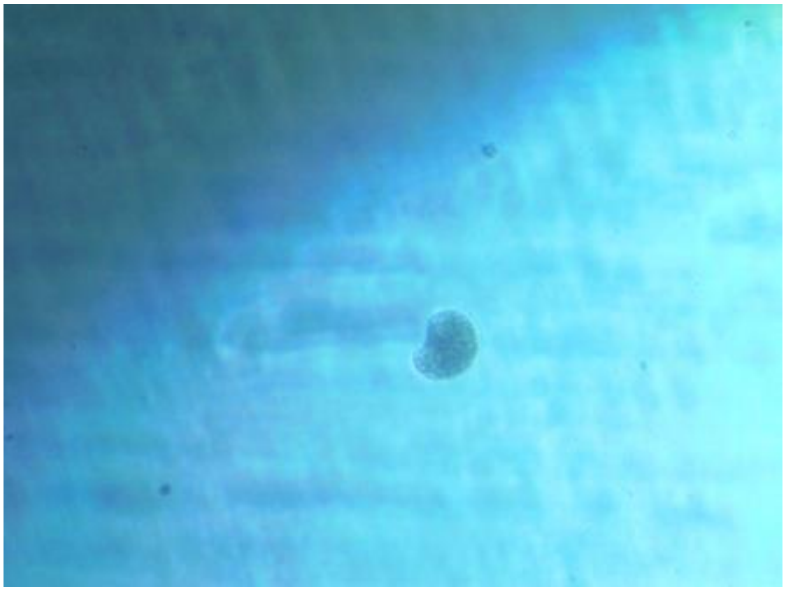
Of special note for the 2014 SIYB toxicity testing program was the presence of slightly abnormal bivalve larvae. Consistent with the 2013 bivalve larvae test results, only the bivalve larvae exposed to the Station SIYB-1, 100 percent undiluted surface water, sample showed an effect (in the form of abnormally developing larvae; no effect on survival was observed). What was different in the 2014 tests compared with those of 2013 was type and degree of abnormality observed. In 2013, the bivalve larvae were clearly abnormal, while in 2014, the degree of abnormality was more subtle. The classic definition of "normal bivalve larvae" is that they form a D-shaped shell that possesses a straight-lined hinge. The majority (approximately 70 percent) of the larvae scored as "abnormal" in 2014 had developed a shell; however, they had a slightly curved hinge as opposed to a straight hinge.

The differences between these two types of larvae are shown in Figure 4-5. Additional photographs of the various types of larvae observed in the 2014 study are contained in the toxicity report presented in Appendix D.

Figure 4-5. Comparison between Normal Straight-hinged and Slightly Curved-hinged Bivalve Larvae



Normal Straight-hinged Larvae (Station SIYB-1)



Slightly Curved-hinged Larvae (Station SIYB-1)

Based upon this finding, the toxicity laboratory project manager (Adrienne Cibor) decided to research this issue further. Based upon her research, she found that there is a discrepancy among toxicity professionals and regulators as to whether a larva with a slightly curve hinge should be scored as normal or abnormal. The toxicity test report prepared by Nautilus (Appendix D) indicated that “Most of the affected larvae [scored as abnormal] in the SIYB-1 sample were partially developed, but did not possess a straight hinge; this response was not observed in any of the controls or any replicates from other sites.” Based upon this statement, it is likely that there may not have been a statistically significant effect observed in the SIYB-1 sample if the larvae with slightly curved hinges had been scored as normal.

Because of this apparent discrepancy in the way that larvae are scored, a recommendation has been included in Section 5 (Recommendations) to discuss this issue further with Regional Board, Southern California Coastal Water Research Project (SCCWRP), and USEPA Region 9 and USEPA headquarters toxicologists to arrive at a definitive consensus on how slightly effected larvae should be scored. If modifications to the approach currently used to score bivalve larvae are required, these revisions will be discussed in detail in the 2015 revision of the SIYB TMDL Monitoring Plan.

4.2.3 Monitoring Program Summary

Surface water samples were collected at six locations in SIYB and one reference location outside of the basin in San Diego Bay. All samples were collected on August 12, 2014. The seven samples were analyzed for total and dissolved copper and zinc, total and dissolved organic carbon, and toxicity using a fish and bivalve larvae. Water quality characteristics (salinity, temperature, and pH) were also recorded at each station.

The results of this study showed the SIYB-wide average dissolved copper level on the day of collection to be 7.3 µg/L. This basin-wide average dissolved copper level was higher than the level measured in the previous two years of the monitoring program (2012 and 2013). In addition, higher levels of total copper, dissolved zinc, and total zinc basin-wide were also found in 2014 compared with 2013, indicating that the 2014 increase was not simply limited to dissolved copper.

Consistent with 2013 results, the monitoring station located at the head of SIYB (SIYB-1) showed the highest level of dissolved copper. Station SIYB-1 is at the farthest point from San Diego Bay within the basin, and it is a location that is characterized by relatively low flushing and a relatively high density of vessels. As shown on Figure 4-1, the dissolved copper levels at the Reference Station and SIYB-6 (which is the station located near the mouth of the basin near San Diego Bay) were identical to the 2013 levels. This indicates that the increase in dissolved copper levels (as well as total copper and dissolved and total zinc) observed in 2014 mainly occurred in the middle and head of the basin.

Only one station (SIYB-1) in 2014 showed a statistically significant effect on bivalve larvae development. No effects were observed in the fish toxicity test. In contrast to the 2013 bivalve larvae test, most of the larvae scored as abnormal in 2014 in the SIYB-1 sample were partially developed, but did not possess a straight hinge. Based upon discussions with regulators, these partially developed larvae could possibly be scored as normal. Further research and discussion regarding the bivalve endpoint need to be carried out prior to future testing.

In summary, the results of the 2014 monitoring event found the average basin-wide dissolved copper level in SIYB to be higher compared with 2012 and 2013 levels. Toxicity tests showed that the 2014 results were comparable to the 2013 results and were an improvement over the 2012 results. Copper loading into the basin in 2014 estimated through the vessel tracking efforts of the SIML TMDL Group and Port showed a continuing year-over-year reduction compared to previous years. The increase in the average basin-wide dissolved copper levels observed in 2014 seems to be counter to the continued load reduction estimated through the SIYB TMDL vessel tracking. As discussed above, the other factors may have contributed to the higher basin-wide average dissolved copper level observed in 2014.

4.3 Description of Ongoing Initiatives, Studies, and Reports Relevant to the SIYB TMDL

Since submittal of the 2012 SIYB Monitoring and Progress Report to the Regional Board, several pieces of new information associated with copper boat paints and the establishment of site-specific water quality objectives have become available. The information presented below warrants further discussion with regard to the future direction of the SIYB TMDL. Copies of the reports discussed in this section are in Appendix F.

The information presented in this section was previously discussed in the *2013 SIYB TMDL Monitoring and Progress Report*. This information is being included in this report because it was finalized in 2014 and continues to be important, relevant, and applicable to the future direction of the SIYB TMDL.

4.3.1 Assembly Bill 425

On October 5, 2013, Governor Brown signed AB 425, which was sponsored by San Diego Assemblywoman Toni Atkins. The bill required the DPR, no later than February 1, 2014, to (1) determine a leach rate for copper-containing antifouling paint used on recreational vessels, and (2) recommend appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of copper-containing hull paints that are registered as pesticides.

4.3.2 SPAWAR Study

To address the first requirement of AB 425, the DPR contracted with SPAWAR to conduct a detailed and comprehensive copper leaching study. The SPAWAR study, which was funded by the American Coatings Association, is described in detailed in *Life Cycle Contributions of Copper from Vessel Painting and Maintenance Activities* (Earley et al., 2013).

The SPAWAR study involved the design and implementation of a set of experiments to evaluate the *in situ* copper leaching from both epoxy and ablative antifouling paint at various times: post-application (i.e., initial exposure), passive leaching, and surface refreshment (e.g., following cleaning events). The study was conducted utilizing two protocols developed by the US Navy: the dome method and the in-water hull-cleaning sampling method. Cleaning techniques investigated included a soft-pile carpet and a medium-duty 3M™ pad for fouling removal.

Results showed that the passive leach rates of copper peaked three days after both initial deployment and cleaning events, and then rapidly decreased over about 15 days and slowly approached asymptotic levels on approximately day 30. The study showed that copper was more bioavailable during a cleaning event in comparison with the passive leaching that immediately followed. The report presents a paint life cycle model quantifying annual copper loading estimates of each paint and cleaning method based on a three-year cycle of painting, episodic cleaning, and passive leaching.

4.3.3 DPR Memorandum on AB 425

To fulfill the second requirement of AB 425, the DPR prepared a memorandum (dated January 30, 2014) entitled "Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints per AB 425." The memorandum has two appendices: (1) modeling to determine the maximum allowable leach rate for copper-based antifouling products in California marinas, and (2) DPR Copper Antifouling Paint (AFP) Mitigation Recommendations. The purpose of the DPR memorandum was to present the DPR's modeling approach and rationale for decision making, recommendations for mitigation, and the selected maximum allowable leach rate.

4.3.3.1 Reformulation of AFPs

The pertinent findings in the DPR memorandum about the reformulation of AFPs and in-water hull cleaning are as follows:

- The DPR recommends establishing the maximum allowable copper leach rate for AFP products at 9.5 μg/cm^2/day under the condition that in-water hull cleaners follow the California Professional Divers Association's BMP method with soft-pile carpet and that cleaning not be performed more often than once per month.
- Setting a maximum allowable leach rate at 9.5 μg/cm^2/day should require reformulation of about 58 percent of the currently registered copper AFP products (approximately 100 products).
- For copper AFP products that do not require in-water cleaning, the DPR recommends establishing the maximum allowable copper leach rate at 13.4 μg/cm^2/day under the condition that in-water hull cleaning of any type is prohibited.
- Based upon the results of the SPAWAR study, the DPR calculated that in-water hull cleaning accounts for 41 to 62 percent of the dissolved copper load in coastal marinas, depending on the paint type and whether BMPs were used or not.

4.3.3.2 Mitigation of Copper AFPs

In addition to the reformulation of AFPs, the DPR also recommended the following mitigation of the impacts of copper-containing AFPs:

- Require in-water hull cleaners to implement BMPs for in-water hull cleaning.
- Reduce in-water hull-cleaning frequency to no more than once per month.
- Include painted-hull maintenance information as part of product labels.

- Develop for distribution hull maintenance brochures to be provided to boaters via boatyards at the time of painting.
- Increase boater awareness and acceptance of copper AFP alternatives.
- Foster new incentive programs and continue support of existing programs to convert copper-painted boat hulls to those painted with alternatives.

4.3.3.3 DPR Recommendation Regarding Site-Specific Objectives

Finally, Recommendation #8 in the DPR's AB 425 memorandum states that *"Dischargers consider site-specific objectives for copper for marinas or harbors that have extremely high boat density and very poor flushing.*" SIYB falls into this category. The DPR made this recommendation because its modeling suggests that some marina locations may not achieve the current CTR chronic water quality criterion for copper concentrations of 3.1 µg/L at all times, even with the implementation of copper AFP reformulation and other mitigation approaches outlined in its memorandum. The DPR memorandum also indicates that *"DPR's analysis using the draft marine Biotic Ligand Model for many California coastal marinas suggests that this approach could raise the compliance threshold to a level higher than the current 3.1 ppb criterion."*

The DPR's assertion, based upon its modeling using the SPAWAR study findings *"….that some marina locations may not achieve the current California Toxics Rule chronic water quality criterion for copper of 3.1 µg/L at all times even with the implementation of copper AFP reformulation…,"* calls into question whether the SIYB TMDL requirement to achieve a water quality objective of 3.1 µg/L for dissolved copper in SIYB would ever be attainable, regardless of the numerous load reduction efforts that the Port and SIML TMDL Group are currently undertaking. In addition, the Capolupo Bosse study conducted in SIYB showed, through use of the BLM, that the basin waters likely have the natural binding capacity to reduce the bioavailability of dissolved copper.

4.3.4 USEPA Dissolved Copper Saltwater Criteria Using the Biotic Ligand Model

Currently, the USEPA is preparing a dissolved copper saltwater criteria document using the BLM. There is considerable support for completion of the BLM for dissolved copper in saltwater. Both the Port and Port Tenants Associations submitted letters of support to the USEPA for the development of this BLM. In addition, Thomas Howard of the SWRCB stated in his letter of support for BLM approach, *"The State Water Board supports U.S. EPA in pursuing and making it a priority to complete development of saltwater copper criteria using the BLM in the coming year. I have directed [SWRCB] staff to meet with U.S. EPA staff to discuss the development of the saltwater criteria and the BLM."*

University of San Diego graduate student Casey Elaine-Capolupo Bosse (with support from SPAWAR researchers) published her master's thesis in 2013 entitled "Copper Bioavailability and Toxicity to *Mytilus galloprovincialis* in Shelter Island Yacht Basin, San Diego, CA." Her research included a site-specific assessment of copper bioavailability in SIYB using the BLM. The assessment showed, in part, that there is considerable capacity in SIYB because of the presence of biotic ligands to effectively complex dissolved copper, thus reducing its bioavailability.

4.3.5 Harbor Island Study

As discussed in Section 4.2.1 (Dissolved Copper Levels), Dr. Alberto Zirino of Scripps Institution of Oceanography presented the results of a study entitled “Copper in Harbor Island East and West Inlets: Keys to Understanding Detoxification Processes?” The study was conducted in Harbor Island’s West and East Basins and suggests that wind speed and direction have the potential to dampen the tidal exchange of surface waters in marina basins, resulting in an increased level of dissolved copper in surface waters compared with that in deeper waters. While this study was not conducted in SIYB, the study findings are important and may assist in evaluating the behavior of dissolved copper in enclosed basins such as SIYB.

This page intentionally left blank

5.0 RECOMMENDATIONS

This section presents recommendations related to ongoing program implementation and the future direction of the SIYB TMDL. It is important to note that many of the 2013 recommendations related to the findings and mitigation measures associated with AB 425 are still being pursued. The 2013 recommendations that are still in progress are discussed in detail in Table 2-1. These 2013 recommendations are still pertinent because, while AB 425 planning by the DPR and SWRCB continued through 2014, no actual specifics on program implementation (e.g., lists of acceptable paints) were formalized. Consequently, several 2013 recommendations need to be carried forward for continued evaluation. The status of the 2013 report recommendations and the new recommendations for the 2014 program year are presented in Tables 5-1 and 5-2, respectively.

This page intentionally left blank

Table 5-1.
Status of 2013 Monitoring and Progress Report Recommendations[a]

2013 Report Recommendation	2013 Report Recommendation Status
Issue 1: Implications of SPAWAR Study for SIYB TMDL – The Port recommended that the Regional Board, SIYB TMDL stakeholders (the Port and SIML TMDL Group), and the study scientists from SPAWAR assemble a working group to hold meeting(s) and specifically discuss how this new information affects the future direction of the SIYB TMDL. In particular, the objectives of this collaborative effort would include: • Discussions of the report's findings agreement and the relevance of this new information to ongoing SIYB TMDL monitoring and assessment, and determination of the appropriate approach to work with the Regional Board to adjust load calculation and contribution estimates for assessing future compliance with SIYB TMDL targets • Development of a consensus on the degree to which this new information affects the direction of the SIYB TMDL as the stakeholders continue with the program during the second interim compliance period • Participation with the San Diego and other Regional Boards to develop consistency in how the data generated by these new studies are used in the future, both locally and in other locations (e.g., the dissolved copper TMDLs for Newport Harbor and Marina del Rey)	To date, the recommended working group has not been formed. However, the following progress did occur in 2014: • The Port and SIML Group presented the workgroup concept at the SIYB TMDL status meeting held at the Regional Board office on June 17, 2014. • A follow-up email was sent by the Port to the Regional Board on October 23, 2014, that included a more detailed concept plan for an educational seminar on AB 425 at which the formation of a technical work group could be discussed further. *In response to the Port's email, Regional Board staff requested that the proposed workshop be delayed until a later date in 2015 so they could attend to several regional permitting efforts that were ongoing.* • The educational seminar agenda was completed, presenters were solicited, and formal invitations to the presenters were completed in September 2014. However, the information was not distributed because of the aforementioned request for a delay. • The Port submitted a comment letter to the Los Angeles Regional Board (January 14, 2014) in regard to the Draft TMDL for Marina del Rey. The letter emphasized the need for consistency when using data and encouraged the use of AB 425 findings. Next Steps: The Stakeholders (i.e., Port and SIML TMDL Group) will continue to pursue convening an AB 425 technical workshop and forming a working group of SIYB stakeholders, Regional Board, DPR staff, and SPAWAR scientist and others to assess the results of these AB 425 studies and their effects on the future of the SIYB TMDL.

Table 5-1.
Status of 2013 Monitoring and Progress Report Recommendations (continued)

2013 Report Recommendation	2013 Report Recommendation Status
Issue 2: Updating Loading Assumptions and Conceptual Model – The Port recommended that the conceptual model be revised to incorporate the applicable findings of the recent copper hull paint leaching studies, and that any revisions of the conceptual model be based upon the consensus of the working group described in Issue 1, above.	The SIYB conceptual model update was not completed in 2014 because several outstanding issues related to AB 425 remain that need to be addressed. In particular, formation of a working group is limiting the ability to gain consensus on the model's revisions, as was recommended. The following tasks were completed for this recommendation during 2014: • The Port obtained the Marine Antifoulant Model to Predict Environmental Concentrations (MAM-PEC) model from the DPR and has identified the parameters necessary to run the model. • The Port and its consultant have coordinated with the DPR modelers to understand the predictive capabilities of the MAM-PEC model and potential benefits of using it for SIYB. Next Steps: The Port and SIML TMDL Group will continue to work with the Regional Board and the DPR to develop a better understanding of the ramifications of AB 425 on the future implementation of the SIYB TMDL. In addition, given that the working group has not yet been formed, the Port proposes that the conceptual model revisions proceed as detailed in the new 2014 recommendation for a model update.
Issue 3: Site-Specific Objectives – In preparation for the USEPA's completion of the saltwater copper BLM, the Port recommended that the SIYB TMDL stakeholders and Regional Board lay the groundwork necessary to implement this approach once it is adopted. This preparation would include evaluating existing data, identifying data gaps, and developing work plans for the potential studies needed to support the BLM approach for developing a site-specific dissolved copper water quality objective for SIYB. An example of such a potential study is a site-specific study to assess the levels of biotic ligands in SIYB and how these levels may vary seasonally and spatially. Such a water quality objective might apply to other locations within San Diego Bay. Additionally, the Port would encourage the Regional Board to submit a support letter to the USEPA for the development of the BLM consistent with the letter sent by Thomas Howard of the SWRCB.	The following tasks were completed for this recommendation during 2014: • On January 9, 2014, the Port sent a letter to the USEPA Region 9 to request the consideration of the Biotic Ligand Model for Marine Waters. The final saltwater copper BLM was not released by the USEPA in 2014 as expected; however, all indications are that the model will be made available officially during 2015. • The Port approached Regional Board about sending a letter to the USEPA. A copy of the Port's letter was provided as an example. • The Port and SIML TMDL Group worked together to compile data from numerous studies within SIYB into a single database. This dataset provides the foundation from which data gaps and future work plans may be completed. Next Steps: The Stakeholders (i.e., Port and SIML TMDL Group) will apply the BLM approach to the dataset to assess the applicability of the BLM for SIYB waters. The stakeholders will also stay apprised of USEPA progress on federal approval of the BLM for marine waters.

Table 5-1.
Status of 2013 Monitoring and Progress Report Recommendations (continued)

2013 Report Recommendation	2013 Report Recommendation Status
Issue 4: In-Water Hull Cleaning – The Port recommended that the Regional Board, SIYB TMDL stakeholders, the California Professional Divers Association, and other appropriate entities assess regulatory oversight responsibility for in-water hull cleaning in light of the DPR's recent higher estimates (compared to the SIYB TMDL estimate of 5 percent) of copper loading attributed to hull cleaning. One objective of this assessment would be to evaluate the role of the Regional Board in developing a regulatory framework and implementing stricter standards for in-water hull-cleaning. The DPR supports this idea, stating in its memorandum, *"DPR calculated that in-water hull cleaning attributes 41–62% of the dissolved copper in coastal marinas depending on the paint type and whether BMPs were used or not. Therefore, management (regulatory or non-regulatory) of in-water hull cleaning could significantly help to lower dissolved copper concentrations in marinas where these activities are common."*	The following tasks were completed for this recommendation during 2014: • At this time, it does not appear that any decision on regulatory oversight has been finalized between the agencies identified in this recommendation. • During 2014, the Port continued implementing its existing in-water hull cleaning regulations for the San Diego Bay. Next Steps: The Port will continue to apply strategies that encourage the other entities identified herein to address in-water hull cleaning at a state level. In addition, the Port will continue to implement its existing regulatory approaches until direction is provided from the state.
Issue 5: Presence of Harmful Organisms in Bay Water Samples – The Port recommended that, when collecting raw bay water samples, the toxicity laboratory should conduct microscopic observations of the samples prior to initiating toxicity tests. These visual observations should note the presence of any predatory species (such as the dinoflagellate *Noctiluca sp.* observed in the 2013 monitoring project) or other naturally occurring species (such as the phytoplankton that cause harmful algal blooms [HAB]). When possible, the laboratory should send images of the phytoplankton observed in the samples to HAB scientists at Scripps Institution of Oceanography to confirm observations. If predatory species or HAB species are observed, determine whether the samples should be filtered before testing to remove the threat and whether the samples need to be recollected. A standard operating procedure for this evaluation process should be included in the revised SIYB TMDL Monitoring Plan.	The following tasks were completed for this recommendation during 2014: • A standard operating procedure for evaluating the SIYB study area for harmful algae, algae blooms, and water clarity prior to collection of water was included in the revised SIYB TMDL Monitoring Plan. This standard practice will continue to be employed for all future SIYB TMDL annual monitoring events. • On the day prior to sample collection (August 11, 2014), a reconnaissance survey was conducted in SIYB to evaluate the study area for the presence of algal blooms and general waster clarity. • In addition to the visual assessments, field team also collected 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. • Plankton samples were also collected on the actual day of sample collection (August 12, 2014) to be evaluated for the presence of harmful algae in the samples. These samples were collected using a plankton net at two stations (SIYB-REF and SIYB-4) and preserved for further analysis in the laboratory.

Notes:
a. *2013 Shelter Island Yacht Basin TMDL Monitoring and Progress Report (AMEC, 2014)*

Table 5-2.
2014 Monitoring and Progress Report Recommendations

2014 Recommendation Issue	2014 Report Recommendation
Issue No. 1: Transitioning to Lower Leach Rate Paints – The integrated copper reduction efforts of the SIYB TMDL stakeholders have resulted in continual reductions in dissolved copper loads into SIYB. It is expected that once the hull coatings with higher copper leach rates have been phased out in favor of the AB 425-approved hull paints with lower copper leach rates, dissolved copper loads into SIYB will be further reduced. The combination of ongoing load reduction activities, coupled with the future phase-out of unacceptable leach rate paints, will continue to reduce the dissolved copper levels in SIYB. There is considerable uncertainty, however, about the implementation methods, timing, and transition duration of this phase out process. A more definitive understanding of the phase-out process will allow the Port and other SIYB TMDL stakeholders and Regional Board to focus their future copper reduction efforts. To further this issue, the Port and Regional Board submitted a letter to Brian Leahy, Director of the DPR, dated February 24, 2015, entitled "Implementation of AB 425 Measures and List of Hull Paints Meeting the AB 425 Leach Rate Criteria." The purpose of the letter is to encourage the DPR to expedite the implementation of the various control and measures that were outlined in the DPR's memorandum (dated January 30, 2014) entitled "Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints Per AB 425."	It is recommended that, as the phase-out process for high copper leach rate paints becomes more defined, the SIYB stakeholders should identify measures that can be used to facilitate the transition. Because of the existing uncertainties in the timing of AB 425 requirements, future updates to the SIYB TMDL implementation will be done using an adaptive management approach, phasing efforts in as information becomes available. Future efforts to fulfill this recommendation may include: • Applying strategies that encourage the other state entities (i.e., the DPR, SWRCB) to expedite implementation of paint reformulation and the mitigation measures identified in the DPR's report. • Preparing literature and conducting outreach activities to educate the marinas, yacht clubs, and boaters on the transition process. [Note: this approach will be coordinated with the DPR and initiated as materials become available.] • Disseminating a list of paints currently meeting AB425 leach rates • Having discussions with local boatyards about use of AB425-acceptable paints. • Establishing, tracking, and reporting metrics for AB 425-accepted paints • Identifying potential incentives and ways to accelerating the transition process

Table 5-2.
2014 Monitoring and Progress Report Recommendations (continued)

2014 Recommendation Issue	2014 Report Recommendation
Issue 2: SIYB TMDL Loading Assumptions and Compliance Schedule – As discussed above, as higher leach rate paints are phased out, SIYB should experience a corresponding reduction in dissolved copper loads. Being able to predict and quantify the timing and magnitude of the expected load reduction is essential to the future implementation of the SIYB TMDL program. As part of its AB 425 evaluation efforts, the DPR employed the MAM-PEC hydrodynamic model to predict dissolved and total concentrations of antifouling compounds within marine environments. The MAM-PEC model is normally used to predict copper concentrations (PEC) in a marina based on input parameters, including the leach rate for particular copper antifouling paints. For the AB 425 study, however, the DPR used the saltwater dissolved copper CTR criterion (3.1 µg/L) as target output to back-calculate the leach rate needed to achieve the desired dissolved copper concentration for five marina scenarios (based upon marina area and number of vessels). Based upon initial discussions with DPR staff, the MAM-PEC model can be employed to help predict future dissolved copper load reductions in SIYB as higher leach rate paints are transitioned out of use. The model would be set up with SIYB-specific variables (e.g., length, width, current velocity, etc) and run using the leaching rates of the paints that will be acceptable following implementation of AB 425. The model output would be a resultant water concentration of dissolved copper that be compared to the saltwater dissolved copper CTR criterion of 3.1 µg/L. The goals of this modeling effort would be to: • Predict the current, basin-wide expected water column dissolved copper level, based upon the realistic, site-specific (non-conservative) model inputs. This would help the stakeholders better understand how their copper reduction efforts have actually reduced the dissolved copper levels in the SIYB water column. • Predict the expected future dissolved copper water column levels in SIYB, once the higher copper leach rate paints have been phased out. It is also important for the SIYB stakeholders to understand the timeframe over which this phase-out will occur. • Estimate the current contribution of underwater hull cleaning to dissolved copper loads in the SIYB and how this level would be reduced by implementing the hull-cleaning mitigation measures identified in the DPR's AB 425 memorandum. • Predict the magnitude of the expected load reductions as a result of transitioning to AB 425 accepted leach rate paints. This prediction would assist in determining the likelihood of achieving these future SIYB TMDL compliance targets and understanding the timeframe that may be needed to complete the transition.	As part of the 2015 SIYB TMDL Conceptual Site Model update, it is recommended that the MAM-PEC model (or equivalent) be evaluated to determine whether it can be effective in predicting future dissolved copper load reductions in SIYB as higher-leach-rate paints are transitioned out of use (as discussed in Issue 2, modeling goals). If this effort appears promising, future reports will outline the steps that will be taken to present this information to the Regional Board and to determine the appropriate approach to incorporate it into the SIYB TMDL compliance strategy.

Table 5-2.
2014 Monitoring and Progress Report Recommendations (continued)

2014 Recommendation Issue	2014 Report Recommendation
Issue 3: Continue to Refine the SIYB Hull Paint Tracking Database – As part of the annual SIYB TMDL implementation program, the SIML TMDL Group works collaboratively with each of the yacht clubs and marinas on a master Vessel Tracking Database. The information collected by the SIML TMDL Group is combined with the Port's tracking information to determine the annual dissolved copper loads to SIYB. The vessel paint categories currently tracked are: no paint, non-copper, low copper (0.45 kg of dissolved copper/year), high copper (0.9 kg of dissolved copper/year), and old paint (0.45 kg of dissolved copper/year). As a result of the AB 425-required transition to lower-leach-rate paints, the annual loading categories currently tracked may need to be reevaluated.	It is recommended that the SIYB vessel tracking process be modified so that it is able to track the transition to AB 425-approved low-leach-rate paints.
Issue No. 4: Work with the Regulators to Clarify the Bivalve Larvae Toxicity Test Endpoint – As discussed in the toxicity section, toxicity (in the form of abnormally developing bivalve larvae) was observed only in Station SIYB-1 and only in the undiluted surface water sample. This is the same toxicity pattern that was observed in 2013. What was different in the 2014 tests compared with 2013 results, however, was the degree of abnormality observed in the developing bivalve larvae. In 2013, the bivalve larvae were clearly abnormal, while in 2014, the degree of abnormality was more subtle. The classic definition of normal bivalve larvae is that they are D-shaped and possess a straight-lined hinge. The majority of the larvae scored as "abnormal" in 2014 had developed a shell (not completely to the D-shape); however, they also had a slightly curved hinge as opposed to a straight hinge. Based upon follow-up research, it was discovered that there is a discrepancy among toxicity professionals and regulators as to whether the D-shaped larvae with a slightly curve hinge should be scored as normal or abnormal. A definitive protocol to score these types of curved shell larvae has significance for the SIYB monitoring program as well as other regional studies that employ the bivalve larvae development test as a toxicity indicator.	It is recommended that the Port and Regional Board jointly request definitive guidance from the SWRCB and USEPA Region 9 on how to score bivalve larvae in the particular circumstance described in this issue.

6.0 REFERENCES

AMEC. 2013. 2012 Shelter Island Yacht Basin Dissolved Copper TMDL Monitoring and Progress Report.

AMEC Environment & Infrastructure, Inc. (AMEC). 2014. 2013 Shelter Island Yacht Basin Dissolved Copper TMDL Monitoring and Progress Report.

Delgadillo-Hinojosa, F., A. Zirino, and C. Nasci. 2008. Copper complexation capacity in surface waters of the Venice Lagoon, Marine Environmental Research 66: 404-411

Early, Patrick J., Brandon L. Swope, Katherine Barbeau, Randelle Bundy, Janessa A. McDonald, and Ignacio Rivera-Duarte. 2013. Life cycle contributions of copper from vessel painting and maintenance activities. Biofouling: The Journal of Bioadhesion and Biofilm Research, DOI: 10.1080/08927014.2013.841891

Johnson, L.T. and J.A. Gonzalez. 2004. Making Dollars and Sense of Nontoxic Antifouling Strategies for Boats. Californian Sea Grant College Program Technical Report No. T-054. 21 p.

Regional Water Quality Control Board, San Diego Region (Regional Board). 1994. Water Quality Control Plan for the San Diego Basin—Region 9 (Basin Plan).

Regional Board. 2005. Shelter Island Yacht Basin Dissolved Copper Total Maximum Daily Load, San Diego Bay. Resolution No. R9-2005-0019. Basin Plan Amendment and Technical Report.

Regional Board. 2011. Investigative Order No. R9-2011-0036 to the San Diego Unified Port District): Shelter Island Yacht Basin Dissolved Copper TMDL Implementation Plan. March 11.

Regional Board. 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.” July 26.

Rosen, G., Rivera-Duarte, I., Kear-Padilla, L., Chadwick, B. 2005. Use of laboratory toxicity tests with bivalve and echinoderm embryos to evaluate the bioavailability of copper in San Diego Bay, California, USA. Environmental Toxicology and Chemistry, 24:415-422.

San Diego Unified Port District and the Institute for Research and Technical Assistance. 2011. USEPA Project NP00946501-4: Safer Alternatives to Copper Antifouling Paints for Marine Vessels. January.

U.S. Environmental Protection Agency (USEPA). 1995. Short-term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. EPA Office of Research and Development. Narragansett, RI.

USEPA. 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. Rules and Regulations. Federal Register, Vol. 65, No. 97. May 18.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012. October.

USEPA. 2010. National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document. EPA/833/R-10/003. June 2010.

Weston. 2011. Shelter Island Yacht Basin TMDL Monitoring Plan. Prepared for the California Regional Water Quality Control Board, San Diego Region. May.

Zirino, A., R. Demarco, I. Rivera, and B. Pejcic. 2002. The influence of diffusion fluxes on the detection limit of the jalpaite copper ion-selective electrode. Electroanalysis 14:493–498.

APPENDIX A

SIYB DISSOLVED COPPER TMDL MONITORING PLAN REVISION 1

This page intentionally left blank

FINAL
SHELTER ISLAND YACHT BASIN
TOTAL MAXIMUM DAILY LOAD
MONITORING PLAN
REVISION 1

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

Prepared by:
AMEC Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123

In Coordination with:
Port of San Diego

May 2011
Revision 1: March 2014

TABLE OF CONTENTS

Page

ACRONYMS AND ABBREVIATIONS iii
1.0 INTRODUCTION 1-1
  1.1 Compliance Schedule 1-2
  1.2 TMDL Implementation Plan 1-3
  1.3 Sources of Dissolved Copper 1-3
  1.4 Water Quality Objective Criteria 1-4
  1.5 Monitoring Purpose 1-4
  1.6 Monitoring Plan Revisions 1-5
2.0 BEST MANAGEMENT PRACTICE IMPLEMENTATION FOR SIYB 2-1
3.0 TRACKING VESSEL CONVERSIONS 3-1
  3.1 Vessel Tracking 3-1
    3.1.1 Tracking Approach 3-1
    3.1.2 Tracking Templates 3-3
  3.2 Annual Dissolved Copper Load Analysis 3-3
4.0 WATER QUALITY MONITORING 4-1
  4.1 Water Quality Sampling and Analyses 4-1
    4.1.1 SIYB Sample Locations 4-1
    4.1.2 Frequency of Sampling 4-2
    4.1.3 Sample Collection 4-2
    4.1.4 Equipment Decontamination and Cleaning 4-5
    4.1.5 Chemical Analysis 4-5
    4.1.6 Toxicity Testing 4-6
    4.1.7 Water Quality Analysis 4-8
  4.2 Field and Analytical QA/QC Procedures 4-9
  4.3 Chain-of-Custody Procedures 4-11
    4.3.1 Health and Safety 4-12
    4.3.2 Use of Boats and Working over Water 4-12
5.0 DATA REVIEW AND MANAGEMENT 5-1
  5.1 Data Review 5-1
  5.2 Data Management 5-1
  5.3 Laboratory Quality Assurance and Quality Control 5-1
6.0 REPORTING 6-1
7.0 REFERENCES 7-1

LIST OF TABLES

Table 1-1. Loading Targets for TMDL Attainment 1-2
Table 1-2. Sources of Dissolved Copper to SIYB per the TMDL 1-3
Table 1-3. Summary of 2012 Monitoring Report Recommendations and Regional Board Response 1-5
Table 3-1. Required Vessel Tracking Data 3-1
Table 3-2. Required Low-Copper and Non-Copper Hull Paint Vessel Data 3-2
Table 3-3. Vessel Tracking Data for Annual Monitoring as Required in Investigative Order 3-2

TABLE OF CONTENTS (Cont.)

Page

LIST OF TABLES (Cont.)

Table 3-4. Dissolved Copper Loading Calculation Assumptions..3-4
Table 4-1. Sampling Station Coordinates...4-1
Table 4-2. Laboratory Analytical Methods and Detection Limits..4-5
Table 4-3. Conditions for the 96-Hour Pacific Topsmelt Bioassay 4-6
Table 4-4. Conditions for the 48-Hour Mussel Development Bioassay 4-8
Table 4-5. Sample Holding Times 4-10

LIST OF FIGURES

Figure 4-1. Shelter Island Yacht Basin Monitoring Network 4-3

LIST OF ATTACHMENTS

ATTACHMENT 1 TRACKING DATABASE FIELDS
ATTACHMENT 2 CHAIN-OF-CUSTODY FORMS

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
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
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
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)
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 1) is being submitted to the San Diego Regional Water Quality Control Board (Regional Board) to incorporate monitoring program modifications that arose during the first three monitoring events (2011–2013). 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).

This plan revision includes 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 this revised plan have all been approved by the Regional Board and include, for example:

- 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

Specific monitoring plan modifications are discussed in additional detail in Section 1.6 (Monitoring Plan Revisions).

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.

The Port is also planning to revise the 2011 SIYB TMDL Conceptual Model to include new information, such as refining copper paint leach rates and revising load contributions from various sources (e.g., in-water hull cleaning). The project-specific conceptual model identifies the physical and chemical factors that control the fate and transport of copper in SIYB and identifies the biological receptors that could be exposed to pollutants in the water and sediments. The conceptual model will be revised following discussions between the SIYB TMDL Stakeholders (the Port and Shelter Island Master Leaseholders [SIML] TMDL Group) and the Regional Board on recent and relevant study findings. The purpose of these discussions will be to arrive at a consensus on how these new findings affect the future direction of the SIYB TMDL. The revised conceptual model will also identify potential future studies needed to refine the model.

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[1], 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

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.

---

[1] 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.

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[a]	100	5%
Urban Runoff	30	1%
Background	30	1%
Direct Atmospheric Deposition	3	<1%
Sediment	0	0
Total	2,163	100%

Notes:

[a] As reported in a recent study by the Space and Naval Warfare Systems Command (SPAWAR) (Earley et al., 2013) conducted for the California Department of Pesticide Regulation (DPR) in response to AB 425, the load contributions from passive leaching and hull cleaning may be hard to differentiate because of the accelerated release (leaching) of copper that occurs following refreshment of the painted hull surface following in-water hull cleaning.

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 U.S. Environmental Protection Agency (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.

1.6 Monitoring Plan Revisions

This section presents specific modifications of the monitoring program that have been incorporated into Monitoring Plan Revision 1. In the *2012 SIYB Dissolved Copper TMDL Monitoring and Progress Report,* a series of program revisions were recommended to the Regional Board. Two separate types of recommendations were proposed: (a) modifying the program associated with vessel tracking, and (b) modifying the water quality monitoring program. These recommendations were presented to the Regional Board after careful consideration and were intended to provide more accurate and pertinent monitoring data. In a letter dated July 26, 2013, the Regional Board concurred with the recommendations in the 2012 report. The proposed recommendations included in the 2012 TMDL Monitoring and Progress Report are summarized in Table 1-3. Execution of the 2013 SIYB TMDL monitoring program was modified, as needed, to incorporate these Regional Board-approved recommendations.

Table 1-3.
Summary of 2012 Monitoring Report Recommendations and Regional Board Response

Number	2012 Report Recommendation[a]	Regional Board Response[b]	Revisions in Monitoring Plan Revision 1
1	Improvements can be made by increasing boater participation, continued diligence by the SIML TMDL Group to increase survey responses, and efforts throughout the year to improve the reporting process and validate the data.	This recommendation was informational and did not require a response from the Regional Board	No Monitoring Plan revision is necessary
2	The SIML TMDL Group recommended removing hull registration data from future monitoring reports because of privacy concerns.	RWQCB agreed with the recommendation to remove the collection of hull registration data (i.e., vessel registration numbers) because of concerns that this information might become part of a public document.	The requirement to report this information has been removed from Table 3-1 (Required Vessel Tracking Data).
3	The Port recommended that the concept of coding vessels with aged-copper paint similar to the load calculation (0.45 kg/yr) used for low-copper paints be considered for future loading calculations.	To more accurately calculate the amount of copper loading to SIYB, allow the assumption that vessels with aged-copper antifouling paints have a rate of copper release (i.e., leaching or loading) similar to low–copper antifouling paints (0.45 kg/yr) because the research (provided in Appendix E of the 2012 report) indicates that copper leach rates degrade over time, particularly after the first 2–3 years after application.	Vessels with aged-copper paints on their hulls are being tracked separately. An aged-copper paint category has been added to Table 3-4 (Dissolved Copper Loading Calculation Assumptions).

Table 1-3.
Summary of 2012 Monitoring Report Recommendations and Regional Board Response (Cont.)

Number	Recommendation of 2012 Report[a]	Response of Regional Board[b]	Monitoring Plan Revision(s)
4	TOC and DOC analyses should be conducted by SM 5310B (as opposed to SM 5310C) because of its greater sensitivity, lower reporting limits, and less susceptibility for interference.	This recommendation is informational and did not require a response from the Regional Board.	Table 4-2 (Laboratory Analytical Methods and Detection Limits) has been revised to include DOC/TOC methods SM 5310B.
5	Because of the limitations and issues of using the free copper ion test method (e.g., the experimental nature of the test), the Port recommended removing this test from future monitoring.	Remove the free copper ion activity measurement from future monitoring because of the lack of USEPA guidance and time constraints caused by the instrument calibration process.	Section 4.1 (Water Quality Sampling and Analyses) has removed free copper analyses from the testing regime.
6	Several changes to the QAPP were recommended to improve monitoring and data collection.	This recommendation was informational in nature and did not require a response from the Regional Board.	No Monitoring Plan revision is necessary. The updated QAPP is available upon request.
7	The Port requested including the test of significant toxicity (TST) calculation in the program as an additional statistical analysis tool for reporting toxicity data, along with the existing no-observed-effect concentration (NOEC) approach.	Include the Test of Significant Toxicity (TST) calculation as an additional statistical analysis for reporting toxicity data.	Section 4.1.6 (Toxicity Testing) has been revised to reflect that the toxicity test results for this program will be analyzed by the TST method.

Notes:

[a] *2012 Shelter Island Yacht Basin TMDL Monitoring and Progress Report*

[b] 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.”

DOC	dissolved organic carbon
kg/yr	kilograms per year
NOEC	no observed effect concentration
Port	Port of San Diego
QAPP	Quality Assurance Project Plan
RWQCB	Regional Water Quality Control Board
SIML	Shelter Island Master Leaseholders
SIYB	Shelter Island Yacht Basin
SM	Standard Methods
TMDL	total maximum daily load
TOC	total organic carbon
TST	test of significant toxicity
USEPA	U.S. Environmental Protection Agency

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.

This page intentionally left blank

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 low-copper (i.e., 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

Pertinent vessel tracking information will be solicited annually from all SIYB boat owners. 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 1.

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.	Total number of slips or buoys in facility available to be occupied by vessels
4.	Slip/mooring occupation data
	a. Percent of time unoccupied
	b. Percent of time occupied by vessel(s) with known copper hull paint
	c. Percent of time occupied by vessel(s) with aged-copper hull paint
	d. Percent of time occupied by vessel(s) with documented low-copper hull paint
	e. Percent of time occupied by vessel(s) with documented non-copper hull paint
5.	Vessel-specific information
	a. Vessel type (sail, power, multi-hull, etc.)
	b. Vessel length
	c. Vessel beam width

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

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

Vessel Tracking Data Fields	
1.	Paint brand name
2.	Product number
3.	Name of boatyard that applied paint
4.[a]	Painting date
5.	Percent copper if low-copper hull paint is indicated

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, low-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 low-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 document and track the number and paint types of all vessels moored at marinas and 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), 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 1.

The Port intends to develop a Web-based database. The database will be administered and maintained by the Port and will be designed for SIYB, will be adaptable and able to move to a bay-wide tracking system over time. Boatyards, marinas, and yacht clubs will be able to access, input, and review data, both specific to their facilities and basin-wide. All users will have password-protected rights to enter and edit data from their facility, and read-only rights for all basin-wide data. The development of this Web-based application is currently in progress and is anticipated to be completed by 2015.

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, low-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[2].
- 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. The use of low-copper hull paints (i.e., hull coatings with less than 40-percent copper) also was recognized in the TMDL as a viable means of reducing copper loading to the basin. 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.

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.
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.	Low copper hull paints are paints with less than 40-percent copper.
7.	Average annual dissolved copper load from a vessel with low-copper paint equals 0.45 kg/yr
8	Vessels determined to have aged-copper paint (i.e., copper paint applied to a vessel hull prior to December 31, 2010[a]) will have an annual dissolved copper load equal to 0.45 kg/yr.
9.	Annual loads will be normalized by the percent of time vessels are docked in SIYB.

Notes:
[a] December 31, 2010, is the cutoff date for vessels to be considered to have aged-copper paint for the 2013 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

---

[2] 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.

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.

The dissolved copper contribution resulting from in-water hull cleaning that will be used in the annual loading calculations is 6.2 $\mu g/cm^2$/event. This is less than the level provided in the Regional Board's original TMDL assumptions (8.5 $\mu g/cm^2$/event). This reduced loading factor is a consequence of the development and implementation of the Port's in-water hull cleaning policies. The TMDL assumed that BMPs would be used 50 percent of the time; however, the Port's ordinance requires that in-water hull cleaning BMPs are used 100 percent of the time. Additionally, with the vessel tracking data that are now being collected annually, the known number of copper hulls and their average wetted hull size can be used in the calculation instead of assuming that all hulls contain copper paint. The assumed number of cleaning events used in the calculation will be the same as in the TMDL (i.e., 14 cleaning events/year).

This page intentionally left blank

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 (Table 4-1 and Figure 4-1). Monitoring was conducted at these stations for the first three SIYB TMDL monitoring events (2011–2013).

Table 4-1.
Sampling Station Coordinates

Station	Target		Actual	
	Latitude	Longitude	Latitude	Longitude
SIYB-1	32.71821	-117.22601	32.71815	-117.22604
SIYB-2	32.71412	-117.22921	32.71420	-117.22930
SIYB-3	32.71550	-117.22989	32.71543	-117.22997
SIYB-4	32.71683	-117.23203	32.71680	-117.23193
SIYB-5	32.71217	-117.23297	32.71213	-117.23292
SIYB-6	32.70858	-117.23514	32.70877	-117.23511
SIYB-REF	32.70406	-117.23232	32.70380	-117.23216

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 at 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. 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 located in San Diego Bay and continue northward to Station SIYB-01 located near the head of basin. Samples will be collected in the following order: SIYB-Ref, SIYB-06, SIYB-05, SIYB-04, SIYB-03, SIYB-02, and SIYB-01. Collection of the samples will be timed so that the midpoint of the collection (SIYB-04) 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), and toxicity testing. 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

All water samples will be logged on a chain-of-custody (COC) form (Attachment 2) 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.

R:\2012\Aquatics\SanPedro_Improvement\mxd\Report Figures\Fig2-1_Monitoring_Stations.mxd

FIGURE

4-1

Shelter Island Yacht Basin TMDL Monitoring Station Locations

This page intentionally left blank

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, salinity, temperature, and pH (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. Physical 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
Salinity	YSI Pro Plus	NA	ppt
Temperature	YSI Pro Plus	NA	0.1 °C
pH	YSI Pro Plus	NA	0.2 pH unit

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
USEPA - U.S. Environmental Protection Agency
YSI - YSI Incorporated

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>Mytilus galloprovincialis</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">Recommended Water Quality Parameters</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[3] (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).

---

[3] 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). If possible, samples will be delivered to the analytical laboratories on the same day as 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]
48-hour acute bioassay	36 hours
96-hour chronic bioassay	36 hours

Notes:
[a] The holding time is applicable to preserved sample. The sample was 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 at the laboratory immediately upon receipt from the courier on the same day as 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.

This page intentionally left blank

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 low-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 low-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 low-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.

7.0 REFERENCES

AMEC Environmental & Infrastructure, Inc. (AMEC). 2013. *2012 Shelter Island Yacht Basin Dissolved Copper TMDL Monitoring and Progress Repor*t.

American Public Health Association (APHA). 1998. *Standard Methods for the Examination of Water and Wastewater.* 19th ed. Washington, D.C. 1325 pp.

American Society for Testing and Materials (ASTM). 2006. E1367-03 Standard Guide for Conducting 10-Day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods. *Annual Book of Standards, Water and Environmental Technology*, Vol. 11.05, West Conshohocken, PA.

Neira, C., F. Delgadillo-Hinojosa, A. Zirino, G. Mendoza, L.A. Levin, M. Porrachia, M., and D.D. Deheyn. 2009. Spatial distribution of copper in relation to recreational boating in a California shallow-water basin. *Chemistry and Ecology* 25(6): 417-433.

Regional Water Quality Control Board, San Diego Region (Regional Board). 1994. Water Quality Control Plan for San Diego Basin—Region 9 (Basin Plan).

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.)

U.S. Environmental Protection Agency (USEPA). 1995. *Short-term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms.* EPA/600/R-95/136. EPA Office of Research and Development. Narragansett, RI.

U.S. Environmental Protection Agency (USEPA). 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. *Federal Register.* Vol. 65. No. 97. May 18, 2000. Rules and Regulations.

U.S. Environmental Protection Agency (USEPA). 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition. EPA-821-R-02-012. October.

U.S. Environmental Protection Agency (USEPA). 2010. National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document. EPA/833/R-10/003. June 2010.

Weston Solutions, Inc. (WESTON). 2008. *Regional Harbor Monitoring Program 2005–2007 Pilot Study Final Report. Prepared for the Port of San Diego, City of San Diego, City of Oceanside, and County of Orange*. May 2008.

Weston Solutions, Inc. (WESTON). 2010. *Regional Harbor Monitoring Program 2008 Final Report*. Prepared for the Port of San Diego, City of San Diego, City of Oceanside, and County of Orange. May.

Weston. 2011. *Shelter Island Yacht Basin TMDL Monitoring Plan*. Prepared for the California Regional Water Quality Control Board, San Diego Region. May.

This page intentionally left blank

ATTACHMENT 1

TRACKING DATABASE FIELDS

This page intentionally left blank

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

ATTACHMENT 2

CHAIN-OF-CUSTODY FORMS

This page intentionally left blank

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 5

CLIENT NAME:

PROJECT: Port of San Diego - Shelter Island Yacht Basin

ADDRESS:

PHONE:
FAX:
EMAIL:

PROJECT MANAGER Rolf Schottle

SAMPLER

ANALYSES REQUESTED

- **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

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.	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc	Total Organic Carbon (TOC)	Dissolved Organic Carbon (DOC)					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

4340 Vandever Ave. San Diego, CA 92120

Chain of Custody (electronic)

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**		**Relinquished By:**	**Received By (courier):**
Client:	**Total # Containers:**		**Signature:** Date	**Signature:** Date
P.O. No.:	**Good Condition?**		**Print Name:** Time	**Print Name:** Time
Shipped Via:	**Matches Test Schedule?**		**Company:**	**Company:**
Comments: Concurrent reference toxicant test for both species			**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

This page intentionally left blank

PORT OF SAN DIEGO
BMP PLAN IMPLEMENTATION

This page intentionally left blank

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

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 is involved in the development of state legislation that will require the Department 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: February 2013*** ***Completion date:*** ***(1) Bill complete – October 2013*** ***(2) Establish leach rate – February 2014*** ***(3) Leach rate use - TBD*** ***Status: Legislation complete***	***AB 425 was signed in October 2013.*** ***The final DPR report was completed on January 30, 2014, and established the following:*** • ***Max leach rate of 9.5 µg/cm2/day for paints with monthly soft carpet*** • ***Max leach rate of 13.4 µg/cm2/day for paints where cleaning is prohibited*** • ***7 additional mitigation measures identified to be implemented***
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 and use BMPs.	# of permitted in-water hull-cleaning businesses/ total in-water hull-cleaning businesses known to operate	Start date: FY10 Ongoing annually Past annual totals: • 2013: 6 hull-cleaning permits issued; 52 active permits as of December 2013.	68 permits issued since onset of regulation. 53 active permits as of December 2014. 3 new hull-cleaning permits issued in 2014. Use of BMPs by all hull cleaners has resulted in an estimated 33-kg/yr load reduction in SIYB.
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 that 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 and use BMPs.	# of permitted in-water hull-cleaning businesses having permits expiring in 2013/total #in-water hull-cleaning businesses	Start Date: Jan 2013 Completion date: Annually Status: Ongoing annually Past annual totals: • 2013 –- 41 hull-cleaning businesses renewed permits; 13 expired permits	8 hull-cleaning businesses renewed permits in 2014. 1 expired permit (no longer in business or will not be renewed).

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Policy/Regulation	In-water Hull Cleaning – Diver/Marina Inspections	Bay-wide	Provide 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 and use BMPs.	# of inspections conducted/ # of citations/warnings issued	Ongoing annually Status: Complete Past annual totals: • 2013 - 50 hull-cleaning inspections; 2 divers cited for lack of permit	28 hull-cleaning inspections in 2014 1 diver cited in 2014 for lack of permit, warning letter issued – issued closed
Policy/Regulation	Correspondence with State and Federal Agencies	State-wide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities and lessons learned, and build upon successful activity models.	Completeness: Submittal of letters; response to request(s)	# of letters sent/# of requests satisfied	Ongoing annually	• Letter to USEPA requesting the consideration of a Biotic Ligand Model for Marine Waters (Jan 8, 2014) • Letter to LARWQCB providing comments on the proposed Harbor Toxic Pollutants TMDL for Marina del Rey (Jan 14, 2014)
Alternative Hull Paint Studies	***Hull Paint Research Grants***	***State-wide***	***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***
Alternative Hull Paint Studies	Long-term Hull Paint Testing Program Development: Development of a testing program to evaluate new and emerging coatings	SIYB	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 Completion date: Ongoing Annual totals: • 2011: 5 of 17 non-copper hull paints identified to be effective • 2010: 4 of 21 non-copper hull paints identified to be effective	No activity in 2012 - 2014. Program on hold due to resource limitations
Hull Paint Transition	***Transition of Port Fleet to Non-Copper Hull Paints***	***SIYB/ Bay-wide***	***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*** ***13 of 13 converted***	***All 13 Port boats have been converted, resulting in a 9.9-kg/yr load reduction*** ***Project completed ahead of schedule***

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Hull Paint Transition	***Vessel Tracking Templates***	***SIYB/ Bay-wide***	***Provide 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***
Hull Paint Transition	Web-based Vessel Tracking System	SIYB/ Bay-wide	Provide 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	Worked to implement enhancements to database with IT Department and consultant (2014)
Grant Funding/ Incentives	319h Hull Paint Conversion Project	SIYB	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: June 2015 Status: In progress Past annual totals: • 2011 to 2013 – 29 boats, 28.43 kg/yr total load reduction	• 5 boats converted in 2014 • 34 vessels converted overall • 2014 load reduction = 3.83 kg/yr • Overall load reduction = 32.3 kg/yr • Time extension for grant project approved in 2014.

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Education/Outreach	Workshops/seminars to boating community and 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: FY09 Status: Ongoing Past annual totals: • 2013 - 1 event • 2012 - 3 events • 2011 - 2 events • 2010 – 1 event	• Eco-Friendly Hull Paint Expos ○ March 22, 2014: Approximately 100 people attended ○ October 18, 2014: Approximately 75 people attended • Conferences: ○ January 16, 2014: California Marine Affairs & Navigation Conference – TMDL Panel Speaker Approximately 50 people attended ○ April 24, 2104: SETAC Conference – Copper Workshop Speaker Approximately 120 people attended • Port Committee Meetings ○ April 15, 2014: Board Meeting – update on TMDL and 319h Grant Approximately 40 people attended ○ August 20, 2014: Environmental Advisory Committee – update on TMDL and 319h grant Approximately 30 people attended
Education/Outreach	Booths at Outreach Events	SIYB/Bay-wide	The Port annually hosts a booth at various boating relating events, such as the Sunroad Boat Show or Day at the Docks. The purpose is to educate the boating community on environmental impacts of copper-based hull paints; provide information on alternative hull paints; and 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: FY09 Status: Ongoing Past annual totals: • 2013 - 5 events • 2012 – 4 events • 2011 – 4 events • 2010 – 1 event • 2009 – 1 event	• Sunroad Boat Show (January 23-26, 2014). Approximately 13,000 people attended. • Eco-Friendly Hull Paint Expo. March 22, 2014: Approximately 100 people attended. • Day at the Docks (April 13, 2014). Approximately 30,000 attendees. • Land and Sea Festival (May 17, 2014). Approximately 500 people attended. • Chula Vista Harbor Days (September 21, 2014). Approximately 17,000 people attended. • Eco-Friendly Hull Paint Expo. October 18, 2014: Approximately 75 people attended.

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: FY09 Completion date: Ongoing Status: In progress:	• Hornblower Cruises (Testing on Newport) Complete • Panel testing with San Diego Yacht Club and Southwestern Yacht Club • Coordination with hull cleaners on In-Water Hull-Cleaning Regulations • Coordination with SIML TMDL Group on SIYB TMDL annual report • Coordination with Newport Beach and Marina del Rey jurisdictions on proposed TMDLs • Regular participation in state-led Interagency Coordinating Committee (IACC) meetings for antifouling and marina-related topics • Regular meetings with Regional Board staff to debrief on annual reports and recommendations
Education/ Outreach	Website Development	SIYB/ Bay-wide	Serve as an information source for staying up-to-date with boating trends, news, events, and environmental issues. Provide tenants, stakeholders, 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: - Ongoing Past annual totals: • 2013 - 2 updates • 2012 – 2 updates • 2011 – 1 update	• 1 update during 2014
Education/Outreach	Literature Development: (brochures, handouts, print materials)	Bay-wide	Develop and distribute brochures and other educational materials for the public addressing the bay's copper problems and provide information on non-copper alternative hull paints.	Change in awareness	# of brochures or pamphlets created and # distributed	Start date: FY10 Past annual totals: • 2013 - 4 items • 2012 – 1 item • 2011 – 2 items	2 collateral items completed: • Testimonial poster (October 2014) • E-flyer: "Happy Hullidays" reminder email on the Grant Project (December 2014)

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Education/Outreach	Media Development: (Videos, Web tools, Testimonials, Press releases)	SIYB/ Bay-wide	Develop and distribute 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: FY09 Status: Ongoing Past annual totals: • 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	• 7 press releases in 2014 • Testimonial poster: New poster to display at events and on website (October 13, 2014)
Agency Wide Activities	Construction Site Inspections	Bay-wide	Ensure that sites undergoing development/ redevelopment 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: Ongoing	41 construction projects 262 inspections and 29 follow-up inspections 96% BMP implementation rate overall
Agency Wide Activities	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: Ongoing Past annual totals: • 2013 – 26 inspections bay-wide; 4 follow-ups required • 2012 – 9 inspections bay-wide, 0 follow-ups required	45 inspections and 18 follow-up inspections bay-wide in 2014 In SIYB, inspections confirmed that BMPS were being implemented appropriately and written warnings were sufficient to resolve the deficiencies at two facilities Bay-wide written warnings were sufficient to resolve the deficiencies in the Non-SIYB facilities

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Structural and Mechanical BMP Implementation	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 as LID.	Change in behavior: Compliance	# of projects having metals as priority pollutant/# of completed SUSMP BMPs/# acres (sq ft)	Status: Ongoing	8 existing projects overall had metals as priority pollutant; 39.37 acres treated bay-wide 2 projects occurred in SIYB in 2014 and had metals as priority pollutant; 1.69 acres treated
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 2014: Basin average for dissolved copper was 7.0 µg/L, a decrease of 15.5% from basin average of 8.28 µg/L in SIYB TMDL***
Monitoring/ Reporting	***Revisions to QAPP and 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: March 2014 Completion Date: August 2014 Status: Revisions complete***	***Revisions include removal of Free Copper analysis, updated toxicity methods, use of aged paint in load calculations, and various QA updates***
Monitoring/ Reporting	Updates to SIYB TMDL Conceptual Model (as-needed)	SIYB	Model identifies the physical and chemical factors that control the fate and transport of dissolved copper within SIYB and receptors (i.e., biota) that could be exposed to copper in the water and sediment	Completeness; annual review and update (when applicable)	Completed report; updates as needed	Status: Ongoing	Data from DPR Report are being considered for inclusion into conceptual model
Monitoring	Regional Harbor Monitoring Program (RHMP): 2013 Core Monitoring Program	Bay-wide	Assess conditions found in San Diego Bay based on comparisons to historical data and comparisons of contaminant concentrations to known surface water and sediment thresholds	Completeness	Water, sediment, and fish sampling in bay Report on findings of the study	Start date: FY13 Completion date: FY15 Status: In progress	Sampling completed in August/September 2014 Data analysis in progress

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
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 February 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 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.
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

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

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)	SIYB/ Bay-wide	Develop and distribute brochures and other educational materials for the public addressing the bay's copper problems and provide information on non-copper alternative hull paints	Change in awareness	# of brochures or pamphlets created and # distributed	Status: Ongoing	Proposed collateral: • TBD
Education/ Outreach	Media Development: (Videos, Testimonials, Press releases) – Ongoing task	SIYB/ Bay-wide	Develop and distribute 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/change in behavior	# of press releases or videos created	Status: Ongoing	
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	
Alternative Hull Paint Studies	Long-term Hull Paint Testing Program Development: Development of a testing program to evaluate new and emerging coatings	SIYB	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: Ongoing	Testing will occur as budget allows
Policy/ Regulation	Policy efforts as deemed applicable and appropriate	SIYB/ Bay-wide	Evaluate potential policy efforts locally and statewide, as deemed appropriate				
Grant Funding/ Incentives	Explore grant opportunities for other portions of San Diego Bay	SIYB/ Bay-wide	Explore grant opportunities for other portions of San Diego Bay	Grant award			
Monitoring	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: FY18 Completion date: FY20	City of San Diego, City of Oceanside, County of Orange

Shelter Island Yacht Basin Total Maximum Daily Load Work Plan – San Diego Unified Port District
Summary of Efforts Completed/in Progress During 2014 Reporting Period (January – December 2014)

BMP TYPE	PROJECT NAME/DESCRIPTION	LOCATION	PURPOSE(S)	TARGETED OUTCOME(S)	ASSESSMENT MECHANISM	SCHEDULE/STATUS	FINDINGS/ACCOMPLISHMENTS
Ongoing Partnerships and Cooperative Efforts							
Vessel Tracking Program	Track vessel conversion from copper to non-copper and low-copper hull paints to determine annual loading reductions	SIYB	Monitor implementation progress and assess progress toward interim and final loading targets	Interim and final loading reduction targets	Annual basin-wide vessel tracking assessments and loading reduction calculations	Annually beginning in 2011; reporting to Regional Board on March 31 annually	All Named Parties
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 toward 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 on March 31 annually	All Names Parties
Education/ Outreach	IACC Meetings	State-wide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities and 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
Policy/ Regulation	Coordination with other regions on Copper TMDLs/impairments	State-wide	Promote consistency in requirements being developed across the state; discuss strategies for implementation activities and lessons learned, and build upon successful activity models	Consistency in regulations	Assessment mechanism is dependent on information being considered	As-needed coordination	TBD

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

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

SHELTER ISLAND MASTER LEASEHOLDERS TMDL GROUP BMP PLAN IMPLEMENTATION

This page intentionally left blank

SIMLG
SIYB Master Leaseholders
TMDL Group

January 15, 2015

Karen Holman
Port of San Diego
Environmental and Land Use
Port of San Diego
PO Box 120448
San Diego, CA 92122

The Shelter Island TMDL Master Leaseholders Group through collaborative efforts submit the required Hull Coating Data as described on the attached master Vessel Tracking Template workbook and the Best Management Practices Plan for compliance with the Shelter Island Yacht Basin Total Maximum Daily Load (SIYB TMDL).

The workbook consists of individual tracking templates submitted by each marina or yacht club located within the Shelter Island yacht basin. The data from each property are then tabulated. The results are provided for your review and submission to the Regional Water Quality Control Board as required by the SIYB TMDL.

We are pleased to see that the collective efforts of the marina and yacht clubs indicates that the boat owners are meeting compliance requirements and essentially the overall loading reductions are being met and exceeded.

We have achieved an overall reduction of 33% in copper loading. This is the result of 6.1% in hull conversions to non-copper paints, 5.0% to low copper paints, aged paints average 29.4% overall and an average slip vacancy rate of 6.4% in our marinas and yacht clubs.

We are pleased with our progress thus far and our efforts to report accurate compliance data. We pledge to continue with boater education and awareness of the best practices for recreational boating and to protect the sensitive ocean environment.

Please feel free to contact me with any questions at shelterislandtmdl@yahoo.com.

Best regards,

Deborah Pennell

Deborah Pennell
Chairman
Shelter Island TMDL Master Leaseholder Group

Shelter Island Yacht Basin Master Leaseholders TMDL Group

BMP SUB-COMMITTEE 2014

BMP Compliance

- SIYB Master Leaseholders are dedicated to reducing copper levels in the Shelter Island Basin to comply with Regional Water Quality Control Board's TMDL for the basin.

- In order to ensure that the Leaseholders are working diligently to reduce copper levels on an annual basis the SIYB Group formed a Best Management Practices Subcommittee.

- The BMP Subcommittee has been tasked to make recommendations to the Shelter Island Yacht Basin TMDL Committee and Master Leaseholders regarding Best Management Practices associated with the TMDL. The subcommittee's role is to promote BMP compliance & facilitate compliance with basin-wide efforts through effective BMPs.

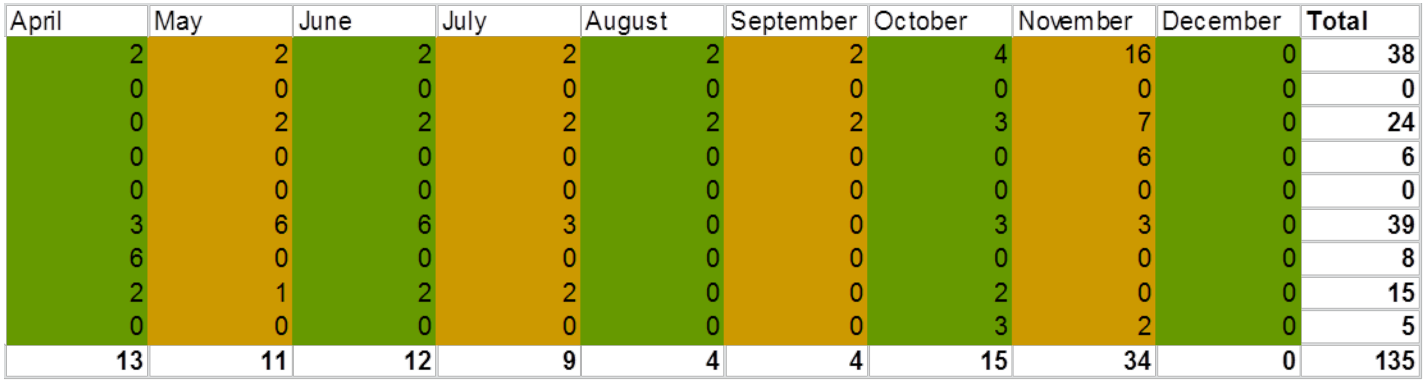
BMP Compliance 2014

- BMP activity in 2014 was assigned to the individual properties to manage and distribute, topics covered included:
  - Education
    - Some properties provided alternative paint brochures for the tenants and members
  - Seminars
    - Some properties invited tenants and members to the Shelter Island Boat Festival
  - Training
    - Properties trained staff on Port Diver Permits, divers were informed of Port regulations.
  - News Media
    - E-news articles were published on hull paint surveys, fliers posted on bulletin boards and gates, links sent to tenants and members on the online paint survey.
  - Signage
    - Signs posted at properties of Hull Cleaning BMPs and Port's Eco Friendly Hull Paint Expo
  - Mailings
    - Bottom paint survey mailed to tenants and members.
  - Surveys
    - Bottom paint surveys compiled and sent to Port.
  - Meetings
    - Various meetings are held year-round including SIYB, Port Environmental, SDPTA Environmental , Port Board, Port Vessel Conversion Data Base user meeting.
  - Contracts
    - Some yacht clubs amended by-laws to compel reporting, marinas slip policies were updated to include BMP's, updated access agreements for divers to include Port regulations.
  - Incentives
    - Facilitating dry sailing boats, no bottom paint on these and also built a high capacity hoist to be able to dry store more vessels.

BMP Compliance 2014

Data Collection Best Management Practices to ensure best possible data is collected when annual Port surveys are executed.

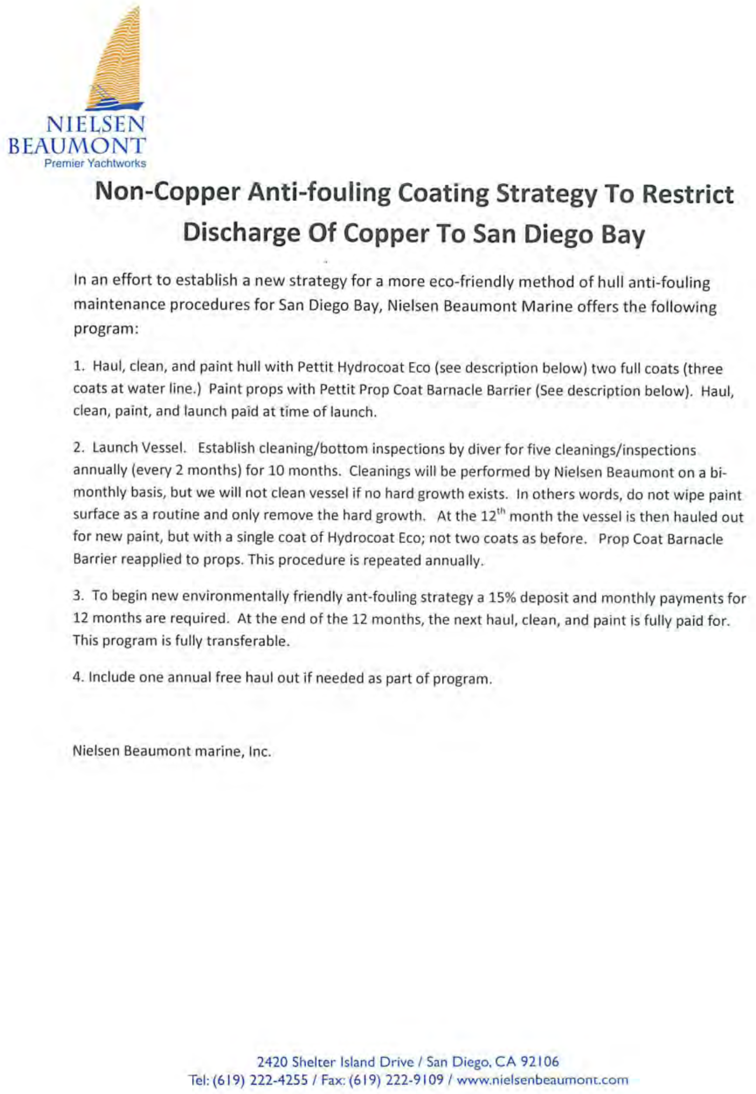
- **SIYB BMP Data Collection Process**
- Include bottom paint reporting form (BRF) in all new tenant or member packages to be filled out while contracts are being signed.
- Mail/email bottom paint form to current tenant/members to be filled out and returned to marina managers by end of July.
- Validate information in forms.
- Add updated bottom paint forms to 2014 spreadsheet.
- Email forms to tenants who have not filled out to be returned to Marina Manager by end of August.
- Validate information in forms.
- Add updated bottom paint forms to 2014 spreadsheet.
- Call owners who have not filled out form, note on form that owner is being interviewed by phone, fill out form with owner.
- Add to 2014 spreadsheet.
- Email boatyards with lists of boats names for any clarification on paint type, paint date.
- Update 2014 spreadsheet.
- File all paperwork in 2014 file folder or scan to hard drive for audit trail.
- **Cost Of Compliance**
- The Subcommittee also recommends that all institutions track time and resources associated with the TMDL efforts so the group understands the financial burden of these efforts.
- SIYB TMDL Group estimates that each boat in Shelter Island basin takes .4 hours per vessel to gather the relevant data to report the bottom paint data each year.



April	May	June	July	August	September	October	November	December	**Total**
2	2	2	2	2	2	4	16	0	38
0	0	0	0	0	0	0	0	0	0
0	2	2	2	2	2	3	7	0	24
0	0	0	0	0	0	0	6	0	6
0	0	0	0	0	0	0	0	0	0
3	6	6	3	0	0	3	3	0	39
6	0	0	0	0	0	0	0	0	8
2	1	2	2	0	0	2	0	0	15
0	0	0	0	0	0	3	2	0	5
13	11	12	9	4	4	15	34	0	135

2014 Incentives

Nielsen Beaumont has developed a non-copper strategy package to offer boaters a "one stop shop" for application and maintenance of copper free hulls.



NIELSEN
BEAUMONT
Premier Yachtworks

Non-Copper Anti-fouling Coating Strategy To Restrict Discharge Of Copper To San Diego Bay

In an effort to establish a new strategy for a more eco-friendly method of hull anti-fouling maintenance procedures for San Diego Bay, Nielsen Beaumont Marine offers the following program:

1. Haul, clean, and paint hull with Pettit Hydrocoat Eco (see description below) two full coats (three coats at water line.) Paint props with Pettit Prop Coat Barnacle Barrier (See description below). Haul, clean, paint, and launch paid at time of launch.

2. Launch Vessel. Establish cleaning/bottom inspections by diver for five cleanings/inspections annually (every 2 months) for 10 months. Cleanings will be performed by Nielsen Beaumont on a bi-monthly basis, but we will not clean vessel if no hard growth exists. In others words, do not wipe paint surface as a routine and only remove the hard growth. At the 12th month the vessel is then hauled out for new paint, but with a single coat of Hydrocoat Eco; not two coats as before. Prop Coat Barnacle Barrier reapplied to props. This procedure is repeated annually.

3. To begin new environmentally friendly ant-fouling strategy a 15% deposit and monthly payments for 12 months are required. At the end of the 12 months, the next haul, clean, and paint is fully paid for. This program is fully transferable.

4. Include one annual free haul out if needed as part of program.

Nielsen Beaumont marine, Inc.

2420 Shelter Island Drive / San Diego, CA 92106
Tel: (619) 222-4255 / Fax: (619) 222-9109 / www.nielsenbeaumont.com

Hydrocoat Eco

Copper Free Water Based Multi-Season Ablative

- **Easy application and cleanup with soap & water**
- **Water-based, copper-free, self-polishing ablative antifouling paint**
- **Co-polymer ablative technology eliminates sanding and paint build-up**
- **Dual-biocides provide outstanding multi-season protection in all conditions**
- **Uses the power of organic ECONEA™ for better protection and a greener earth**

Hydrocoat Eco is the newest member of Pettit's exclusive water-based, copolymer ablative family of bottom paints. The highest level of metal-free ECONEA™ biocide available is combined with a powerful slime fighting inhibitor to provide unprecedented multi-season protection in the toughest marine environments. Innovative Hydrocoat Technology is used to replace the harsh solvents found in most bottom paints with water, providing an easier application and clean up, with low VOC's, and no heavy solvent smell. Hydrocoat Eco's co-polymer ablative paint film wears away with use allowing for a controlled release of biocides while eliminating paint build up and the need for sanding between coats. This copper-free formula is compatible over almost all bottom paints and is safe for use on all substrates including steel and aluminum. Hydrocoat Eco will not lose effectiveness when removed from the water.

Use water to thin if necessary.

Prop Coat Barnacle Barrier

2014 Incentives

- The SIYB Group supports efforts made by Shelter Island marinas and yacht clubs that promote the voluntary use of eco-friendly hull paints. Many of the marinas and clubs have incentives for boaters to convert to non copper hulls including being placed at the top of waitlists, financial and slip assignment priority incentives.

Meetings 2014

- The SIYB Group meet on a monthly basis to discuss ongoing efforts, scientific updates, water monitoring updates, survey results, regulatory items and any other items pertaining to the Shelter Island and other TMDLs. In addition to monthly group meetings a sub committee meets and discusses BMPs to assist with the TMDL.

- A series of executive meetings, advisory meetings, presentations and workshops were held in 2014 with RWQCB, Port Commissioners and state officials:
  - Executive Meetings
    - 1/6 - Port and SPAWAR meeting on DPR report
    - 12/13 to 1/17 – Individual Port Commissioner briefings
    - 1/13 – Port, SDPTA and Senator Atkins meeting on AB425
    - 1/23 – DPR meeting
    - 2/12 – Port QA meeting
    - 3/12 - Port meeting to review 2013 reports
    - 4/15 - Port Board of Commissioners meetings
    - 5/8 - Port meeting for 2014 water monitoring
    - 10/1 - Port meeting to review monitoring results

    Advisory Meetings, Presentations and Workshops
    - 2/10 – Presentation to SDPTA on workshops
    - 2/13– Presentation on TMDL to IEA
    - 3/3 – Presentation on DPR report to SDPTA EAC
    - 4/24-4/25 –Presentation on Copper to SEATAC
    - 5/10 – Port and Consultant, Planning Scientific Advisory Group
    - 7/10- Port and Consultant, Planning Scientific Advisory Group
    - 7/17- Port and Consultant, Planning Scientific Advisory Group

Seminars & Contracts 2014

- **Seminars:** The Subcommittee discussed that seminars should be an integral part of education regarding copper reduction for both boaters and SIYB staff. The seminars would be best "piggybacked" onto other events such as boat shows, yacht club opening days, the Port's scheduled Eco Friendly Hull Paint Expo and any other Shelter Island events. Paint Manufacturers have shown interest in participating with the seminar program. The Subcommittee will gather a list of boating events and discuss with group about next steps. Dockmasters and marina staff attend the Marina Recreation Association conference to discuss water quality standards and hull paint issues.

- **Contracts:** at the present time various SIYB members include bottom paint reporting as a contractual obligation. The BMP Committee suggests that each property should determine whether contractual obligation is appropriate for their members and/or tenants, recognizing that yacht clubs will likely have an alternate avenue of implementation as opposed to public marinas.

- **Incentives**: The BMP Committee discussed that incentives for conversion to non-copper or low copper paints for boaters should be an on-going effort to get us to the 40% copper reduction required by 2017. Incentives could be anything from letters of appreciation from Marina Owners and Commodores to gifts and rent reductions. Each property should ascertain what they can do to entice their boaters to consider non and low copper alternatives when hauling for bottom paint. The BMP Committee will also discuss non and low alternative paint selections with the local yards who are often looked to by boaters as subject matter experts. The group also suggests reaching out to the paint manufacturers, in conjunction with the boatyards, to see if a collective effort could lead to potential discounts/incentives.

Seminars 2014

Happy HULLidays!

View this email in your browser

GET ON BOARD WITH HOLIDAY SAVINGS

Click anywhere on this flier to use the Port's cost calculator and learn how this grant can benefit you!

sandiegobaycopperreduction.org

Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board and the U.S. Environmental Protection Agency under the Federal Nonpoint Source Pollution Control Program (Clean Water Act Section 319). The proceeds or cost offsets distributed to boaters through this program are taxable. Boaters are encouraged to consult with a tax or legal professional regarding the taxability of any cost offset received from the District as a result of the Grant Project.

Happy HULLidays!

'Tis the season to get on board with **savings of 60 or 75%** off hull painting costs when converting to eco-friendly alternative hull paints. To learn more about grant funds that may be available for you, use our hull paint application cost calculator or

Nearly 30 Shelter Island boaters have benefited from the Port of San Diego grant designed to help them switch their copper boat hull paints to eco-friendly alternatives.

This year San Diego's boating community were invited to two expos where they learnt about eco-friendly hull paints and grant funding available to help make the switch.

Boaters are still interested in the grant and are signing up into 2015 to convert to eco-friendly paints.

APPENDIX C

VESSEL TRACKING DATA

This page intentionally left blank

DATA FOR PORT-OPERATED VESSELS AND DOCKS

This page intentionally left blank

Appendix Table C-1.

Shelter Island Yacht Basin Port of San Diego HPD Fleet Vessel Tracking Data 2014

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
12/31/14	HPD		100	Marine 1 (# 9157)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	SIBY	2012	N/A
12/31/14	HPD		100	Marine 2 (#9162)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	SIBY	2012	N/A
12/31/14	HPD		100	Marine 3 (# 9139)	P - Fire Boat	39.1'	13'	Non	Intersleek 900	BZA646	Marine Group	2012	N/A
12/31/14	HPD		100	Marine 4 (# 9138)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	Marine Group	2012	N/A
12/31/14	HPD		100	Marine 5 (#9163)	P - Fire Boat	39.1'	13'	Org	Interspeed 5640	BZA646	SIBY	2012	N/A
12/31/14	HPD		100	Marine 6 (# 7762)	P - Patrol Boat	31'	10'	Non	Intersleek 900	FXA972/A	Marine Group	2012	N/A
12/31/14	HPD		100	Marine 7 (# 7763)	P - Patrol Boat	31'	10'	Org	Interspeed 5640	BZA646	Marine Group	2012	N/A
12/31/14	HPD		100	Marine 8 (# 9066)	P - Patrol Boat	36'	10'	Org	Interspeed 5640	BZA646	Marine Group	2012	N/A
12/31/14	HPD		100	Phoenix (# 7730)	P - GS Dive Boat	34'	8'	Non	Intersleek 900	FXA972/A	SIBY	2011	N/A
12/31/14	HPD		100	Coral Reef (# 7708)	P - GS Work Boat	40'	14'	Non	Intersleek 900	FXA972/A	SIBY	2011	N/A
12/31/14	HPD		100	Bay Shore 1 (7712)	P - GS Work Boat	17'	12'	Non	VC Performance Epoxy	V127/A	SIBY	2011	N/A
12/31/14	HPD		on trailer	Marine 9 (9079)	P - Patrol Boat	22'		Non	No bottom paint	N/A	N/A	N/A	N/A
12/31/14	GST		100	Enviro (# 7720)	P - Work Boat	20'	7'	Non	Intersleek 900	FXA972/A	SIBY	2010	N/A
12/31/14	GST		100	Tsunamii II (# 9144)	P - GS Boat	20'	6'	Non	Intersleek 900	FXA972/A	SIBY	2011	N/A
12/31/14	GST		on trailer	Surveyors boat (7702)	P - GS Boat	12'		Non	No bottom paint	N/A	N/A	N/A	N/A

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/27/2014	Trans	1			36'		1	Cu
8/12/2014	Trans	1			40'		1	Cu
			0.5%				**2**	
1/4/2014	Trans	2			38'		1	Cu
1/5/2014	Trans	2			30'		1	Cu
1/24/2014	Trans	2			32'		1	Cu
1/31/2014	Trans	2			22'		1	Cu
2/1/2014	Trans	2			31'		4	Cu
2/5/2014	Trans	2			31'		1	Cu
2/6/2014	Trans	2			31'		7	Cu
2/22/2014	Trans	2			38'		2	Cu
3/22/2014	Trans	2			20'		1	Cu
3/28/2014	Trans	2			24'		2	Cu
4/9/2014	Trans	2			23'		1	Cu
4/23/2014	Trans	2			26'		1	Cu
4/27/2014	Trans	2			34'		11	Cu
5/10/2014	Trans	2			16'		1	Cu
5/16/2014	Trans	2			49'		7	Cu
5/23/2014	Trans	2			16'		3	Cu
5/26/2014	Trans	2			35'		1	Cu
6/7/2014	Trans	2			26'		1	Cu
6/10/2014	Trans	2			33'		1	Cu
6/8/2014	Trans	2			33'		2	Cu
6/13/2014	Trans	2			22'		2	Cu
6/15/2014	Trans	2			22'		13	Cu
6/28/2014	Trans	2			27'		5	Cu
7/3/2014	Trans	2			18'		5	Cu
7/21/2014	Trans	2			28'		1	Cu
7/22/2014	Trans	2			28'		2	Cu
7/25/2014	Trans	2			28'		1	Cu
8/3/2014	Trans	2			27'		2	Cu
8/16/2014	Trans	2			23'		7	Cu
8/31/2014	Trans	2			25'		2	Cu
9/3/2014	Trans	2			25'		1	Cu
9/5/2014	Trans	2			19'		2	Cu
9/13/2014	Trans	2			20'		1	Cu
9/19/2014	Trans	2			10'		2	Cu
9/26/2014	Trans	2			25'		5	Cu
10/13/2014	Trans	2			31'		14	Cu
10/6/2014	Trans	2			35'		1	Cu
10/8/2014	Trans	2			26'		3	Cu
11/17/2014	Trans	2			10'		1	Cu
12/1/2014	Trans	2			10'		1	Cu
12/13/2014	Trans	2			21'		2	Cu
12/22/2014	Trans	2			26'		1	Cu
			34.0%				**124**	
1/22/2014	Trans	3			46'		1	Cu
1/25/2014	Trans	3			31'		1	Cu
1/26/2014	Trans	3			31'		4	Cu
1/30/2014	Trans	3			31'		1	Cu
2/12/2014	Trans	3			43'		1	Cu
2/22/2014	Trans	3			24'		1	Cu
3/6/2014	Trans	3			45'		2	Cu
3/8/2014	Trans	3					2	Cu
3/10/2014	Trans	3			45'		1	Cu
3/11/2014	Trans	3			45'		1	Cu
3/22/2014	Trans	3			29'		1	Cu
3/26/2014	Trans	3			42'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/27/2014	Trans	3			42'		1	Cu
3/28/2014	Trans	3			42'		1	Cu
3/29/2014	Trans	3			42'		1	Cu
4/2/2014	Trans	3			60'		1	Cu
4/5/2014	Trans	3			40'		1	Cu
4/14/2014	Trans	3			31'		4	Cu
4/21/2014	Trans	3			31'		4	Cu
5/2/2014	Trans	3			22'		3	Cu
4/25/2014	Trans	3			31'		1	Cu
4/27/2014	Trans	3			41'		2	Cu
5/5/2014	Trans	3			37'		3	Cu
5/12/2014	Trans	3			49'		2	Cu
5/14/2014	Trans	3			49'		2	Cu
5/16/2014	Trans	3			40'		1	Cu
5/19/2014	Trans	3			38'		2	Cu
5/25/2014	Trans	3			29'		7	Cu
6/24/2014	Trans	3			22'		5	Cu
6/29/2014	Trans	3			28'		6	Cu
7/5/2014	Trans	3			26'		1	Cu
7/8/2014	Trans	3			33'		1	Cu
7/10/2014	Trans	3			33'		1	Cu
7/11/2014	Trans	3			18'		2	Cu
7/25/2014	Trans	3			26'		2	Cu
8/1/2014	Trans	3			24'		1	Cu
8/2/2014	Trans	3			28'		2	Cu
8/8/2014	Trans	3			24'		2	Cu
8/6/2014	Trans	3			32'		1	Cu
8/11/2014	Trans	3			56'		2	Cu
8/10/2014	Trans	3			24'		1	Cu
8/18/2014	Trans	3			44'		5	Cu
8/24/2014	Trans	3			27'		6	Cu
8/23/2014	Trans	3			27'		1	Cu
8/30/2014	Trans	3			40'		2	Cu
9/5/2014	Trans	3			47'		2	Cu
9/7/2014	Trans	3			40'		1	Cu
9/13/2014	Trans	3			19'		1	Cu
9/19/2014	Trans	3			52'		3	Cu
9/28/2014	Trans	3			30'		2	Cu
10/1/2014	Trans	3			24'		5	Cu
10/6/2014	Trans	3			24'		1	Cu
10/11/2014	Trans	3			41'		1	Cu
10/12/2014	Trans	3			41'		15	Cu
10/8/2014	Trans	3			31'		3	Cu
10/30/2014	Trans	3			48'		2	Cu
11/1/2014	Trans	3			48'		1	Cu
11/21/2014	Trans	3			40'		1	Cu
11/15/2014	Trans	3			27'		1	Cu
11/13/2014	Trans	3			12'		1	Cu
11/14/2014	Trans	3			27'		1	Cu
11/17/2014	Trans	3			40'		1	Cu
1/8/2015	Trans	3			60'		3	Cu
11/24/2014	Trans	3			42'		10	Cu
12/10/2014	Trans	3			19'		3	Cu
12/14/2014	Trans	3			19'		3	Cu
12/4/2014	Trans	3			42'		1	Cu
12/8/2014	Trans	3			42'		1	Cu
12/13/2014	Trans	3			19'		1	Cu
12/23/2014	Trans	3			46'		2	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
			43.8%				160	
1/2/2014	Trans	4			32'		1	Cu
1/3/2014	Trans	4			24'		1	Cu
1/11/2014	Trans	4			19'		1	Cu
1/13/2014	Trans	4			25'		1	Cu
1/16/2014	Trans	4			32'		1	Cu
1/19/2014	Trans	4			42'		1	Cu
1/29/2014	Trans	4			15'		2	Cu
2/3/2014	Trans	4			44'		14	Cu
2/1/2014	Trans	4			23'		1	Cu
2/23/2014	Trans	4			36'		1	Cu
2/22/2014	Trans	4			22'		1	Cu
2/24/2014	Trans	4			26'		5	Cu
3/7/2014	Trans	4			26'		1	Cu
3/9/2014	Trans	4			26'		5	Cu
3/15/2014	Trans	4			40'		1	Cu
3/16/2014	Trans	4			44'		1	Cu
3/21/2014	Trans	4			40'		3	Cu
3/24/2014	Trans	4			32'		1	Cu
3/30/2014	Trans	4			34'		1	Cu
4/15/2014	Trans	4			20'		1	Cu
4/8/2014	Trans	4			21'		1	Cu
4/17/2014	Trans	4			42'		1	Cu
4/20/2014	Trans	4			27'		3	Cu
4/27/2014	Trans	4			42'		1	Cu
5/12/2014	Trans	4			38'		3	Cu
5/5/2014	Trans	4			32'		1	Cu
5/6/2014	Trans	4			36'		2	Cu
5/9/2014	Trans	4			23'		2	Cu
5/24/2014	Trans	4			18'		2	Cu
5/15/2014	Trans	4			36'		3	Cu
5/18/2014	Trans	4			36'		1	Cu
5/20/2014	Trans	4			29'		3	Cu
5/19/2014	Trans	4			40'		1	Cu
5/29/2014	Trans	4			21'		2	Cu
5/31/2014	Trans	4			38'		1	Cu
6/2/2014	Trans	4			36'		1	Cu
6/9/2014	Trans	4			32'		1	Cu
6/10/2014	Trans	4			27'		3	Cu
7/3/2014	Trans	4			23'		3	Cu
6/13/2014	Trans	4			27'		1	Cu
6/14/2014	Trans	4			27'		1	Cu
6/26/2014	Trans	4			18'		1	Cu
6/21/2014	Trans	4			27'		1	Cu
6/22/2014	Trans	4			40'		3	Cu
6/25/2014	Trans	4			40'		1	Cu
6/27/2014	Trans	4			10'		3	Cu
7/1/2014	Trans	4			36'		1	Cu
7/2/2014	Trans	4			25'		1	Cu
7/6/2014	Trans	4			23'		1	Cu
7/20/2014	Trans	4			23'		7	Cu
7/7/2014	Trans	4			26'		3	Cu
7/12/2014	Trans	4			21'		1	Cu
7/11/2014	Trans	4			24'		1	Cu
7/13/2014	Trans	4			21'		1	Cu
7/14/2014	Trans	4			29'		1	Cu
7/30/2014	Trans	4			40'		2	Cu
7/27/2014	Trans	4			23'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/15/2014	Trans	4			24'		3	Cu
7/29/2014	Trans	4			28'		1	Cu
8/10/2014	Trans	4			19'		3	Cu
8/3/2014	Trans	4			40'		1	Cu
8/4/2014	Trans	4			32'		1	Cu
8/20/2014	Trans	4			25'		2	Cu
8/18/2014	Trans	4			36'		1	Cu
8/22/2014	Trans	4			19'		1	Cu
8/27/2014	Trans	4			19'		3	Cu
8/30/2014	Trans	4			30'		1	Cu
9/4/2014	Trans	4			23'		4	Cu
9/2/2014	Trans	4			24'		1	Cu
9/8/2014	Trans	4			23'		2	Cu
9/12/2014	Trans	4			17'		3	Cu
9/20/2014	Trans	4			38'		2	Cu
9/15/2014	Trans	4			17'		4	Cu
9/26/2014	Trans	4			19'		2	Cu
10/2/2014	Trans	4			25'		3	Cu
10/9/2014	Trans	4			24'		4	Cu
9/28/2014	Trans	4			40'		1	Cu
9/29/2014	Trans	4			35'		2	Cu
10/1/2014	Trans	4			35'		1	Cu
10/20/2014	Trans	4			44'		1	Cu
10/24/2014	Trans	4			44'		4	Cu
10/28/2014	Trans	4			44'		10	Cu
10/7/2014	Trans	4			35'		1	Cu
10/17/2014	Trans	4			34'		1	Cu
10/16/2014	Trans	4			34'		1	Cu
10/18/2014	Trans	4			20'		1	Cu
10/21/2014	Trans	4			39'		1	Cu
10/23/2014	Trans	4			40'		1	Cu
10/22/2014	Trans	4			49'		1	Cu
11/10/2014	Trans	4			37'		1	Cu
11/11/2014	Trans	4			37'		2	Cu
11/13/2014	Trans	4			37'		1	Cu
11/15/2014	Trans	4			19'		6	Cu
11/21/2014	Trans	4			30'		3	Cu
11/26/2014	Trans	4			23'		4	Cu
12/6/2014	Trans	4			40'		1	Cu
12/4/2014	Trans	4			30'		1	Cu
12/5/2014	Trans	4			37'		1	Cu
12/8/2014	Trans	4			26'		1	Cu
12/17/2014	Trans	4			40'		1	Cu
12/20/2014	Trans	4			38'		2	Cu
12/22/2014	Trans	4			25'		2	Cu
12/25/2014	Trans	4			32'		3	Cu
1/3/2015	Trans	4			40'		3	Cu
12/31/2014	Trans	4			23'		2	Cu
			58.1%				**212**	
1/23/2014	Trans	5			32'		1	Cu
1/24/2014	Trans	5			32'		2	Cu
1/26/2014	Trans	5			32'		1	Cu
1/27/2014	Trans	5			32'		1	Cu
1/28/2014	Trans	5			32'		1	Cu
1/31/2014	Trans	5			36'		2	Cu
2/15/2014	Trans	5			26'		2	Cu
2/13/2014	Trans	5			32'		1	Cu
2/19/2014	Trans	5			27'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
2/22/2014	Trans	5			27'		3	Cu
2/25/2014	Trans	5			27'		1	Cu
3/3/2014	Trans	5			26'		1	Cu
3/4/2014	Trans	5			26'		1	Cu
3/5/2014	Trans	5			26'		2	Cu
3/8/2014	Trans	5			38'		1	Cu
3/10/2014	Trans	5			40'		1	Cu
3/14/2014	Trans	5			23'		1	Cu
3/15/2014	Trans	5			27'		1	Cu
3/17/2014	Trans	5			40'		2	Cu
4/7/2014	Trans	5			32'		1	Cu
4/8/2014	Trans	5			32'		1	Cu
4/13/2014	Trans	5			27'		5	Cu
4/20/2014	Trans	5			40'		2	Cu
4/18/2014	Trans	5			36'		2	Cu
4/22/2014	Trans	5			44'		1	Cu
4/26/2014	Trans	5			27'		1	Cu
4/28/2014	Trans	5			40'		1	Cu
4/30/2014	Trans	5			22'		2	Cu
5/12/2014	Trans	5			36'		3	Cu
5/5/2014	Trans	5			29'		4	Cu
5/10/2014	Trans	5			20'		1	Cu
5/16/2014	Trans	5			29'		3	Cu
5/19/2014	Trans	5			29'		3	Cu
5/23/2014	Trans	5			25'		3	Cu
5/26/2014	Trans	5			43'		1	Cu
5/29/2014	Trans	5			39'		2	Cu
5/31/2014	Trans	5			39'		3	Cu
6/6/2014	Trans	5			23'		1	Cu
7/3/2014	Trans	5			32'		10	Cu
6/9/2014	Trans	5			36'		2	Cu
6/16/2014	Trans	5			26'		2	Cu
6/26/2014	Trans	5			25'		1	Cu
7/2/2014	Trans	5			36'		1	Cu
7/14/2014	Trans	5			27'		2	Cu
7/20/2014	Trans	5			25'		5	Cu
7/16/2014	Trans	5			27'		2	Cu
7/18/2014	Trans	5			27'		1	Cu
7/19/2014	Trans	5			34'		1	Cu
7/26/2014	Trans	5			29'		2	Cu
7/28/2014	Trans	5			32'		1	Cu
7/30/2014	Trans	5			24'		1	Cu
7/31/2014	Trans	5			26'		7	Cu
8/9/2014	Trans	5			23'		1	Cu
8/10/2014	Trans	5			29'		3	Cu
8/13/2014	Trans	5			29'		2	Cu
8/7/2014	Trans	5			29'		1	Cu
8/20/2014	Trans	5			31'		12	Cu
8/8/2014	Trans	5			19'		1	Cu
8/17/2014	Trans	5			30'		1	Cu
8/19/2014	Trans	5			20'		1	Cu
9/2/2014	Trans	5			35'		1	Cu
9/6/2014	Trans	5			42'		1	Cu
9/12/2014	Trans	5			22'		2	Cu
9/7/2014	Trans	5			17'		3	Cu
9/10/2014	Trans	5			21'		1	Cu
9/11/2014	Trans	5			35'		1	Cu
9/15/2014	Trans	5			35'		6	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
9/21/2014	Trans	5			40'		1	Cu
9/23/2014	Trans	5			40'		1	Cu
9/24/2014	Trans	5			35'		3	Cu
9/27/2014	Trans	5			35'		2	Cu
9/29/2014	Trans	5			20'		6	Cu
10/9/2014	Trans	5			28'		7	Cu
10/20/2014	Trans	5			22'		1	Cu
10/18/2014	Trans	5			38'		1	Cu
10/24/2014	Trans	5			31'		3	Cu
10/29/2014	Trans	5			41'		1	Cu
10/30/2014	Trans	5			41'		1	Cu
11/6/2014	Trans	5			40'		1	Cu
11/7/2014	Trans	5			36'		3	Cu
11/15/2014	Trans	5			40'		1	Cu
11/16/2014	Trans	5			40'		1	Cu
11/27/2014	Trans	5			32'		3	Cu
12/1/2014	Trans	5			40'		1	Cu
12/3/2014	Trans	5			37'		2	Cu
12/11/2014	Trans	5			35'		3	Cu
12/14/2014	Trans	5			35'		1	Cu
12/22/2014	Trans	5			36'		2	Cu
12/24/2014	Trans	5			36'		5	Cu
12/29/2014	Trans	5			36'		3	Cu
			53.7%				**196**	
1/9/2014	Trans	6			27'		2	Cu
1/16/2014	Trans	6			27'		2	Cu
1/18/2014	Trans	6			27'		1	Cu
1/23/2014	Trans	6			18'		1	Cu
1/24/2014	Trans	6			18'		1	Cu
2/6/2014	Trans	6			42'		2	Cu
2/15/2014	Trans	6			25'		2	Cu
2/18/2014	Trans	6			40'		2	Cu
3/31/2014	Trans	6			22'		1	Cu
5/14/2014	Trans	6			24'		3	Cu
5/20/2014	Trans	6			40'		2	Cu
5/22/2014	Trans	6			40'		2	Cu
5/24/2014	Trans	6			29'		3	Cu
5/27/2014	Trans	6			29'		3	Cu
5/30/2014	Trans	6			29'		3	Cu
6/2/2014	Trans	6			29'		3	Cu
6/29/2014	Trans	6			26'		7	Cu
6/18/2014	Trans	6			26'		2	Cu
6/25/2014	Trans	6			21'		1	Cu
6/27/2014	Trans	6			29'		2	Cu
7/12/2014	Trans	6			35'		1	Cu
7/10/2014	Trans	6			27'		1	Cu
7/18/2014	Trans	6			43'		1	Cu
7/14/2014	Trans	6			43'		4	Cu
7/25/2014	Trans	6			41'		1	Cu
7/26/2014	Trans	6			41'		2	Cu
7/30/2014	Trans	6			28'		1	Cu
7/31/2014	Trans	6			28'		1	Cu
8/1/2014	Trans	6			28'		1	Cu
8/2/2014	Trans	6			38'		1	Cu
8/3/2014	Trans	6			36'		1	Cu
8/4/2014	Trans	6			36'		1	Cu
8/15/2014	Trans	6			29'		3	Cu
8/5/2014	Trans	6			25'		5	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/18/2014	Trans	6			29'		4	Cu
8/22/2014	Trans	6			38'		5	Cu
9/3/2014	Trans	6			30'		2	Cu
9/7/2014	Trans	6					1	Cu
9/8/2014	Trans	6					1	Cu
9/9/2014	Trans	6					1	Cu
9/10/2014	Trans	6					1	Cu
9/11/2014	Trans	6					1	Cu
9/14/2014	Trans	6			24'		1	Cu
9/15/2014	Trans	6			29'		1	Cu
9/18/2014	Trans	6			35'		1	Cu
9/21/2014	Trans	6			40'		1	Cu
9/23/2014	Trans	6			25'		1	Cu
9/24/2014	Trans	6					2	Cu
9/26/2014	Trans	6			28'		1	Cu
9/28/2014	Trans	6			26'		4	Cu
10/3/2014	Trans	6			26'		1	Cu
10/2/2014	Trans	6					1	Cu
10/4/2014	Trans	6			28'		1	Cu
10/7/2014	Trans	6			26'		2	Cu
10/9/2014	Trans	6					1	Cu
10/24/2014	Trans	6			42'		3	Cu
10/11/2014	Trans	6			24'		10	Cu
10/22/2014	Trans	6			36'		2	Cu
10/27/2014	Trans	6			36'		1	Cu
10/28/2014	Trans	6			26'		1	Cu
10/30/2014	Trans	6			25'		1	Cu
10/31/2014	Trans	6			41'		1	Cu
11/5/2014	Trans	6			41'		1	Cu
11/6/2014	Trans	6			25'		1	Cu
11/18/2014	Trans	6			35'		1	Cu
11/27/2014	Trans	6			25'		1	Cu
11/28/2014	Trans	6			24'		2	Cu
11/30/2014	Trans	6			24'		3	Cu
12/3/2014	Trans	6			24'		3	Cu
12/6/2014	Trans	6			24'		5	Cu
12/12/2014	Trans	6			24'		2	Cu
			38.6%				**141**	
1/1/2014	Trans	7			37'		2	Cu
1/6/2014	Trans	7			32'		5	Cu
1/4/2014	Trans	7			22'		2	Cu
1/11/2014	Trans	7			32'		4	Cu
1/21/2014	Trans	7			38'		2	Cu
1/29/2014	Trans	7			20'		5	Cu
1/25/2014	Trans	7			32'		1	Cu
1/28/2014	Trans	7			20'		1	Cu
1/26/2014	Trans	7			32'		1	Cu
2/4/2014	Trans	7			26'		7	Cu
2/11/2014	Trans	7			26'		5	Cu
2/20/2014	Trans	7			40'		1	Cu
2/21/2014	Trans	7			23'		1	Cu
2/24/2014	Trans	7			26'		1	Cu
3/6/2014	Trans	7			32'		1	Cu
3/10/2014	Trans	7			32'		1	Cu
3/11/2014	Trans	7			32'		3	Cu
3/14/2014	Trans	7			32'		1	Cu
3/15/2014	Trans	7			32'		1	Cu
3/17/2014	Trans	7			32'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
3/24/2014	Trans	7			40'		1	Cu
4/1/2014	Trans	7			22'		2	Cu
4/3/2014	Trans	7			38'		1	Cu
4/5/2014	Trans	7			26'		1	Cu
4/6/2014	Trans	7			26'		1	Cu
4/7/2014	Trans	7			36'		10	Cu
4/17/2014	Trans	7			36'		5	Cu
4/25/2014	Trans	7			32'		9	Cu
5/4/2014	Trans	7			32'		7	Cu
5/11/2014	Trans	7			23'		1	Cu
5/21/2014	Trans	7			26'		3	Cu
5/26/2014	Trans	7			26'		2	Cu
5/31/2014	Trans	7			36'		1	Cu
6/2/2014	Trans	7			20'		2	Cu
6/6/2014	Trans	7			36'		2	Cu
6/13/2014	Trans	7			25'		2	Cu
6/15/2014	Trans	7			25'		1	Cu
7/3/2014	Trans	7			34'		2	Cu
6/19/2014	Trans	7			40'		3	Cu
7/1/2014	Trans	7			36'		1	Cu
7/5/2014	Trans	7			43'		3	Cu
7/10/2014	Trans	7			42'		1	Cu
7/14/2014	Trans	7			38'		4	Cu
7/13/2014	Trans	7			43'		1	Cu
7/19/2014	Trans	7			36'		1	Cu
7/21/2014	Trans	7			35'		2	Cu
7/23/2014	Trans	7			35'		1	Cu
7/24/2014	Trans	7			35'		3	Cu
7/27/2014	Trans	7			41'		1	Cu
7/28/2014	Trans	7			26'		4	Cu
8/1/2014	Trans	7			22'		2	Cu
8/16/2014	Trans	7			35'		1	Cu
8/3/2014	Trans	7			36'		2	Cu
8/13/2014	Trans	7			36'		3	Cu
8/22/2014	Trans	7			21'		3	Cu
8/12/2014	Trans	7			36'		1	Cu
8/17/2014	Trans	7			23'		3	Cu
8/31/2014	Trans	7			24'		2	Cu
8/20/2014	Trans	7			22'		1	Cu
9/3/2014	Trans	7					4	Cu
9/8/2014	Trans	7			26'		4	Cu
9/12/2014	Trans	7			26'		3	Cu
9/15/2014	Trans	7			26'		2	Cu
9/18/2014	Trans	7					2	Cu
9/20/2014	Trans	7			25'		1	Cu
9/21/2014	Trans	7			25'		2	Cu
9/27/2014	Trans	7			22'		1	Cu
10/3/2014	Trans	7			23'		2	Cu
9/30/2014	Trans	7			35'		3	Cu
10/6/2014	Trans	7			26'		1	Cu
10/7/2014	Trans	7			30'		3	Cu
10/11/2014	Trans	7			36'		1	Cu
10/12/2014	Trans	7			29'		3	Cu
10/16/2014	Trans	7					1	Cu
10/18/2014	Trans	7			28'		1	Cu
10/19/2014	Trans	7			36'		3	Cu
10/24/2014	Trans	7			36'		1	Cu
10/25/2014	Trans	7					1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/30/2014	Trans	7			27'		2	Cu
10/26/2014	Trans	7					1	Cu
11/1/2014	Trans	7			36'		2	Cu
11/5/2014	Trans	7			19'		5	Cu
11/10/2014	Trans	7			25'		2	Cu
11/12/2014	Trans	7			25'		2	Cu
11/14/2014	Trans	7			25'		2	Cu
11/17/2014	Trans	7			25'		2	Cu
11/19/2014	Trans	7			25'		2	Cu
11/21/2014	Trans	7			25'		1	Cu
11/24/2014	Trans	7			25'		2	Cu
11/26/2014	Trans	7			24'		1	Cu
11/27/2014	Trans	7			27'		3	Cu
12/3/2014	Trans	7			34'		1	Cu
12/5/2014	Trans	7			30'		1	Cu
12/12/2014	Trans	7			40'		1	Cu
12/13/2014	Trans	7			40'		3	Cu
12/16/2014	Trans	7			40'		3	Cu
12/19/2014	Trans	7			40'		1	Cu
12/20/2014	Trans	7			40'		1	Cu
12/21/2014	Trans	7			40'		1	Cu
12/22/2014	Trans	7			40'		1	Cu
12/23/2014	Trans	7			40'		3	Cu
12/27/2014	Trans	7			40'		2	Cu
12/29/2014	Trans	7			25'		1	Cu
			62.2%				**227**	
1/2/2014	Trans	8			31'		2	Cu
1/15/2014	Trans	8			32'		2	Cu
1/21/2014	Trans	8			27'		4	Cu
1/26/2014	Trans	8			36'		3	Cu
1/30/2014	Trans	8			36'		2	Cu
2/27/2014	Trans	8			29'		3	Cu
4/21/2014	Trans	8			26'		2	Cu
4/27/2014	Trans	8			27'		1	Cu
4/28/2014	Trans	8			27'		1	Cu
5/10/2014	Trans	8			32'		3	Cu
5/16/2014	Trans	8			35'		1	Cu
5/21/2014	Trans	8			16'		1	Cu
6/2/2014	Trans	8			30'		1	Cu
6/9/2014	Trans	8			30'		1	Cu
6/13/2014	Trans	8			17'		3	Cu
6/16/2014	Trans	8			30'		2	Cu
6/20/2014	Trans	8			22'		1	Cu
6/26/2014	Trans	8			22'		1	Cu
7/3/2014	Trans	8			29'		1	Cu
7/4/2014	Trans	8			34'		2	Cu
7/7/2014	Trans	8			43'		1	Cu
7/9/2014	Trans	8			26'		1	Cu
7/14/2014	Trans	8			26'		2	Cu
7/17/2014	Trans	8			26'		1	Cu
7/27/2014	Trans	8			33'		2	Cu
8/1/2014	Trans	8			23'		2	Cu
8/3/2014	Trans	8			36'		1	Cu
8/7/2014	Trans	8			26'		5	Cu
8/12/2014	Trans	8			26'		2	Cu
8/18/2014	Trans	8			26'		1	Cu
8/19/2014	Trans	8			25'		3	Cu
8/22/2014	Trans	8			24'		2	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/26/2014	Trans	8			22'		1	Cu
8/28/2014	Trans	8			30'		1	Cu
8/29/2014	Trans	8			23'		1	Cu
8/31/2014	Trans	8			30'		1	Cu
8/30/2014	Trans	8			18'		1	Cu
9/10/2014	Trans	8			20'		3	Cu
9/13/2014	Trans	8			29'		1	Cu
9/16/2014	Trans	8			30'		3	Cu
9/20/2014	Trans	8			40'		1	Cu
9/22/2014	Trans	8			35'		5	Cu
10/17/2014	Trans	8			34'		10	Cu
9/29/2014	Trans	8			30'		1	Cu
9/30/2014	Trans	8			38'		2	Cu
10/3/2014	Trans	8			35'		1	Cu
10/9/2014	Trans	8			26'		1	Cu
10/27/2014	Trans	8			34'		1	Cu
10/30/2014	Trans	8			30'		1	Cu
11/2/2014	Trans	8			30'		1	Cu
11/5/2014	Trans	8			25'		2	Cu
11/7/2014	Trans	8			25'		3	Cu
11/23/2014	Trans	8			25'		1	Cu
11/27/2014	Trans	8			18'		3	Cu
12/10/2014	Trans	8			32'		9	Cu
12/19/2014	Trans	8			28'		3	Cu
12/31/2014	Trans	8			25'		1	Cu
			32.3%				**118**	
1/8/2014	Trans	9			41'		2	Cu
1/14/2014	Trans	9			37'		1	Cu
1/17/2014	Trans	9			26'		1	Cu
1/18/2014	Trans	9			26'		2	Cu
1/21/2014	Trans	9			26'		1	Cu
1/25/2014	Trans	9			26'		1	Cu
1/22/2014	Trans	9			26'		3	Cu
1/28/2014	Trans	9			16'		6	Cu
2/9/2014	Trans	9			26'		2	Cu
2/11/2014	Trans	9			26'		1	Cu
2/21/2014	Trans	9			26'		1	Cu
3/5/2014	Trans	9			39'		1	Cu
3/11/2014	Trans	9			27'		1	Cu
3/21/2014	Trans	9			32'		1	Cu
3/23/2014	Trans	9			18'		1	Cu
3/31/2014	Trans	9			33'		3	Cu
4/3/2014	Trans	9			33'		3	Cu
4/7/2014	Trans	9			33'		6	Cu
4/21/2014	Trans	9			32'		1	Cu
4/27/2014	Trans	9			38'		1	Cu
4/28/2014	Trans	9			42'		1	Cu
5/2/2014	Trans	9			24'		1	Cu
5/3/2014	Trans	9			29'		3	Cu
5/6/2014	Trans	9			29'		1	Cu
5/16/2014	Trans	9			24'		1	Cu
5/24/2014	Trans	9			32'		2	Cu
5/26/2014	Trans	9			32'		1	Cu
5/29/2014	Trans	9			26'		1	Cu
6/2/2014	Trans	9			26'		4	Cu
6/16/2014	Trans	9			26'		4	Cu
6/13/2014	Trans	9			30'		1	Cu
6/26/2014	Trans	9			40'		2	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/4/2014	Trans	9			32'		3	Cu
7/8/2014	Trans	9			25'		7	Cu
7/3/2014	Trans	9			40'		1	Cu
7/15/2014	Trans	9			26'		1	Cu
7/18/2014	Trans	9			29'		1	Cu
7/23/2014	Trans	9			38'		1	Cu
7/25/2014	Trans	9			19'		9	Cu
8/4/2014	Trans	9			26'		2	Cu
8/8/2014	Trans	9			40'		1	Cu
8/9/2014	Trans	9			26'		1	Cu
8/11/2014	Trans	9			30'		2	Cu
8/15/2014	Trans	9			25'		4	Cu
8/14/2014	Trans	9			26'		1	Cu
8/20/2014	Trans	9			25'		2	Cu
8/23/2014	Trans	9			26'		3	Cu
8/29/2014	Trans	9			22'		4	Cu
8/28/2014	Trans	9			35'		1	Cu
9/3/2014	Trans	9			41'		3	Cu
9/20/2014	Trans	9			25'		9	Cu
9/6/2014	Trans	9			41'		1	Cu
9/8/2014	Trans	9			41'		1	Cu
9/14/2014	Trans	9			36'		1	Cu
9/15/2014	Trans	9			30'		4	Cu
9/19/2014	Trans	9			40'		1	Cu
10/4/2014	Trans	9			27'		2	Cu
10/6/2014	Trans	9			27'		1	Cu
10/7/2014	Trans	9			27'		1	Cu
10/8/2014	Trans	9			27'		1	Cu
10/13/2014	Trans	9			32'		1	Cu
10/31/2014	Trans	9			33'		3	Cu
11/3/2014	Trans	9			33'		1	Cu
11/4/2014	Trans	9			33'		1	Cu
11/5/2014	Trans	9			33'		1	Cu
11/6/2014	Trans	9			18'		1	Cu
11/7/2014	Trans	9			25'		1	Cu
11/14/2014	Trans	9			37'		2	Cu
11/13/2014	Trans	9			18'		1	Cu
11/25/2014	Trans	9			24'		8	Cu
12/3/2014	Trans	9			24'		1	Cu
12/4/2014	Trans	9			24'		1	Cu
12/5/2014	Trans	9			36'		1	Cu
12/9/2014	Trans	9			42'		1	Cu
12/13/2014	Trans	9			44'		1	Cu
12/14/2014	Trans	9			44'		2	Cu
12/19/2014	Trans	9			32'		5	Cu
12/29/2014	Trans	9			32'		1	Cu
12/30/2014	Trans	9			32'		1	Cu
12/31/2014	Trans	9			32'		2	Cu
			45.5%				**166**	
1/26/2014	Trans	10			26'		1	Cu
1/27/2014	Trans	10			26'		1	Cu
1/28/2014	Trans	10			26'		1	Cu
1/31/2014	Trans	10			20'		2	Cu
1/29/2014	Trans	10			26'		1	Cu
2/13/2014	Trans	10			39'		1	Cu
2/14/2014	Trans	10			39'		1	Cu
4/9/2014	Trans	10			27'		2	Cu
4/11/2014	Trans	10			22'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
4/12/2014	Trans	10					1	Cu
4/13/2014	Trans	10					1	Cu
4/14/2014	Trans	10			22'		1	Cu
4/15/2014	Trans	10			22'		5	Cu
4/20/2014	Trans	10			22'		7	Cu
4/27/2014	Trans	10			22'		3	Cu
4/30/2014	Trans	10			22'		3	Cu
5/3/2014	Trans	10			22'		3	Cu
5/12/2014	Trans	10			26'		1	Cu
5/13/2014	Trans	10			26'		2	Cu
5/17/2014	Trans	10			39'		2	Cu
5/19/2014	Trans	10			39'		1	Cu
5/20/2014	Trans	10			39'		1	Cu
5/24/2014	Trans	10			19'		3	Cu
6/4/2014	Trans	10			25'		1	Cu
6/12/2014	Trans	10			28'		1	Cu
6/13/2014	Trans	10			28'		1	Cu
6/14/2014	Trans	10			28'		1	Cu
7/4/2014	Trans	10			41'		3	Cu
6/25/2014	Trans	10			41'		3	Cu
6/30/2014	Trans	10			34'		4	Cu
6/29/2014	Trans	10			18'		1	Cu
7/11/2014	Trans	10			17'		1	Cu
7/14/2014	Trans	10			22'		1	Cu
7/18/2014	Trans	10			19'		2	Cu
7/25/2014	Trans	10			17'		2	Cu
7/21/2014	Trans	10			26'		1	Cu
8/3/2014	Trans	10			30'		7	Cu
8/10/2014	Trans	10			30'		1	Cu
8/13/2014	Trans	10			30'		1	Cu
8/17/2014	Trans	10			26'		1	Cu
8/19/2014	Trans	10			33'		3	Cu
8/26/2014	Trans	10			26'		1	Cu
8/28/2014	Trans	10			25'		2	Cu
9/2/2014	Trans	10			36'		1	Cu
9/4/2014	Trans	10			35'		1	Cu
9/9/2014	Trans	10			41'		2	Cu
9/12/2014	Trans	10			21'		3	Cu
9/15/2014	Trans	10			18'		1	Cu
9/16/2014	Trans	10			18'		1	Cu
9/17/2014	Trans	10			18'		1	Cu
9/18/2014	Trans	10			18'		3	Cu
9/25/2014	Trans	10			30'		2	Cu
10/14/2014	Trans	10			43'		14	Cu
11/8/2014	Trans	10			35'		5	Cu
11/19/2014	Trans	10			44'		1	Cu
12/8/2014	Trans	10			44'		15	Cu
			36.4%				**133**	
1/2/2014	Trans	11			44'		3	Cu
1/17/2014	Trans	11			21'		2	Cu
1/31/2014	Trans	11			26'		1	Cu
2/1/2014	Trans	11			26'		1	Cu
2/2/2014	Trans	11			26'		8	Cu
2/15/2014	Trans	11			30'		2	Cu
3/14/2014	Trans	11			30'		2	Cu
3/19/2014	Trans	11			44'		2	Cu
4/4/2014	Trans	11			30'		2	Cu
4/6/2014	Trans	11			22'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
4/19/2014	Trans	11			35'		7	Cu
4/26/2014	Trans	11			35'		5	Cu
5/1/2014	Trans	11			35'		1	Cu
5/2/2014	Trans	11			35'		7	Cu
5/12/2014	Trans	11			28'		1	Cu
5/14/2014	Trans	11			26'		4	Cu
5/23/2014	Trans	11			40'		1	Cu
5/24/2014	Trans	11			23'		12	Cu
8/2/2014	Trans	11			18'		1	Cu
6/5/2014	Trans	11			23'		1	Cu
6/7/2014	Trans	11			19'		2	Cu
7/4/2014	Trans	11			26'		1	Cu
7/3/2014	Trans	11			21'		1	Cu
7/5/2014	Trans	11			26'		1	Cu
7/6/2014	Trans	11			15'		1	Cu
7/7/2014	Trans	11			15'		1	Cu
7/8/2014	Trans	11			15'		1	Cu
7/9/2014	Trans	11			15'		3	Cu
7/13/2014	Trans	11			15'		3	Cu
7/16/2014	Trans	11			21'		3	Cu
7/24/2014	Trans	11			14'		4	Cu
8/19/2014	Trans	11			43'		3	Cu
8/15/2014	Trans	11			22'		2	Cu
8/22/2014	Trans	11			35'		5	Cu
8/30/2014	Trans	11			23'		1	Cu
8/31/2014	Trans	11			31'		1	Cu
9/2/2014	Trans	11			26'		3	Cu
9/12/2014	Trans	11			21'		1	Cu
9/17/2014	Trans	11			21'		3	Cu
9/20/2014	Trans	11			21'		2	Cu
9/30/2014	Trans	11			34'		3	Cu
10/12/2014	Trans	11			23'		3	Cu
10/29/2014	Trans	11			21'		1	Cu
11/7/2014	Trans	11			18'		2	Cu
11/14/2014	Trans	11			21'		1	Cu
11/15/2014	Trans	11			21'		2	Cu
11/17/2014	Trans	11			21'		1	Cu
11/30/2014	Trans	11			40'		5	Cu
12/25/2014	Trans	11			42'		3	Cu
			35.3%				**129**	
1/19/2014	Trans	12			25'		13	Cu
2/15/2014	Trans	12			40'		2	Cu
2/17/2014	Trans	12			32'		2	Cu
2/21/2014	Trans	12			31'		2	Cu
3/12/2014	Trans	12			25'		2	Cu
3/15/2014	Trans	12			25'		2	Cu
3/30/2014	Trans	12			18'		1	Cu
4/1/2014	Trans	12			40'		2	Cu
4/7/2014	Trans	12			26'		3	Cu
4/10/2014	Trans	12			26'		1	Cu
4/13/2014	Trans	12			23'		3	Cu
4/16/2014	Trans	12			23'		3	Cu
4/26/2014	Trans	12			23'		3	Cu
5/1/2014	Trans	12			25'		3	Cu
5/4/2014	Trans	12			25'		1	Cu
5/6/2014	Trans	12			25'		2	Cu
5/12/2014	Trans	12			50'		2	Cu
5/17/2014	Trans	12			32'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/18/2014	Trans	12			32'		1	Cu
5/19/2014	Trans	12			32'		1	Cu
5/23/2014	Trans	12			29'		1	Cu
5/26/2014	Trans	12			21'		4	Cu
6/1/2014	Trans	12			41'		1	Cu
6/7/2014	Trans	12			25'		2	Cu
6/26/2014	Trans	12			25'		5	Cu
6/13/2014	Trans	12			21'		1	Cu
6/14/2014	Trans	12			21'		2	Cu
7/3/2014	Trans	12			21'		2	Cu
6/25/2014	Trans	12			42'		1	Cu
7/1/2014	Trans	12			21'		2	Cu
7/5/2014	Trans	12			20'		5	Cu
7/12/2014	Trans	12			23'		1	Cu
8/1/2014	Trans	12			26'		4	Cu
7/20/2014	Trans	12			25'		2	Cu
7/22/2014	Trans	12			23'		3	Cu
7/27/2014	Trans	12			18'		3	Cu
8/8/2014	Trans	12			28'		1	Cu
8/30/2014	Trans	12			18'		2	Cu
8/23/2014	Trans	12			18'		1	Cu
8/20/2014	Trans	12			26'		3	Cu
8/29/2014	Trans	12			30'		1	Cu
9/5/2014	Trans	12			31'		7	Cu
9/3/2014	Trans	12			38'		2	Cu
9/12/2014	Trans	12			18'		3	Cu
9/15/2014	Trans	12			21'		1	Cu
9/16/2014	Trans	12			21'		1	Cu
9/17/2014	Trans	12			17'		1	Cu
9/19/2014	Trans	12			47'		1	Cu
9/20/2014	Trans	12			40'		1	Cu
9/21/2014	Trans	12			18'		1	Cu
10/4/2014	Trans	12			34'		1	Cu
10/5/2014	Trans	12			34'		1	Cu
10/8/2014	Trans	12			39'		2	Cu
10/17/2014	Trans	12			39'		2	Cu
10/21/2014	Trans	12			39'		1	Cu
10/14/2014	Trans	12			42'		1	Cu
10/22/2014	Trans	12			20'		3	Cu
10/25/2014	Trans	12			40'		1	Cu
10/26/2014	Trans	12			40'		1	Cu
11/8/2014	Trans	12			31'		7	Cu
10/29/2014	Trans	12			26'		2	Cu
11/7/2014	Trans	12			24'		1	Cu
11/16/2014	Trans	12			41'		2	Cu
11/18/2014	Trans	12			41'		1	Cu
11/25/2014	Trans	12			37'		1	Cu
11/28/2014	Trans	12			28'		1	Cu
11/29/2014	Trans	12			37'		3	Cu
12/11/2014	Trans	12			30'		3	Cu
12/6/2014	Trans	12			15'		2	Cu
12/10/2014	Trans	12			25'		1	Cu
12/18/2014	Trans	12					1	Cu
12/22/2014	Trans	12			41'		1	Cu
12/23/2014	Trans	12			41'		1	Cu
12/27/2014	Trans	12			20'		2	Cu
12/29/2014	Trans	12			20'		1	Cu
1/1/2014	Trans	13			26'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
			43.6%				159	
2/11/2014	Trans	13			45'		1	Cu
2/12/2014	Trans	13			30'		1	Cu
5/7/2014	Trans	13			41'		1	Cu
5/24/2014	Trans	13			30'		1	Cu
5/26/2014	Trans	13			33'		2	Cu
7/3/2014	Trans	13			24'		2	Cu
7/5/2014	Trans	13			28'		1	Cu
7/13/2014	Trans	13			19'		3	Cu
7/16/2014	Trans	13			19'		2	Cu
7/20/2014	Trans	13			19'		2	Cu
7/24/2014	Trans	13			45'		4	Cu
7/31/2014	Trans	13			36'		3	Cu
8/7/2014	Trans	13			22'		3	Cu
8/11/2014	Trans	13			30'		1	Cu
8/14/2014	Trans	13			33'		11	Cu
8/25/2014	Trans	13			33'		2	Cu
9/23/2014	Trans	13			38'		1	Cu
9/27/2014	Trans	13			20'		2	Cu
9/30/2014	Trans	13			22'		3	Cu
10/20/2014	Trans	13			50'		7	Cu
10/3/2014	Trans	13			22'		3	Cu
10/6/2014	Trans	13			22'		3	Cu
10/13/2014	Trans	13			46'		1	Cu
11/8/2014	Trans	13			36'		1	Cu
12/18/2014	Trans	13			30'		1	Cu
			17.0%				62	
1/1/2014	Trans	14			39'		1	Cu
1/3/2014	Trans	14			39'		1	Cu
1/4/2014	Trans	14			40'		1	Cu
2/7/2014	Trans	14			26'		3	Cu
2/12/2014	Trans	14			39'		3	Cu
2/17/2014	Trans	14			40'		2	Cu
3/18/2014	Trans	14			25'		1	Cu
4/10/2014	Trans	14			23'		3	Cu
3/28/2014	Trans	14			32'		2	Cu
3/30/2014	Trans	14			32'		1	Cu
3/31/2014	Trans	14			32'		2	Cu
4/25/2014	Trans	14			35'		1	Cu
4/26/2014	Trans	14			35'		1	Cu
4/27/2014	Trans	14			17'		1	Cu
4/28/2014	Trans	14			35'		1	Cu
4/30/2014	Trans	14			28'		2	Cu
5/4/2014	Trans	14			28'		1	Cu
5/6/2014	Trans	14			28'		1	Cu
5/12/2014	Trans	14			28'		1	Cu
5/13/2014	Trans	14			28'		1	Cu
5/21/2014	Trans	14			32'		1	Cu
5/28/2014	Trans	14			28'		1	Cu
5/29/2014	Trans	14			28'		1	Cu
5/30/2014	Trans	14			40'		1	Cu
6/2/2014	Trans	14			28'		1	Cu
6/7/2014	Trans	14			37'		1	Cu
6/9/2014	Trans	14			28'		1	Cu
7/2/2014	Trans	14			25'		3	Cu
6/26/2014	Trans	14			32'		2	Cu
6/28/2014	Trans	14			32'		1	Cu
7/16/2014	Trans	14			22'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/17/2014	Trans	14			32'		1	Cu
7/22/2014	Trans	14			28'		7	Cu
8/7/2014	Trans	14			23'		2	Cu
8/25/2014	Trans	14			42'		2	Cu
8/28/2014	Trans	14			42'		1	Cu
8/21/2014	Trans	14			20'		3	Cu
8/31/2014	Trans	14			26'		1	Cu
8/29/2014	Trans	14			19'		2	Cu
9/15/2014	Trans	14			24'		5	Cu
9/3/2014	Trans	14			25'		1	Cu
9/4/2014	Trans	14			40'		4	Cu
9/11/2014	Trans	14			35'		4	Cu
9/25/2014	Trans	14			37'		2	Cu
9/27/2014	Trans	14			37'		3	Cu
10/2/2014	Trans	14			20'		1	Cu
10/23/2014	Trans	14			50'		4	Cu
10/21/2014	Trans	14			50'		2	Cu
10/27/2014	Trans	14			32'		2	Cu
10/29/2014	Trans	14			32'		2	Cu
10/31/2014	Trans	14			32'		1	Cu
11/2/2014	Trans	14			32'		1	Cu
11/6/2014	Trans	14			32'		1	Cu
11/8/2014	Trans	14			28'		1	Cu
11/13/2014	Trans	14			32'		1	Cu
11/18/2014	Trans	14			25'		2	Cu
11/24/2014	Trans	14			45'		3	Cu
11/28/2014	Trans	14			41'		1	Cu
11/29/2014	Trans	14			41'		1	Cu
11/30/2014	Trans	14			41'		1	Cu
12/1/2014	Trans	14			41'		1	Cu
12/2/2014	Trans	14			41'		1	Cu
12/3/2014	Trans	14			41'		1	Cu
12/4/2014	Trans	14			41'		2	Cu
12/6/2014	Trans	14			41'		2	Cu
12/8/2014	Trans	14			41'		2	Cu
12/18/2014	Trans	14			32'		1	Cu
12/25/2014	Trans	14			38'		1	Cu
12/26/2014	Trans	14			40'		2	Cu
12/28/2014	Trans	14			40'		2	Cu
12/30/2014	Trans	14			40'		1	Cu
			33.4%				**122**	
1/29/2014	Trans	15			42'		1	Cu
2/6/2014	Trans	15			42'		1	Cu
2/22/2014	Trans	15			22'		1	Cu
3/30/2014	Trans	15			35'		1	Cu
4/14/2014	Trans	15			32'		1	Cu
4/15/2014	Trans	15			32'		1	Cu
4/27/2014	Trans	15			36'		4	Cu
4/24/2014	Trans	15			26'		2	Cu
5/5/2014	Trans	15			38'		2	Cu
5/8/2014	Trans	15			36'		1	Cu
5/15/2014	Trans	15			21'		3	Cu
5/24/2014	Trans	15			28'		4	Cu
5/29/2014	Trans	15			25'		2	Cu
6/3/2014	Trans	15			25'		1	Cu
6/8/2014	Trans	15			25'		1	Cu
7/3/2014	Trans	15			25'		3	Cu
7/30/2014	Trans	15			25'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/31/2014	Trans	15			25'		1	Cu
8/7/2014	Trans	15			20'		1	Cu
8/8/2014	Trans	15			26'		2	Cu
8/10/2014	Trans	15			26'		3	Cu
8/26/2014	Trans	15			40'		2	Cu
9/3/2014	Trans	15			28'		1	Cu
9/11/2014	Trans	15			30'		1	Cu
9/20/2014	Trans	15			20'		1	Cu
9/22/2014	Trans	15			42'		4	Cu
9/21/2014	Trans	15			20'		1	Cu
10/3/2014	Trans	15			30'		1	Cu
10/4/2014	Trans	15			30'		1	Cu
10/11/2014	Trans	15			21'		1	Cu
10/13/2014	Trans	15			35'		1	Cu
10/14/2014	Trans	15			35'		1	Cu
10/25/2014	Trans	15			44'		2	Cu
10/23/2014	Trans	15			50'		1	Cu
10/24/2014	Trans	15					1	Cu
12/18/2014	Trans	15			26'		1	Cu
12/19/2014	Trans	15			35'		1	Cu
			15.9%				**58**	
2/1/2014	Trans	16			32'		2	Cu
2/3/2014	Trans	16			32'		2	Cu
2/5/2014	Trans	16			32'		2	Cu
2/12/2014	Trans	16			40'		3	Cu
2/20/2014	Trans	16			32'		1	Cu
2/27/2014	Trans	16			42'		2	Cu
3/6/2014	Trans	16			40'		1	Cu
3/21/2014	Trans	16			40'		7	Cu
4/14/2014	Trans	16			26'		1	Cu
4/15/2014	Trans	16			26'		1	Cu
4/16/2014	Trans	16			26'		1	Cu
4/17/2014	Trans	16			26'		1	Cu
4/18/2014	Trans	16			26'		1	Cu
4/20/2014	Trans	16			23'		6	Cu
4/26/2014	Trans	16			17'		1	Cu
4/27/2014	Trans	16			32'		2	Cu
4/30/2014	Trans	16			37'		1	Cu
5/1/2014	Trans	16			37'		2	Cu
5/7/2014	Trans	16			32'		1	Cu
5/8/2014	Trans	16			32'		1	Cu
5/12/2014	Trans	16			32'		1	Cu
5/13/2014	Trans	16			32'		1	Cu
5/20/2014	Trans	16			28'		1	Cu
6/2/2014	Trans	16			42'		3	Cu
6/14/2014	Trans	16			20'		1	Cu
6/19/2014	Trans	16			32'		1	Cu
7/4/2014	Trans	16			24'		1	Cu
7/7/2014	Trans	16			48'		2	Cu
7/5/2014	Trans	16			21'		1	Cu
6/28/2014	Trans	16			30'		2	Cu
6/30/2014	Trans	16			43'		2	Cu
7/6/2014	Trans	16			38'		1	Cu
7/10/2014	Trans	16			32'		1	Cu
7/17/2014	Trans	16			42'		1	Cu
7/19/2014	Trans	16			27'		5	Cu
7/24/2014	Trans	16			32'		1	Cu
7/26/2014	Trans	16			26'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
8/6/2014	Trans	16			22'		2	Cu
8/8/2014	Trans	16			38'		1	Cu
8/12/2014	Trans	16			23'		1	Cu
8/13/2014	Trans	16			40'		1	Cu
8/29/2014	Trans	16			30'		4	Cu
8/19/2014	Trans	16			20'		5	Cu
9/3/2014	Trans	16			45'		1	Cu
9/5/2014	Trans	16			36'		2	Cu
9/16/2014	Trans	16			44'		1	Cu
9/15/2014	Trans	16			40'		1	Cu
9/19/2014	Trans	16			37'		1	Cu
9/21/2014	Trans	16			38'		1	Cu
9/25/2014	Trans	16			34'		2	Cu
10/15/2014	Trans	16			43'		12	Cu
10/4/2014	Trans	16			28'		1	Cu
10/11/2014	Trans	16			23'		1	Cu
10/31/2014	Trans	16			37'		1	Cu
11/3/2014	Trans	16			40'		1	Cu
11/15/2014	Trans	16			45'		1	Cu
11/8/2014	Trans	16			43'		3	Cu
11/17/2014	Trans	16			32'		1	Cu
12/11/2014	Trans	16			10'		1	Cu
12/4/2014	Trans	16			40'		1	Cu
12/5/2014	Trans	16			40'		1	Cu
12/15/2014	Trans	16			35'		7	Cu
12/24/2014	Trans	16			25'		1	Cu
12/29/2014	Trans	16			30'		6	Cu
			34.5%				**126**	
1/26/2014	Trans	18			45'		15	Cu
3/11/2014	Trans	18			61'		1	Cu
3/23/2014	Trans	18			51'		1	Cu
3/26/2014	Trans	18			65'		1	Cu
4/16/2014	Trans	18			46'		1	Cu
5/4/2014	Trans	18			45'		1	Cu
5/6/2014	Trans	18			45'		1	Cu
5/8/2014	Trans	18			61'		2	Cu
5/15/2014	Trans	18			63'		15	Cu
6/1/2014	Trans	18			50'		1	Cu
6/17/2014	Trans	18			61'		1	Cu
6/23/2014	Trans	18			61'		1	Cu
6/24/2014	Trans	18			61'		1	Cu
6/29/2014	Trans	18			50'		9	Cu
7/8/2014	Trans	18			50'		10	Cu
8/11/2014	Trans	18			45'		2	Cu
8/21/2014	Trans	18			61'		1	Cu
9/12/2014	Trans	18			65'		1	Cu
9/15/2014	Trans	18			59'		5	Cu
9/20/2014	Trans	18			59'		8	Cu
9/29/2014	Trans	18			46'		1	Cu
10/1/2014	Trans	18			41'		2	Cu
10/21/2014	Trans	18			50'		2	Cu
10/23/2014	Trans	18			50'		4	Cu
11/1/2014	Trans	18			41'		1	Cu
11/29/2014	Trans	18			40'		1	Cu
11/30/2014	Trans	18			40'		1	Cu
12/1/2014	Trans	18			40'		5	Cu
12/13/2014	Trans	18			50'		1	Cu
			26.3%				**96**	

Appendix Table C-2.

Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
1/26/2014	Trans	19			8'		15	Cu
2/14/2014	Trans	19			38'		1	Cu
2/20/2014	Trans	19			46'		5	Cu
3/3/2014	Trans	19			45'		1	Cu
3/30/2014	Trans	19			50'		4	Cu
4/19/2014	Trans	19			53'		3	Cu
4/30/2014	Trans	19			38'		1	Cu
5/17/2014	Trans	19			60'		1	Cu
5/29/2014	Trans	19			53'		2	Cu
6/19/2014	Trans	19			61'		1	Cu
7/4/2014	Trans	19			48'		3	Cu
7/14/2014	Trans	19			65'		1	Cu
7/23/2014	Trans	19			65'		2	Cu
8/5/2014	Trans	19			50'		2	Cu
9/11/2014	Trans	19			45'		1	Cu
9/12/2014	Trans	19			22'		1	Cu
9/15/2014	Trans	19			45'		2	Cu
9/18/2014	Trans	19			45'		1	Cu
9/23/2014	Trans	19			65'		3	Cu
9/29/2014	Trans	19			59'		1	Cu
10/1/2014	Trans	19			45'		2	Cu
10/9/2014	Trans	19			44'		1	Cu
10/14/2014	Trans	19			50'		2	Cu
10/16/2014	Trans	19			50'		1	Cu
10/26/2014	Trans	19			50'		1	Cu
10/25/2014	Trans	19			60'		1	Cu
11/1/2014	Trans	19			45'		2	Cu
10/27/2014	Trans	19			50'		1	Cu
10/30/2014	Trans	19			41'		2	Cu
11/6/2014	Trans	19			41'		1	Cu
11/28/2014	Trans	19			40'		1	Cu
12/23/2014	Trans	19			40'		1	Cu
			18.4%				**67**	
5/1/2014	Trans	20			38'		1	Cu
5/3/2014	Trans	20			50'		1	Cu
5/7/2014	Trans	20			47'		2	Cu
5/28/2014	Trans	20			45'		1	Cu
7/3/2014	Trans	20			24'		4	Cu
7/12/2014	Trans	20			45'		2	Cu
8/4/2014	Trans	20			50'		1	Cu
8/12/2014	Trans	20			57'		1	Cu
8/30/2014	Trans	20			51'		1	Cu
10/23/2014	Trans	20			50'		4	Cu
			4.9%				**18**	
2/10/2014	Trans	21			45'		21	Cu
4/2/2014	Trans	21			50'		2	Cu
4/15/2014	Trans	21			45'		1	Cu
5/12/2014	Trans	21			45'		1	Cu
5/21/2014	Trans	21			53'		1	Cu
5/22/2014	Trans	21			53'		1	Cu
5/24/2014	Trans	21			53'		1	Cu
5/26/2014	Trans	21			50'		1	Cu
6/2/2014	Trans	21			45'		1	Cu
6/16/2014	Trans	21			62'		2	Cu
6/3/2014	Trans	21			45'		1	Cu
6/11/2014	Trans	21			50'		3	Cu
7/4/2014	Trans	21			25'		4	Cu
7/13/2014	Trans	21			47'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/12/2014	Trans	21			51'		1	Cu
7/14/2014	Trans	21			47'		1	Cu
7/26/2014	Trans	21			51'		1	Cu
8/4/2014	Trans	21			50'		1	Cu
8/6/2014	Trans	21			45'		1	Cu
8/16/2014	Trans	21			47'		2	Cu
8/26/2014	Trans	21			45'		1	Cu
8/29/2014	Trans	21			45'		2	Cu
9/19/2014	Trans	21			50'		3	Cu
9/29/2014	Trans	21			45'		2	Cu
10/9/2014	Trans	21			45'		1	Cu
10/17/2014	Trans	21			45'		3	Cu
10/11/2014	Trans	21			63'		1	Cu
10/15/2014	Trans	21			63'		2	Cu
10/12/2014	Trans	21			63'		3	Cu
10/21/2014	Trans	21			45'		2	Cu
10/23/2014	Trans	21			60'		4	Cu
11/21/2014	Trans	21			40'		4	Cu
11/25/2014	Trans	21			40'		2	Cu
12/7/2014	Trans	21			47'		1	Cu
12/8/2014	Trans	21			47'		1	Cu
12/22/2014	Trans	21			43'		1	Cu
12/26/2014	Trans	21			62'		3	Cu
			23.0%				**84**	
1/27/2014	Trans	22			47'		1	Cu
4/27/2014	Trans	22			40'		1	Cu
6/9/2014	Trans	22			61'		1	Cu
6/10/2014	Trans	22			61'		1	Cu
6/12/2014	Trans	22			61'		1	Cu
6/24/2014	Trans	22			37'		3	Cu
7/6/2014	Trans	22			40'		4	Cu
7/4/2014	Trans	22			26'		1	Cu
10/22/2014	Trans	22			40'		5	Cu
11/5/2014	Trans	22			38'		1	Cu
11/21/2014	Trans	22			45'		4	Cu
12/4/2014	Trans	22			47'		1	Cu
			6.6%				**24**	
1/29/2014	Trans	23			50'		1	Cu
2/3/2014	Trans	23			50'		1	Cu
1/30/2014	Trans	23			50'		4	Cu
2/4/2014	Trans	23			50'		1	Cu
2/22/2014	Trans	23			50'		2	Cu
2/18/2014	Trans	23			47'		4	Cu
2/24/2014	Trans	23			47'		4	Cu
3/6/2014	Trans	23			40'		2	Cu
4/11/2014	Trans	23			45'		2	Cu
4/19/2014	Trans	23			47'		1	Cu
4/28/2014	Trans	23			53'		1	Cu
5/5/2014	Trans	23			45'		1	Cu
5/6/2014	Trans	23			45'		2	Cu
5/11/2014	Trans	23			28'		1	Cu
5/12/2014	Trans	23			44'		1	Cu
5/13/2014	Trans	23			42'		5	Cu
5/19/2014	Trans	23			42'		1	Cu
5/27/2014	Trans	23			53'		1	Cu
5/31/2014	Trans	23			47'		2	Cu
6/20/2014	Trans	23			65'		2	Cu
7/5/2014	Trans	23			40'		5	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/3/2014	Trans	23			28'		2	Cu
7/12/2014	Trans	23			45'		1	Cu
8/2/2014	Trans	23			65'		1	Cu
8/4/2014	Trans	23			53'		1	Cu
8/12/2014	Trans	23			50'		1	Cu
8/19/2014	Trans	23			62'		2	Cu
9/2/2014	Trans	23			65'		1	Cu
9/6/2014	Trans	23			62'		1	Cu
9/10/2014	Trans	23			40'		3	Cu
9/15/2014	Trans	23			38'		2	Cu
9/21/2014	Trans	23			61'		2	Cu
9/29/2014	Trans	23			55'		1	Cu
10/9/2014	Trans	23			40'		3	Cu
10/14/2014	Trans	23			40'		3	Cu
10/17/2014	Trans	23			42'		8	Cu
10/25/2014	Trans	23			50'		2	Cu
11/8/2014	Trans	23			51'		1	Cu
11/21/2014	Trans	23			46'		1	Cu
12/1/2014	Trans	23			41'		1	Cu
12/22/2014	Trans	23			55'		10	Cu
			24.9%				**91**	
1/4/2014	Trans	24			59'		2	Cu
1/11/2014	Trans	24			55'		3	Cu
2/3/2014	Trans	24			65'		8	Cu
2/12/2014	Trans	24			45'		4	Cu
2/26/2014	Trans	24			65'		4	Cu
3/13/2014	Trans	24			53'		1	Cu
3/14/2014	Trans	24			53'		1	Cu
3/19/2014	Trans	24			45'		1	Cu
4/7/2014	Trans	24			53'		1	Cu
4/8/2014	Trans	24			53'		2	Cu
4/10/2014	Trans	24			53'		1	Cu
4/11/2014	Trans	24			53'		1	Cu
4/12/2014	Trans	24			53'		1	Cu
4/13/2014	Trans	24			53'		2	Cu
4/15/2014	Trans	24			53'		1	Cu
4/16/2014	Trans	24			53'		1	Cu
4/17/2014	Trans	24			53'		1	Cu
4/18/2014	Trans	24			53'		1	Cu
4/20/2014	Trans	24			46'		2	Cu
4/22/2014	Trans	24			53'		1	Cu
4/23/2014	Trans	24			53'		1	Cu
4/24/2014	Trans	24			53'		1	Cu
4/25/2014	Trans	24			53'		1	Cu
5/3/2014	Trans	24			47'		1	Cu
5/5/2014	Trans	24			45'		1	Cu
5/6/2014	Trans	24			50'		3	Cu
5/15/2014	Trans	24			53'		10	Cu
5/28/2014	Trans	24			57'		3	Cu
6/4/2014	Trans	24			52'		3	Cu
6/12/2014	Trans	24			47'		1	Cu
6/15/2014	Trans	24			45'		3	Cu
7/3/2014	Trans	24			52'		3	Cu
6/30/2014	Trans	24			46'		2	Cu
7/7/2014	Trans	24			46'		1	Cu
7/8/2014	Trans	24			46'		1	Cu
7/14/2014	Trans	24			41'		5	Cu
7/19/2014	Trans	24			41'		7	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/12/2014	Trans	24			49'		3	Cu
7/26/2014	Trans	24			41'		2	Cu
7/28/2014	Trans	24			44'		1	Cu
8/14/2014	Trans	24			46'		4	Cu
8/1/2014	Trans	24			46'		1	Cu
8/6/2014	Trans	24			53'		2	Cu
8/8/2014	Trans	24			53'		4	Cu
8/26/2014	Trans	24			46'		1	Cu
8/18/2014	Trans	24			46'		1	Cu
8/22/2014	Trans	24			34'		4	Cu
8/28/2014	Trans	24			36'		7	Cu
9/6/2014	Trans	24			45'		2	Cu
9/21/2014	Trans	24			50'		1	Cu
10/9/2014	Trans	24			49'		3	Cu
9/24/2014	Trans	24			60'		5	Cu
9/29/2014	Trans	24			60'		7	Cu
10/7/2014	Trans	24			60'		2	Cu
10/15/2014	Trans	24			60'		5	Cu
10/20/2014	Trans	24			47'		7	Cu
11/1/2014	Trans	24			60'		1	Cu
11/4/2014	Trans	24			43'		3	Cu
11/7/2014	Trans	24			48'		3	Cu
11/10/2014	Trans	24			48'		1	Cu
11/16/2014	Trans	24			47'		1	Cu
11/25/2014	Trans	24			40'		3	Cu
12/2/2014	Trans	24			48'		2	Cu
12/18/2014	Trans	24			52'		3	Cu
12/21/2014	Trans	24			33'		7	Cu
12/28/2014	Trans	24			50'		1	Cu
			47.4%				**173**	
1/8/2014	Trans	26			36'		1	Cu
1/9/2014	Trans	26			36'		1	Cu
1/21/2014	Trans	26			40'		1	Cu
2/1/2014	Trans	26			40'		2	Cu
2/3/2014	Trans	26			40'		2	Cu
2/5/2014	Trans	26			40'		1	Cu
2/6/2014	Trans	26			40'		2	Cu
2/9/2014	Trans	26			38'		1	Cu
2/10/2014	Trans	26			40'		1	Cu
2/25/2014	Trans	26			39'		1	Cu
2/27/2014	Trans	26			39'		3	Cu
3/4/2014	Trans	26			40'		2	Cu
3/22/2014	Trans	26			40'		1	Cu
4/19/2014	Trans	26			31'		6	Cu
4/16/2014	Trans	26			46'		3	Cu
4/28/2014	Trans	26			31'		3	Cu
5/1/2014	Trans	26			31'		5	Cu
5/6/2014	Trans	26			40'		3	Cu
5/10/2014	Trans	26			30'		1	Cu
8/7/2014	Trans	26			32'		3	Cu
5/27/2014	Trans	26			60'		3	Cu
5/30/2014	Trans	26			60'		3	Cu
7/3/2014	Trans	26			40'		3	Cu
6/27/2014	Trans	26			35'		2	Cu
7/1/2014	Trans	26			30'		1	Cu
7/10/2014	Trans	26			35'		2	Cu
7/20/2014	Trans	26			30'		2	Cu
7/22/2014	Trans	26			30'		5	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
7/27/2014	Trans	26			30'		1	Cu
7/28/2014	Trans	26			30'		2	Cu
7/31/2014	Trans	26			38'		3	Cu
8/10/2014	Trans	26			37'		4	Cu
8/14/2014	Trans	26			37'		2	Cu
8/18/2014	Trans	26			25'		3	Cu
8/21/2014	Trans	26			36'		7	Cu
8/30/2014	Trans	26			31'		1	Cu
8/29/2014	Trans	26			32'		1	Cu
9/1/2014	Trans	26			30'		2	Cu
9/3/2014	Trans	26			30'		2	Cu
9/5/2014	Trans	26			30'		1	Cu
9/15/2014	Trans	26			30'		2	Cu
9/17/2014	Trans	26			30'		1	Cu
9/18/2014	Trans	26			30'		1	Cu
9/20/2014	Trans	26			27'		1	Cu
9/22/2014	Trans	26			30'		2	Cu
9/24/2014	Trans	26			30'		2	Cu
9/26/2014	Trans	26			30'		3	Cu
9/30/2014	Trans	26			30'		1	Cu
10/1/2014	Trans	26			30'		1	Cu
10/2/2014	Trans	26			30'		1	Cu
10/9/2014	Trans	26			60'		1	Cu
10/12/2014	Trans	26			60'		1	Cu
10/10/2014	Trans	26			60'		1	Cu
10/11/2014	Trans	26			60'		1	Cu
10/13/2014	Trans	26			60'		2	Cu
10/17/2014	Trans	26			63'		2	Cu
10/20/2014	Trans	26			40'		2	Cu
10/24/2014	Trans	26			38'		3	Cu
10/22/2014	Trans	26			42'		2	Cu
11/4/2014	Trans	26			38'		2	Cu
11/8/2014	Trans	26			40'		1	Cu
11/9/2014	Trans	26			40'		1	Cu
11/10/2014	Trans	26			40'		1	Cu
12/8/2014	Trans	26			35'		1	Cu
12/9/2014	Trans	26			35'		1	Cu
12/11/2014	Trans	26			38'		1	Cu
12/16/2014	Trans	26			35'		2	Cu
12/22/2014	Trans	26			35'		5	Cu
			37.8%				**138**	
1/18/2014	Trans	27			38'		2	Cu
1/24/2014	Trans	27			52'		3	Cu
1/29/2014	Trans	27			31'		5	Cu
2/8/2014	Trans	27			40'		1	Cu
2/22/2014	Trans	27			31'		1	Cu
2/12/2014	Trans	27			38'		2	Cu
3/2/2014	Trans	27			41'		5	Cu
3/13/2014	Trans	27			38'		1	Cu
3/22/2014	Trans	27			40'		1	Cu
3/23/2014	Trans	27			31'		5	Cu
3/30/2014	Trans	27			31'		1	Cu
3/31/2014	Trans	27			38'		1	Cu
4/3/2014	Trans	27			38'		1	Cu
4/7/2014	Trans	27			38'		1	Cu
4/14/2014	Trans	27			38'		1	Cu
5/14/2014	Trans	27			38'		1	Cu
5/17/2014	Trans	27			40'		1	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
5/15/2014	Trans	27			38'		1	Cu
5/25/2014	Trans	27			40'		1	Cu
6/7/2014	Trans	27			37'		1	Cu
6/10/2014	Trans	27			35'		1	Cu
6/8/2014	Trans	27			35'		2	Cu
7/4/2014	Trans	27			40'		2	Cu
6/30/2014	Trans	27			25'		3	Cu
7/8/2014	Trans	27			37'		22	Cu
7/3/2014	Trans	27			25'		1	Cu
8/1/2014	Trans	27			37'		2	Cu
7/30/2014	Trans	27			38'		2	Cu
8/22/2014	Trans	27			35'		2	Cu
8/30/2014	Trans	27			36'		3	Cu
9/3/2014	Trans	27			40'		2	Cu
9/5/2014	Trans	27			38'		1	Cu
9/11/2014	Trans	27			38'		1	Cu
9/15/2014	Trans	27			38'		2	Cu
9/19/2014	Trans	27			32'		3	Cu
9/24/2014	Trans	27			38'		2	Cu
9/29/2014	Trans	27			30'		1	Cu
10/17/2014	Trans	27			10'		2	Cu
10/21/2014	Trans	27			33'		5	Cu
10/20/2014	Trans	27			39'		1	Cu
10/26/2014	Trans	27			33'		1	Cu
12/4/2014	Trans	27			38'		1	Cu
12/18/2014	Trans	27			37'		3	Cu
12/22/2014	Trans	27			37'		1	Cu
12/24/2014	Trans	27			38'		2	Cu
			28.5%				**104**	
/31/2014	Trans	28			10'		10	Cu
2/10/2014	Trans	28			38'		1	Cu
2/11/2014	Trans	28			38'		4	Cu
2/27/2014	Trans	28			35'		1	Cu
2/28/2014	Trans	28			35'		1	Cu
3/28/2014	Trans	28			31'		1	Cu
3/31/2014	Trans	28			31'		1	Cu
4/1/2014	Trans	28			31'		1	Cu
4/4/2014	Trans	28			31'		4	Cu
4/28/2014	Trans	28			30'		1	Cu
5/6/2014	Trans	28			38'		6	Cu
5/14/2014	Trans	28			36'		1	Cu
5/29/2014	Trans	28			36'		1	Cu
6/9/2014	Trans	28			20'		4	Cu
6/6/2014	Trans	28					2	Cu
6/14/2014	Trans	28			40'		1	Cu
6/19/2014	Trans	28			25'		1	Cu
7/4/2014	Trans	28			19'		1	Cu
6/27/2014	Trans	28			26'		1	Cu
7/3/2014	Trans	28			36'		1	Cu
7/14/2014	Trans	28			30'		3	Cu
7/25/2014	Trans	28			53'		7	Cu
8/1/2014	Trans	28			53'		1	Cu
8/6/2014	Trans	28			47'		2	Cu
8/12/2014	Trans	28			23'		1	Cu
8/14/2014	Trans	28			38'		1	Cu
9/6/2014	Trans	28			30'		3	Cu
9/26/2014	Trans	28			38'		1	Cu
10/4/2014	Trans	28			36'		2	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
10/11/2014	Trans	28			40'		1	Cu
10/13/2014	Trans	28			38'		1	Cu
10/18/2014	Trans	28			40'		1	Cu
10/20/2014	Trans	28			37'		1	Cu
10/21/2014	Trans	28			37'		2	Cu
10/24/2014	Trans	28			42'		1	Cu
10/25/2014	Trans	28			42'		2	Cu
10/27/2014	Trans	28			37'		4	Cu
11/10/2014	Trans	28			38'		1	Cu
11/3/2014	Trans	28			37'		2	Cu
11/5/2014	Trans	28			37'		1	Cu
11/6/2014	Trans	28			37'		1	Cu
11/16/2014	Trans	28			31'		2	Cu
12/1/2014	Trans	28			37'		1	Cu
12/4/2014	Trans	28			26'		1	Cu
12/8/2014	Trans	28			37'		1	Cu
12/9/2014	Trans	28			37'		3	Cu
12/18/2014	Trans	28			40'		1	Cu
			25.2%				**92**	
6/12/2014	Trans	29			25'		1	Cu
			0.3%				**1**	
Fri 5/23/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 1/3/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/3/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/3/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/3/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/3/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/10/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 2/7/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			38'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 7/4/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/17/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 1/24/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/31/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 2/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 2/7/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 2/7/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 2/7/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			30'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 2/14/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 2/14/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			58'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 2/21/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 2/28/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/7/2014	A1 Anchorage	Mooring			35'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 3/7/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			23'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring					3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 3/14/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/21/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring					3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			36'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 5/30/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 3/28/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/4/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			36'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 5/23/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 4/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 4/18/2014	A1 Anchorage	Mooring					3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 5/23/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring					3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			49'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 4/25/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 4/25/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring					3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 5/2/2014	A1 Anchorage	Mooring			19'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			63'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			63'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			23'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			24'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 5/9/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			47'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 5/30/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			61'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/16/2014	A1 Anchorage	Mooring			58'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			42'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 6/13/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/4/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/30/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			24'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			24'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			56'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			42'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 7/11/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			60'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/6/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			61'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 6/13/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			61'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			44'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 6/20/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/20/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			22'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 6/27/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			27'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			50'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 7/11/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			58'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			54'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			49'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 7/11/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			54'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			28'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 8/22/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/18/2014	A1 Anchorage	Mooring			24'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/25/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			56'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			21'		3	Cu

Appendix Table C-2.

Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 8/1/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			59'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/1/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 8/8/2014	A1 Anchorage	Mooring			42'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 8/15/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 8/15/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/22/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			52'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			56'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 8/29/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			26'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 9/19/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			59'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 5/29/2015	A1 Anchorage	Mooring			55'		3	Cu
Fri 8/28/2015	A1 Anchorage	Mooring			55'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			56'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/5/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			56'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring					3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 9/12/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 6/19/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			41'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring					3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			10'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/19/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			40'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 10/10/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/26/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			23'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 5/29/2015	A1 Anchorage	Mooring			48'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			48'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			48'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			38'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			21'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 10/3/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			42'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 10/31/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			22'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			22'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/10/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			17'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			22'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			41'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 10/17/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/17/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/24/2014	A1 Anchorage	Mooring			54'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			39'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 11/28/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 10/31/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			33'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/7/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 6/19/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			57'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			31'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			51'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			50'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 11/14/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/14/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			43'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			50'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			51'		3	Cu
Sat 11/22/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/21/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			49'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			49'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			47'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			54'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			36'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring					3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			55'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 11/28/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			50'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 11/28/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			10'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			65'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 12/5/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 4/24/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			37'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			25'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			36'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			48'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			29'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			38'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			37'		3	Cu
Fri 12/12/2014	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			58'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			50'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			39'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			32'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			41'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			44'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			60'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			29'		3	Cu

Appendix Table C-2.
Port of San Diego Transient Dick and Weekend Achorage Vessel Tracking Data 2014

Date	Facility	Slip / Mooring Number	Percent of Time Occupied	Vessel Type	Vessel Length	Vessel Beam	Length of Stay (nights)	Paint Type
Fri 12/19/2014	A1 Anchorage	Mooring			28'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			26'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			53'		3	Cu
Fri 12/19/2014	A1 Anchorage	Mooring			35'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			38'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			26'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			40'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			30'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			42'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			45'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			44'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			27'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			46'		3	Cu
Fri 12/26/2014	A1 Anchorage	Mooring			40'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			45'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			41'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			36'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			55'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			57'		3	Cu
Fri 1/23/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/9/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/16/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/6/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/13/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 5/22/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			42'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			45'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			32'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			50'		3	Cu
Fri 8/14/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 1/30/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 3/13/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 5/29/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 7/3/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 11/6/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			26'		3	Cu
Fri 7/24/2015	A1 Anchorage	Mooring			26'		3	Cu
Fri 9/4/2015	A1 Anchorage	Mooring			35'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 8/14/2015	A1 Anchorage	Mooring			30'		3	Cu
Fri 2/20/2015	A1 Anchorage	Mooring			34'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			25'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			53'		3	Cu
Fri 1/2/2015	A1 Anchorage	Mooring			30'		3	Cu

DATA FOR SIYB MARINAS AND YACHT CLUBS

This page intentionally left blank

SIYB Master Leaseholders
TMDL Group

2014 Vessel Tracking Spreadsheet: Results, Assumptions and Process

Purpose of the effort

An investigative order (RWQCB, 2010) and an associated monitoring plan authored for the Port of San Diego (AMEC, 2013) requires the collection of paint information from boats moored in Shelter Island Yacht Basin (SIYB) and the evaluation for trends of load reduction. A basin plan amendment (RWQCB, 2005) requires progressive reductions of copper loading from boats into Shelter Island Yacht Basin (SIYB).

As in prior years, Marina and Yacht Club personnel and volunteers have assembled the data to be used in meeting this requirement. Once compiled, this data is submitted to the Port of San Diego for inclusion in an annual report to the San Diego Regional Water Quality Control Board.

The group has as a goal the collection of good quality data, and to that end, meets regularly, coordinates efforts, provides support to new representatives, and explores improved methods of collection. This year's results reflect an over-counting of the actual number of copper-painted hulls and under-counting of alternative paints. The reason lies with survey assumptions, copper paints are assumed when better information is not available, and with survey mechanics.

Vessel Tracking Results

Firstly the data collection has improved over the last year and each prior year. It is valuable to note that boaters produced a 66% reporting rate, a 10% improvement on the 2013 effort and that improvement was realized in results of all group members. In summary:

- 2228 Slips accounted for 100% of the data
- 1178 hulls were painted with copper or unknown paint, 52.9 %
- 112 hulls were painted with low copper paints, 5.0 %
- 657 hulls were painted with aged paint, coated more than 3 years ago, 29.4 %
- 137 hulls were painted with non-copper paints, 6.1 %
- 144 vacant slips (12 months duration) were counted, 6.4 %

The following trends, notable in the past four years of tracking results, correlate with reduced copper loading:

- numbers of copper painted hulls in the basin have been in steady decline, nearly 300 fewer hulls than last year, and
- numbers of non-copper painted hulls have been increasing.

The collected data demonstrates continued and marked progress in reducing load from copper in the basin (additional factors beyond the scope of this effort are needed to arrive at final basin-wide reductions). A projected load reduction of 33% for 2014 when compared to a 2017 load reduction mandate of 40%, shows that the achieved load reductions are substantial and ahead of the prescribed schedule.

Assumptions

The number of slips accounted for this year is similar to last year but less that the number used in the TMDL loading calculation [1]. Variations in the total number of slip are the product of multiple boats occupying a single large slip or end tie, as an example catamaran sailboats due to their broad beam must be accommodated in a single slip or an end tie, slips greater than 85 feet can accommodate several small boats or a single large yacht, and some vintage sailboats are extremely narrow and can be berthed three to a slip. These variations will continue to change year to year as marina managers strive to maximize slip use.

Unoccupied slips cannot load copper into Shelter Island, and are a primary input into a calculation of loading. The number of unoccupied slips was tallied from security logs or from administrative records of slip assignment. Logs are conducted daily and record whether a vessel was or was not present that day in the assigned slip, and are collected by a subset of the group members.

Estimating copper loading reductions for each calendar year depends on a number of factors, including; the original assumptions from the TMDL Technical Document, carefully conducted surveys, simple arithmetic, good paint identification (paint name/paint number), paint leaching behavior and a 50% credit for low copper paints.

- The original TMDL assumed a number of absolutes; that 2,242 slips existed in SIYB and were occupied 100% of the time by boats painted only with copper antifouling paint [1].
- Carefully conducted surveys have been conducted in the past few years establishing paint usage and vacancy rates
- Paints were cross-identified by brand name, product number and reported copper content.
- Coatings applied and in the water for more than three years were identified as “aged or low copper” containing paints.

Quality Assurance Process

To ensure quality of reporting the Vessel Tracking Spreadsheet underwent a quality assurance process to make sure the results are as valid as possible. The systematic activities implemented are outlined below:

1. Supply Reporting Forms to Marinas and Yacht Clubs
2. Information on antifouling paint is requested from boaters
3. Follow up with non-responsive boaters via email and phone
4. Boatyards queried for paint information on incomplete entries
5. Receive data from participating marinas and yacht clubs
6. Save original files
7. Confirm required data is present[2]
8. Verify data supplied
    a. paint product number
    b. copper percentage
    c. age of paint
    d. vacancy
9. Return to participant organizations for revision
10. Reexamine results via steps in item 6, correspond with participant organizations and return if necessary
11. Evaluate progress by calculating the number of vacant, copper, low copper & loading hulls
12. Replace slip reference with generic numbering system (non-required information)[5]

Recommendations

With the experience of four years of collection and evaluation under our belts, we are pleased to see the consistent year-to-year improvements both in the collection process and in the resultant quality of results. We are again, however, challenged with planning future improvements to the process.

While efforts have, to date, been successful, future improvements will increasingly hinge on incorporating and disseminating new information.

Much information from federal water quality, state-level regulatory and legislative initiatives has yet to be applied to the SIYB TMDL. Specifically;

- Leach-rates of currently sold low-leach paints should be made available to improve better estimates of reduction and loading,
- Low-leach copper paints become a primary element of the current implementation plan for TMDL These paints, as demonstrated in AB425 findings, are in most instances capable of meeting water quality objectives, and
- site-specific objectives, as recommended by AB425, could assure that water quality objectives are not over-protective and achievable.

REFERENCES

1) 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.
2) Regional Water Quality Control Board, San Diego Region (Regional Board). Shelter Island Yachts Basin Investigative Order R9-2010-0136
3) AMEC., Environmental and Infrastructure Inc. (*AMEC*) Shelter Island Yacht Basin TMDL Monitoring Plan, 2013. Prepared for the Port of San Diego.

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
HMM	8018	65	P	23	9	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	10	2012	55
HMM	8020	100	P	25	8				Unknown	Unknown		
HMM	8022	100	S	14	5	Non	None	None	None	None	None	
HMM	8024	100	P	16	8	Non	None	None	None	None	None	
HMM	8026	100	S	52	15	Copper	Ultra Blue	Y3669F	Shelter Island Boatyard	7	2013	67
HMM	8028	100	S	50	12				Koehler Kraft	3	2014	
HMM	8030	95	P	50	15	Low	Interlux Ultra	Y3779F	Shelter Island Boatyard	9	2010	30
HMM	8032	100	S	47	14				Unknown	1	2012	
HMM	8034	0										
HMM	8036	50	S	47	14	Copper	Interlux Ultra	Y3669F	Shelter Island Boatyard	5	2012	55
HMM	8038	100	S	48	14		Unknown	None	Unknown	Unknown	Unknown	
HMM	8040	95	S	45	15	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	10	2013	55
HMM	8042	0										
HMM	8044	100	P	48	15							
HMM	8046	0										
HMM	8048	100	S	47	13	Low			Unknown	12	2006	33
HMM	8050	97	S	41	12	Copper	Interlux Ultra	Y3669F	Driscoll MB	8	2013	55
HMM	8052	95	P	36	13	Low	Interlux Ultra	Y3779F	Koehler Kraft	10	2011	33
HMM	8054	100	S	32	9				Unknown	Unknown		
HMM	8056	100	P	36	12	Low			Unknown	8	2007	33
HMM	8058	95	S	35	10	Low			Unknown	12	2010	33
HMM	8060	100	S	30	12				Unknown	Unknown		
HMM	8062	90	S	25	8				Unknown	Unknown		
HMM	8064	100	S	47	14	Low	Trinidad	1275	Self	3	2011	33
HMM	8066	100	S	27	10				Unknown	Unknown		
HMM	8068	99	S	36	12	Low	Interlux Ultra	Y3669F	Driscoll MB	7	2011	33
HMM	8070	100	P	36	12	Copper	Interlux Ultra	3669F	Nielsen-Beaumont	9	2012	55
HMM	8072	100	P	39	13				Unknown	Unknown		
HMM	8074	100	S	38	12	low	Interlux Micron Biolux	5693	British Marine	9	2013	
HMM	8076	100	P	37	13				Unknown	Unknown		
HMM	8078	0										
HMM	8080	100	P	38	12				Unknown	Unknown		
HMM	8082	100	P	41	12	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	9	2013	55
HMM	8084	100	S	42	13				Unknown	Unknown		
HMM	8086	100	P	36	13	Low	None	None	Unknown	Unknown		33
HMM	8088	0										
HMM	8090	100	P	40	12	Low			Shelter Island Boatyard	1	2000	33
HMM	8092	94	S	44	13	Copper	Interlux Ultra	Y3559F	Shelter Island Boatyard	5	2014	55
HMM	8094	100	S	36	11	Copper	California Bottomkote	YBA140	Driscoll SI	12	2009	35
HMM	8096	100	S	35	11	Copper	Interlux Ultra	Y3669F	Shelter Island Boatyard	11	2013	55
HMM	8098	90	S	35	12				Unknown	Unknown	Unknown	
HMM	8100	90	S	44	12	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	9	2013	55
HMM	8102	95	S	38	11	Low	Proline	Y1088-01	Shelter Island Boatyard	8	2011	33
HMM	8452	97	P	21	9	Non	None	None	None	None	None	
HMM	8457	0										
HMM	8462	95	S	34	10				Unknown	Unknown		
HMM	8467	100	S	36	12				Unknown	Unknown	2012	
HMM	8472	100	S	34	12				Unknown	Unknown		
HMM	8477	100	S	35	12	Low	Zspar	V91	Driscoll SI	1	2008	33
HMM	8482	0										

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
HMM	8487	90	S	37	12				Unknown	Unknown		
HMM	8492	0										
HMM	8497	90	S	38	8				Unknown	Unknown		
HMM	8502	65	S	33	11				Unknown	Unknown	2014	
HMM	8507	100	P	30	10				Unknown	12	2013	
HMM	8512	100	S	34	11	Low			Unknown	2	2011	33
HMM	8517	100	S	30	10	Low			Driscoll SI	10	2011	33
HMM	8522	100	S	34	12	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	4	2014	55
HMM	8527	90	S	30	11	Copper	Interlux Ultra	Y3559F	Shelter Island Boatyard	4	2014	55
HMM	8532	100	S	34	11	Non	Interlux/Interseek/900	FXA972/A	Shelter Island Boatyard	8	2013	0
HMM	8537	100	S	30	9	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	Unknown	2010	55
HMM	8542	100	P	28	12	Copper	Proline	1088C-02	Shelter Island Boatyard	12	2013	67
HMM	8547	95	S	37	12	Copper	Micron Extra	5693	Mexico	3	2014	35
HMM	8552	100	S	34	12							
HMM	8557	100	S	26	10	Copper	Interlux Ultra	Y3669F	Driscoll MB	5	2014	55
HMM	8562	85	P	43	14				Unknown	Unknown		
HMM	8567	100	P	18	9		Trinidad					
HMM	8572	100	P	21	8	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	4	2013	55
HMM	8577	100	S	35	11							
HMM	8582	100	S	38	12				Unknown	Unknown		
HMM	8587	95	S	36	12	Low	Proline	1088C-01	Marine Group	7	2008	33
HMM	8592	90	S	35	11							
HMM	8597	95	S	34	10	Low	None	None	Unknown	3	2010	33
HMM	8602	100	S	33	9	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	8	2014	55
HMM	8607	99	S	36	12	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	5	2012	55
HMM	8612	100	S	34	11	Low			Unknown	4	2011	33
HMM	8617	100	S	35	10	Low	None	None	Unknown	3	2011	33
HMM	8622	100	S	36	12				Unknown	11	2013	
HMM	8627	100	S	36	12				Unknown	Unknown		
HMM	8632	0										
HMM	8637	100	S	36	13				Unknown	Unknown		
HMM	8642	90	P	29	10				Balboa Boat Yard	5	2012	
HMM	8647	100	S	36	10				Unknown	Unknown		
HMM	8652	100	S	35	10	Copper	Interlux Ultra	Y3779F	Driscoll MB	10	2012	55
HMM	8657	100	S	34	12				Unknown	Unknown		
HMM	8662	90	P	32	10				Unknown	Unknown		
HMM	8667	90	S	30	11	Low	Seahawk	6142	Driscoll SI	1	2006	33
HMM	8672	100	S	32	9	Copper	Interlux Ultra	Y3669F	Koehler Kraft	10	2012	55
HMM	8677	98	S	32	11	Copper	Interlux Ultra	Y3779F	Nielsen-Beaumont	8	2013	55
HMM	8682	95	S	30	10				Unknown	Unknown		
HMM	8687	100	S	27	12				Unknown	Unknown		
HMM	8692	100	S	28	10				Unknown	Unknown		
HMM	8697	100	S	30	10				Unknown	Unknown		
HMM	8702	100	S	30	11	Low			Driscoll SI	1	2002	33
HMM	8707	100	P	28	11				Unknown	Unknown		
HMM	8712	65	S	30	11	Low	Interlux Ultra	Y3669F	Driscoll MB	7	2011	33
HMM	8717	90	P	30	12				Unknown	Unknown		
HMM	8722	90	S	27	8	Low	Interlux Super Slime Fighter KL	K90BG	Driscolls MB	11	2008	33
HMM	8727	100	S	30	12							
HMM	8732	0										

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
HMM	8737	100	P	53	15				Unknown	Unknown		
HMM	8742	100	P	22	8	Copper	Interlux Ultra	Y3779F	Driscoll MB	1	2013	55
HMM	8747	95	P	30	8	Copper	Interlux Ultra	3669F	Shelter Island Boatyard	6	2013	67
HMM	8752	90	S	25	8	Copper	Interlux Ultra	Y3669F	Shelter Island Boatyard	11	2013	55
HMM	8757	100	S	34	10	Copper	Interlux Ultra	Y3669F	Shelter Island Boatyard	9	2014	55
HMM	8762	50	S	28	12	Low			Shelter Island Boatyard	4	2011	33
HMM	8767	100	P	32	12				Unknown	Unknown		
HMM	8772	90	S	30	12	Copper	Z-Spar	B 91	Driscoll SI	6	2013	60
HMM	8777	100	P	31	11				Unknown	Unknown		
HMM	8782	95	S	30	11	Low			Unknown	10	2011	33
HMM	8787	100	S	25	8	Low	Interlux Ultra	Y3559F	Shelter Island Boatyard	5	2011	33
HMM	8792	100	S	30	11				Unknown	Unknown		
HMM	8797	80	S	30	11				Unknown	Unknown		
HMM	8802	100	S	31	11				Unknown	Unknown		
HMM	8807	100	S	29	9				Unknown	Unknown		
HMM	8812	100	S	27	9							
HMM	8817	100	P	24	8	Non	None	None	Unknown	Unknown		
HMM	8822	100	P	28	10							
HMM	8827	100	P	53	15				Unknown	Unknown		
HMM	8832	100	S	30	11				Unknown	Unknown		
HMM	8837	100	P	24	9				Unknown	Unknown		
HMM	8842	98	S	28	9		Unknown		Unknown	4	2012	
HMM	8847	85	S	24	9				Unknown	Unknown		
HMM	8852	100	S	26	7				Unknown	Unknown		
HMM	8857	100	S	25	8				Unknown	Unknown		
HMM	8862	90	P	29	11				Unknown	Unknown		
HMM	8867	100	S	35	12				Unknown	Unknown		
HMM	8872	100	S	33	10		Unknown	None	Unknown	Unknown	Unknown	
HMM	8877	95	S	34	10				Unknown	Unknown		
HMM	8882	95	S	25	8	Copper	Interlux Ultra	Y3669F	Shelter Island Boatyard	10	2014	55
HMM	8887	95	S	30	11	Copper	Interlux Ultra	3669F	Shelter Island Boatyard	2	2013	55
HMM	8892	100	S	30	10	Copper	Interlux Ultra	Y3779F	Shelter Island Boatyard	9	2014	55
HMM	8897	100	S	30	9	Low	Interlux Ultra	Y3779F	Shelter Island Boatyard	5	2010	33
HMM	8902	100	P	27	8				Driscoll SI	4	2013	
HMM	8907	100	P	42	15				Unknown	Unknown		
HMM	8912	95	P	38	15				Unknown	4	2013	
HMM	8917	70	S	38	12				Unknown	Unknown		
HMM	8922	0										
HMM	8927	100	P	24	9	Low	None	None	None	None	None	
HMM	8932	0										
HMM	8937	100	P	33	10				Unknown	Unknown		
HMM	8942	0										
HMM	8947	0										
HMM	8302	0										
HMM	8305	0										
HMM	8308	0										
HMM	8311	0										
HMM	8314	100	S	27	8	Non	Coronado Admiral	8213	Driscoll SI	4	2013	0
HMM	8317	100	P	35	11	Copper	Z-Spar	B-94	Driscoll SI	8	2014	60
HMM	8320	100	P	35	11	Copper	Z-Spar	B-94	Driscoll SI	8	2014	60

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
HMM	8323	0										
HMM	8326	90	P	25	9	Non	Thorn D	None	Shelter Island Boatyard	6	2013	0
HMM	8329	0										
HMM	8332	95	P	25	9	Copper	Zspar	B 91	Driscoll SI	11	2013	60
HMM	8335	100	UNKNOWN	8	8	Non	None	None	None	None	None	
HMM	8338	100	S	26	9				Unknown	Unknown		
HMM	8341	100	S	22	7				Unknown	Unknown		
HMM	8344	100	S	27	9	Low	None	None	Unknown	2	2011	33
HMM	8347	100	S	22	9	Low			Unknown	12	2011	33
HMM	8350	100	S	22	9				Unknown	Unknown		
HMM	8353	100	S	23	8	Low	None	None	Unknown	12	1990	33
HMM	8356	95	P	18	8				Unknown	Unknown		
HMM	8359	95	S	22	8				Unknown	Unknown		
HMM	8362	100	P	26	8				Unknown	Unknown		
HMM	8365	100	S	27	9	Copper	Interlux Ultra	Y3449F	Shelter Island Boatyard	6	2012	55
HMM	8368	100	P	25	10				Unknown	Unknown		
HMM	8371	100	P	24	8	Low	None	None	None	1	2001	
HMM	8374	100	S	24	8							
HMM	8377	100	P	15	8				Unknown	Unknown		
HMM	8380	100	P	25	9				Unknown	Unknown		
HMM	8383	100	P	14	6							
HMM	8386	100	P	33	11							
HMM	8389	100	S	33	13				Unknown	Unknown		
HMM	8392	0										
HMM	8395	95	P	33	11				Unknown	Unknown		
HMM	8398	85	S	35	12				Unknown	Unknown		
HMM	8401	100	S	20	6							
HMM	8952	100	P	32	12				Unknown	Unknown		
HMM	8953	0										
SDYC	1000	89	Sail	29	6	Copper						
SDYC	1001	99	Power	33	9	Copper	Interlux Ultra	3779	Driscoll Mission Bay	7	2012	55
SDYC	1002	95	Sail	33	9	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	6	2013	67.6
SDYC	1003	100	Power	30	11	Copper						
SDYC	1004	99	Power	32	10	Low Copper	Pettit Z-Spar Protector	B-94	Shelter Island Boatyard	3	2010	60
SDYC	1005	97	Sail	40	12	Copper	Interlux Ultra	3779	Koehler	11	2013	55
SDYC	1006	100	Power	32	10	Low Copper	Interlux Bottomkote Pro	69	Outside San Diego County	8	2013	22
SDYC	1007	94	Sail	34.3	11.5	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	2	2011	66.5
SDYC	1008	98	Power	32	11	Copper	unknown		Koehler	5	2011	
SDYC	1009	96	Sail	34	11	Low Copper	Interlux VC Offshore	V116	The Boatyard	6	2011	67
SDYC	1010	86	Power	35	9	Copper						
SDYC	1011	96	Sail	35	11	Non Copper	Intersleek 900 Black	FXA979/A	Driscoll	3	2013	0.0
SDYC	1012	90	Power	25	9	Low Copper	Interlux Aqua	YBA579	Outside San Diego County	5	2012	35
SDYC	1013	98	Sail	34	11	Low Copper	unknown		Marine Group/ South Bay	6	2005	80
SDYC	1014	100	Sail	12	5	Copper						
SDYC	1015	95	Sail	35	11	Non Copper	Ceramkote	99M	Outside San Diego County	10	2005	0
SDYC	1016	80	Power	38	11	Non Copper	Interlux Pacifica	YBA163	Marine Group/ South Bay	10	2010	0
SDYC	1017	100	Sail	26	7	Copper						
SDYC	1018	90	Power	37	13	Copper	Proline 1088	Y1088C-02	Knight & Carver	1	2013	67
SDYC	1019	100	Power	35	11	Low Copper	Pettit Z-Spar Protector	B-91	Driscoll Mission Bay	2	2011	60
SDYC	1020	83	Power	34'8"	13.5	Copper	Interlux Ultra	3779	Koehler	7	2011	66.5

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1021	80	Power	36	11	Copper	Interlux Ultra	3779	Shelter Island Boatyard	5	2013	55
SDYC	1022	91	Power	41	14	Non Copper	Intersleek 900 White	FXA970/A	Shelter Island Boatyard	3	2013	0.0
SDYC	1023	98	Sail	35	10	Low Copper	unkown		Shelter Island Boatyard	4	2003	80
SDYC	1024	95	Power	43	13	Copper						
SDYC	1025	89	Power	33	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	12	2011	55.0
SDYC	1026	92	Power	42	13.6	Low Copper	Proline 1088	Y1088C-01	Driscoll SI	5	2007	67.6
SDYC	1027	100	Power	21	8	Low Copper	Bluewater Copper Pro	8112	Other	6	2011	67
SDYC	1028	99	Sail	40	12	Low Copper	Pettit Ultima	1032	Driscoll	8	2010	60
SDYC	1029	100	Sail	32	7	Non Copper	Intersleek	FXA972/A	Driscoll	6	2012	0
SDYC	1030	98	Power	38	13	Copper	Interlux Ultra	3779	Neilsen Beaumont	2	2014	55
SDYC	1031	100	Sail	36	6	Low Copper	Interlux Ultra	3779	Koehler	6	2009	55
SDYC	1032	86	Power	40	14	Copper	unknown		Shelter Island Boatyard	5	2010	
SDYC	1033	99	Sail	32	7	Copper	Interlux Ultra	3779		10	2012	55
SDYC	1034	100	Sail	40	12	Copper	Interlux Ultra	3779	Driscoll Mission Bay	6	2014	55.0
SDYC	1035	99	Sail	32.0	7.0	Copper						
SDYC	1036	99	Sail	37	12	Copper	Trinidad SR	1277	Driscoll	1	2012	70.0
SDYC	1037	98	Sail	32	7	Non Copper	Intersleek	FXA972/A	Driscoll	6	2012	0
SDYC	1038	96	Sail	39	12	Copper	Pettit Ultima	1032	Marine Group/ South Bay	11	2012	60
SDYC	1039	98	Sail	32	7	Copper	Interlux Ultra	3669	Koehler	11	2012	55.0
SDYC	1040	91	Sail	37	12	Copper	Sharkskin-7	6142	Driscoll	5	2012	45.0
SDYC	1041	98	Sail	33	7	Copper	Interlux Ultra	3669	Driscoll	4	2013	55
SDYC	1042	96	Power	38	14	Copper	Interlux Ultra	3779	Shelter Island Boatyard	4	2012	55.0
SDYC	1043	100	Sail	32	7	Copper	Interlux Bottomkote	10421	Koehler	5	2012	43
SDYC	1044	88	Sail	38	13	Low Copper	Proline 1088-6	Y1088C-01	Driscoll	6	2005	67.6
SDYC	1045	87	Sail	32.0	7.0	Copper						
SDYC	1046	90	Power	44	14	Non Copper	Intersleek 900 Blue	FXA972/A	Shelter Island Boatyard	3	2013	0.0
SDYC	1047	100	Sail	32	7	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	4	2011	67.6
SDYC	1048	100	Sail	41	12	Low Copper	Interlux Bottomkote Pro	69	Shelter Island Boatyard	6	2014	22
SDYC	1049	100	Sail	32	7	Copper	Coppercoat		Other	1	2013	85
SDYC	1050	100	Sail	41	10	Low Copper	Interlux Ultra	3779	Driscoll SI	3	2008	66.5
SDYC	1051	92	Sail	32	7	Copper						
SDYC	1052	95	Power	41	13	Copper	Pettit Z-Spar Protector	B-91	Driscoll	1	2011	60
SDYC	1053	98	Sail	32	7	Copper	Interlux Bottomkote	10421		5	2011	43
SDYC	1054	99	Power	38	13	Copper	Petitt Z-Spar Protector	B-91	Driscoll	8	2011	60
SDYC	1055	99	Sail	32	7	Low Copper	Pettit Vivid-3	1261		6	2012	25
SDYC	1056	96	Power	38	12	Low Copper	Interlux Aqua	YBA579	Driscoll	6	2013	35
SDYC	1057	70	Sail	32	7	Copper	Proline 1088-6	Y1088C-01		3	2013	67.6
SDYC	1058	97	Power	39	14	Copper	Trinidad Pro	1082	Shelter Island Boatyard	3	2012	70
SDYC	1059	70	Sail	32	7	Copper						
SDYC	1060	100	Sail	40	12	Copper	Pettit Z-Spar Protector	B-91	Knight & Carver	5	2010	60
SDYC	1061	99	Sail	32	7	Low Copper	Pettit Vivid-3	1861	Driscoll	1	2013	25
SDYC	1062	91	Power	42	13	Copper	Pettit Z-Spar Protector	B-91	Driscoll	6	2012	60.0
SDYC	1063	99	Sail	31	7	Low Copper	Interlux Bottomkote	10421	Driscoll	4	2008	43
SDYC	1064	96	Power	44	16	Low Copper	SeaHawk AF33	3345	SD Boatyard	5	2010	33.0
SDYC	1065	98	Sail	32	7	Copper	Pettit Z-Spar Protector	B-91	Driscoll	5	2013	60
SDYC	1066	91	Sail	34	10	Copper	Pettit Z-Spar Protector	B-94	Driscoll	12	2011	60
SDYC	1067	98	Sail	33	12	Copper						
SDYC	1068	100	Power	37	13	Copper	Unknown			1	2013	
SDYC	1069	99	Power	34	12	Copper			Shelter Island Boatyard			
SDYC	1070	95	Power	60	18	Copper	Interlux Ultra	3669	Outside San Diego County	4	2014	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1071	9	Sail	30	10	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	4	2007	67.6
SDYC	1072	95	Power	75	21	Copper	West Marine Bottom Kote		Knight & Carver	7	2012	
SDYC	1073	97	Power	36	13	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	6	2011	60
SDYC	1074	96	Power	65	18	Copper	Interlux Ultra	3669	Knight & Carver	6	2010	55
SDYC	1075	83	Sail	40	12	Copper	proline 1088-6	Y1088C-02	Shelter Island Boatyard	11	2012	67.6
SDYC	1076	90	Power	80	20	Low Copper	Micron Extra-2	5696	Driscoll	4	2010	35.0
SDYC	1077	87	Power	35	12	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll SI	5	2011	35
SDYC	1078	49	Power	92	25	Non Copper	Pettit Ultima Eco	1808	Outside San Diego County	10	2014	0.0
SDYC	1079	100	Sail	32	8	Copper	Coppercoat		Driscoll	5	2013	85
SDYC	1080	91	Power	58	17	Copper	Intersleek 900 Black	FXA979/A	Driscoll	3	2013	
SDYC	1081	72	Sail	41	13	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55
SDYC	1082	75	Power	47	16	Copper	Trinidad-6	1275	Driscoll	10	2013	70
SDYC	1083	0				Non Copper	no boat assigned					
SDYC	1084	98	Power	42	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2014	55
SDYC	1085	100	Power	18	6	Copper						
SDYC	1086	97	Sail	47	14	Copper	Pettit Z-Spar Protector	B-94	Driscoll	3	2012	60
SDYC	1087	83				Copper						
SDYC	1088	99	Sail	49	14	Copper	Interlux Ultra	3669	Outside San Diego County	3	2011	66.5
SDYC	1089	99				Copper						
SDYC	1090	76	Sail	47	40	Copper	Interlux Ultra	3669	Shelter Island Boatyard	11	2013	55
SDYC	1091	98	Sail	36	12	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	1	2011	55
SDYC	1092	97	Sail	47	14	Low Copper	Interlux VC Offshore	V116	Driscoll	6	2009	67
SDYC	1093	98	Sail	33	10	Copper	uknown			1	2011	
SDYC	1094	98	Power	48	15	Copper	Interlux Ultra	3669	Shelter Island Boatyard	7	2013	55
SDYC	1095	94	Sail	35	11	Copper	Interlux VC Offshore	V116	Other	4	2012	67
SDYC	1096	97	Sail	37	12	Copper	Unknown					
SDYC	1097	96	Sail	35	11	Copper						
SDYC	1098	97	Sail	46	14	Copper	Pettit Z-Spar Protector	B-94	Marine Group/ South Bay	6	2012	60
SDYC	1099	94	Power	34	12	Copper	Pettit Z-Spar Protector	B-94	Driscoll	1	2013	60
SDYC	1100	94	Power	47	15	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	7	2010	60
SDYC	1101	94	Sail	34	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	7	2014	55.0
SDYC	1103	100	Power	30	10	Low Copper	Interlux Ultra	3669	Driscoll	3	2011	55
SDYC	1105	98	Sail	35	12	Non Copper	Mission Bay-5	4010	Shelter Island Boatyard	5	2009	0
SDYC	1107	84	Sail	31	7	Copper						
SDYC	1109	93	Sail	34	11	Copper	Proline 1088-6	Y1088C-02	Driscoll	6	2012	67.6
SDYC	1111	100	Sail	35	10	Copper	Pettit Z-Spar Protector	B-94	Driscoll	4	2012	60
SDYC	1113	97	Power	32	11	Low Copper	Interlux Bottomkote Pro	69	Driscoll	4	2012	22
SDYC	1115	92	Sail	35	11	Low Copper	Interlux Bottomkote Pro	69	Koehler	12	2012	22
SDYC	1117	86	Sail	37	11	Low Copper	Petit Vivid - 3	1861	Outside San Diego County	7	2012	25
SDYC	1119	89	Sail	35	8	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55
SDYC	1121	100	Sail	34	11	Low Copper	Interlux Ultra	3779	Driscoll	10	2011	55.0
SDYC	1123	100	Power	31	11	Low Copper	Interlux Bottomkote Pro	69	Shelter Island Boatyard	10	2012	22.0
SDYC	1125	92	Sail	31	9	Copper	Proline 1088-6	Y1088-6	Shelter Island Boatyard	2	2014	67.6
SDYC	1127	100	Sail	35	11	Non Copper	VC Performance Epoxy	V127/A	Other	2	2010	0
SDYC	1129	100				Copper						
SDYC	1131	95	Power	30	11	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	7	2011	55
SDYC	1133	80	Sail	35	12	Copper						
SDYC	1135	98	Sail	33	9	Copper						
SDYC	1137	100	Sail	33	10	Copper						
SDYC	1139	96	Sail	36	11	Copper						

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1141	80	Power	32	11	Copper						
SDYC	1143	100	Sail	30	11	Low Copper	Hydrocoat	1840	Other	3	2010	40.43
SDYC	1145	100	Power	25	9	Non Copper	Petit Vivid - 3	1861	Nielsen Beaumont	3	2014	0
SDYC	1147	100	Sail	31	10	Copper	Pettit Z-Spar Protector	B-94	Shelter Island Boatyard	5	2012	60.0
SDYC	1149	98	Sail	33	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2013	55
SDYC	1150	99	Electric	24	9	Copper	Interlux Ultra	3779	Outside San Diego County	12	2013	55
SDYC	1151	100	Power	17	8	Copper	Interlux Ultra	3779	Nielsen Beaumont	6	2013	55
SDYC	1151	69	Power	32	11	Copper						
SDYC	1152	100	Power	30	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	8	2012	55
SDYC	1153	95	Power	36	11	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	6	2013	67.6
SDYC	1153	95		42	13.8	Copper						
SDYC	1154	97	Power	45	15	Low Copper	Micron Optima	YBA980	Driscoll	5	2011	28
SDYC	1155	99	Sail	34	10	Non Copper	Epoxy	Unknown	Driscoll	6	2012	0
SDYC	1155	100	Sail	37	12	Copper						
SDYC	1156	98	Sail	42	10	Low Copper	Interlux Ultra	3669	Driscoll	10	2011	55
SDYC	1157	99	Sail	33	11	Copper	Pettit Z-Spar Protector	B-94	Driscoll	4	2014	60
SDYC	1157	100	Sail	40	11	Low Copper	Bluewater Copper Pro	8112	Shelter Island Boatyard	10	2011	67
SDYC	1158	100	Power	48	13	Copper	Pettit Z-Spar Protector	B-91	Driscoll SI	3	2012	60
SDYC	1159	92	Sail	30	11	Copper	Ultrakote-6	2669N	Shelter Island Boatyard	6	2011	67.0
SDYC	1159	78	Sail	35	11	Copper	Interlux Ultra	3669	Koehler	6	2013	55
SDYC	1160	100	Sail	40	12	Low Copper	Pettit Z-Spar Protector	B-91	Driscoll	8	2010	60
SDYC	1161	100	Power	32	10	Low Copper	Interlux Interclene	BCA779	Other	2	2010	27
SDYC	1161	100	Power	36	11	Low Copper	Interlux Aqua	YBA579	Koehler	6	2008	35
SDYC	1162	71	Power	59	18	Low Copper	Proline 1088 - 6	Y1088C-01	Shelter Island Boatyard	7	2011	67.6
SDYC	1163	98	Sail	34	12	Copper						
SDYC	1163	96	Sail	49	14	Non Copper	Intersleek 900 Black	FXA979/A	Shelter Island Boatyard	5	2013	0
SDYC	1164	97	Power	35	14	Copper	Interlux Ultra	3669	Shelter Island Boatyard	2	2013	55
SDYC	1165	91	Sail	35	11	Copper						
SDYC	1165	100	Sail	42	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	2	2012	55
SDYC	1166	98	Sail	35	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55.0
SDYC	1167	100	Sail	34	10	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll Mission Bay	1	2010	35
SDYC	1167	100	Sail	39	12	Non Copper	Pacifica Plus	YBB260	Shelter Island Boatyard	3	2013	0
SDYC	1168	93	Sail	40	12	Copper	Trinidad SR	1277	Driscoll	6	2014	70
SDYC	1169	100	Sail	32	10	Low Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	6	2010	67.6
SDYC	1169	98	Sail	35	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55.0
SDYC	1170	100	Sail	39	12	Non Copper	Pacifica Plus	YBB260	Shelter Island Boatyard	3	2013	0
SDYC	1171	99	Sail	36	11	Low Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	2	2010	67.6
SDYC	1171	95	Sail	38	12	Low Copper	Pettit Copper-Guard	1042	Shelter Island Boatyard	8	2011	45.0
SDYC	1172	99	Sail	39	13	Low Copper	Interlux Fiberglass Bottomkote Aqua	YBA579	Other	5	2010	46
SDYC	1173	100	Power	28	13	Copper	Pettit Z-Spar Protector	B-94	Driscoll	5	2014	60
SDYC	1173	98	Sail	41	11	Non Copper	Ceramkote	99M	Shelter Island Boatyard	5	2014	0
SDYC	1174	100	Power	40	14	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll	6	2012	35
SDYC	1175	100	Sail	33	10	Low Copper	Proline 1088-6	Y1088C-02	Driscoll	6	2011	67.6
SDYC	1175	63	Sail	38	13	Copper						
SDYC	1176	99	Sail	39	12	Copper	Interlux Ultra	3779	Koehler	5	2012	66.5
SDYC	1177	98	Sail	34	11	Low Copper	Trinidad-6	1275	Driscoll	6	2008	70.0
SDYC	1177	97	Sail	40	12	Copper	Pettit Z-Spar Protector	B-91	Driscoll SI	8	2012	60
SDYC	1178	95	Power	38	13	Low Copper	Bluewater Copper Pro	8111	Driscoll	3	2010	67.0
SDYC	1179	99	Sail	29	9	Low Copper	Pettit Vivid-3	1861	Koehler	4	2011	25
SDYC	1179	100	Sail	39	12	Non Copper	Pettit Vivid Free-3	1262	Shelter Island Boatyard	7	2012	0

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1180	98	Sail	39	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2012	55
SDYC	1181	100	Power	32	11	Copper						
SDYC	1181	96	Sail	38	12	Low Copper	Proline 1088-6	Y1088C-02	Driscoll Mission Bay	4	2010	67.6
SDYC	1182	84	Sail	40	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	3	2014	67.6
SDYC	1183	99	Sail	34	11	Low Copper	Bluewater Copper Pro	8112	Shelter Island Boatyard	10	2011	67
SDYC	1183	84	Sail	35.5	10.33	Low Copper	Interlux Ultra	3779	Driscoll SI	1	2007	66.5
SDYC	1184	100	Sail	35	11	Copper						
SDYC	1185	100	Sail	30	11	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	5	2011	55
SDYC	1185	100	Power	42	13	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	12	2011	60.0
SDYC	1186	92	Power	42	15	Copper	Proline 1088-6	Y1088C-01	Driscoll	3	2013	67.6
SDYC	1187	98	Power	32	10	Copper	Interlux Bottomkote	10421	Driscoll	12	2012	43.0
SDYC	1187	93	Sail	30	11	Copper						
SDYC	1188	86	Sail	35	11	Copper	Proline 3066		Driscoll	4	2012	
SDYC	1189	98	Sail	36	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	5	2013	67.6
SDYC	1189	95	Sail	35	11	Copper	Interlux Ultra	3779	Driscoll	4	2011	66.5
SDYC	1190	95	Sail	40	12	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	2	2013	67.6
SDYC	1191	100	Sail	30	11	Low Copper	Interlux Bottomkote Pro	69	Shelter Island Boatyard	6	2012	22
SDYC	1191	98	Sail	33	12	Non Copper	Bluewater Shelter Island	8202	Driscoll	12	2013	0
SDYC	1192	93	Power	45.0	14.7	Copper						
SDYC	1193	100	Power	30	10	Copper	Interlux Bottomkote	10421	Driscoll	1	2012	43
SDYC	1193	100	Sail	20	7	Copper	Pettit Z-Spar Protector	B-94	Driscoll	6	2012	60
SDYC	1194	90	Power	17	6	Low Copper	Interlux Fiberglass Bottomkote Aqua	YBA579	Driscoll	4	2010	46
SDYC	1195	100	Power	31	11	Copper						
SDYC	1195	100	Electric	18	6	Low Copper	Pettit Z-Spar Portector	B-91	Driscoll SI		2011	60
SDYC	1196	78	Power	17	6	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	7	2010	55
SDYC	1197	98	Sail	28	9	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	8	2008	67.6
SDYC	1197	98	Power	17	6	Copper	Interlux Ultra	3779	Shelter Island Boatyard	10	2012	55
SDYC	1198	100	Electric	18	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	2	2012	55
SDYC	1199	72	Power	24	7	Low Copper	Proline 1088-6	Y1088C-01	Driscoll	6	2010	67.6
SDYC	1199	100	Power	21	8	Copper	Sharkskin-7	6142	Shelter Island Boatyard	11	2006	45
SDYC	1200	92	Power	20	8'4"	Copper	Bottomshield		Other	1	2011	
SDYC	1201	100	Sail	20	7	Copper						
SDYC	1202	99	Power	17	6	Copper	Trinidad SR	1877	Shelter Island Boatyard	6	2011	70
SDYC	1203	99	Power	16	7	Low Copper	Hempels Anitfouling Olypmic	76600-19990	Other	2	2010	48.8
SDYC	1204	100	Electric	18	5	Copper	Proline 1088-6	Y1088C-02	Other			67.6
SDYC	1205	53	Sail	20	7	Copper						
SDYC	1206	100	Electric	18	5	Low Copper	Interlux Bottomkote	52422	Shelter Island Boatyard	4	2009	43
SDYC	1207	93	Power	50	16.5	Low Copper	Proline 1088 - 6	Y1088C-02	Other	11	2007	67.6
SDYC	1208	100	Sail	59	10	Low Copper	Interlux Super KL-6	K91BG	Knight & Carver	5	2008	70
SDYC	1209	99	Power	50	15	Copper						
SDYC	1210	96	Power	58	16	Low Copper	Interlux Bottomkote Pro	79	Shelter Island Boatyard	6	2010	22.0
SDYC	1211	96	Sail	59	13	Low Copper	Baltaplate		Outside San Diego County	7	2010	
SDYC	1212	97	Sail	55	16	Copper	Pettit Z-Spar Protector	B-94	Driscoll		2012	60
SDYC	1213	92	Power	60	16	Low Copper	Interlux Bottomkote	52422	Shelter Island Boatyard	4	2011	43
SDYC	1214	98	Power	59	16		Unknown		Shelter Island Boatyard	5	2012	
SDYC	1215	98	Power	38	10	Copper	SeaHawk Smart Solution		Driscoll	6	2005	
SDYC	1216	100	Sail	35	11	Copper	Interlux Ultra	3779	Shelter Island Boatyard	5	2012	55
SDYC	1217	100	Sail	38	8	Low Copper	Petit Vivid - 3	1861	Driscoll SI	12	2010	25
SDYC	1218	97	Sail	33		Copper	unknown		Other			
SDYC	1219	100	Sail	32	7	Low Copper	Interlux Ultra	3669	Koehler	3	2008	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1220	100	Sail	35	10	Copper	SeaHawk AF33	3342	Driscoll SI	9	2008	33
SDYC	1221	100	Sail	28	7	Copper						
SDYC	1222	98	Power	27.5	9.5	Copper						
SDYC	1223	100	Sail	32	10	Copper	Interlux Ultra	3669	Koehler	5		55
SDYC	1224	95	Power	35	10	Low Copper	Interlux Bottomkote	52422	Other	2	2009	43
SDYC	1225	100	Sail	40	11	Low Copper	Proline 1088-6	Y1088C-02	Other	7	1991	67.6
SDYC	1226	100	Power	48	15	Low Copper	Sharkskin-7	6145	Driscoll	4	2006	45
SDYC	1227	100	Sail	52	14	Copper						
SDYC	1228	100				Non Copper	No assignment					
SDYC	1229	96	Power	52	15	Low Copper	Proline 1088 - 6	Y1088C-02	Outside San Diego	5	2008	67.6
SDYC	1230	96	Sail	48	14.6	Copper						
SDYC	1231	98	Power	45	14	Low Copper	Interlux Bottomkote	52422	Shelter Island Boatyard		2010	43
SDYC	1232	93	Power	39	14	Low Copper	Trinidad SR	1877	Shelter Island Boatyard	6	2010	55
SDYC	1233	99	Power	44	13	Low Copper	Interlux Aqua	YBA579	Nielsen Beaumont	4	2011	35
SDYC	1234	100	Sail	47	12	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	2	2012	67.6
SDYC	1235	99	Sail	46	14	Copper	Pettit Z-Spar Protector	B-91	Driscoll	2	2011	60
SDYC	1236	100	Power	47	15	Low Copper	Bluewater Copper Pro	8111	Shelter Island Boatyard	2	2010	45.0
SDYC	1237	97	Sail	37	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	3	2012	55
SDYC	1238	95	Sail	47	14	Copper						
SDYC	1239	99	Sail	42	13	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	6	2010	67.6
SDYC	1240	95	Power	50	13	Copper	unknown		Other			
SDYC	1241	90	Sail	52	10	Copper						
SDYC	1242	95	Power	41	13	Low Copper	Interlux Calif Bottomkote-7	YBA140	Shelter Island Boatyard	6	2011	35
SDYC	1243	100	Sail	48.0	14.0	Copper	Uknown		Driscoll	6	2014	
SDYC	1244	100	Power	48	15	Copper	Proline 1088	Y1088C-01	Shelter Island Boatyard	8	2012	67
SDYC	1245	98	Power	50	12	Low Copper	Interlux Ultra	3669	Outside San Diego County	1	2011	55
SDYC	1246	94	Power	50	16	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	12	2010	55
SDYC	1247	98	Power	47	14	Copper	Interlux Ultra	3669	Driscoll Mission Bay	3	2013	55
SDYC	1248	99	Power	43	14	Copper	Petit Z-Spar Protector	B-91	Driscoll	2	2014	60
SDYC	1249	99	Power	40	14	Unknown	Unknown		Unknown	11	2010	
SDYC	1250	100	Power	46	15.5	Copper						
SDYC	1260	96	Power	33.0	12.0	Copper	Interlux Ultra	3779	Shelter Island Boatyard	9	2013	55
SDYC	1261	100	Electric	23	10	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	12	2011	60
SDYC	1262	100	Sail	28	9	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	7	2011	60
SDYC	1263	100	Sail	30	11	Low Copper	Interlux Bottomkote	52422	Shelter Island Boatyard	6	2009	43
SDYC	1264	96	Power	22	8	Low Copper	Interlux K91		Driscoll SI	12	2009	70
SDYC	1265	100	Sail	31	9	Low Copper	Bluewater Copper Pro	8112	Driscoll	4	2009	67.0
SDYC	1266	98	Power	25	9.5	Copper	Pettit Z-Spar Protector	B-94	Driscoll	12	2013	60
SDYC	1267	100	Sail	31	8	Non Copper	No Bottom Paint - hydro hoist					0
SDYC	1268	99	Power	27	9	Copper	Interlux K91		Driscoll	12	2012	70.0
SDYC	1269	82	Sail	34	11	Copper			Driscoll	10	2012	60
SDYC	1270	99	Sail	30	10	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	1	2012	67.6
SDYC	1271	100	Sail	35	11	Non Copper	Epoxy		Other	12	2001	0
SDYC	1272	59	Sail	40	12	Copper	Pettit Z-Spar Protector	B-94	Driscoll	7	2012	60
SDYC	1273	99	Sail	35	12	Non Copper	Intersleek 900	FXA970/A	Driscoll SI	8	2011	0
SDYC	1274	91	Power	30	10	Copper						
SDYC	1300	93	Power	49	10	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	4	2013	67.6
SDYC	1303	100	Power	47	14	Low Copper	Interlux Ultra	3669	Driscoll	6	2011	55
SDYC	1306	99	Sail	37	14	Copper						
SDYC	1309	83	Power	47	15	Copper	Pettit Z-Spar Protector	B-91	Driscoll	3	2013	60

Appendix Table C-3.

Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1312	92	Sail	50	14	Copper	Interlux Bottomkote	10421	Shelter Island Boatyard	6	2011	43
SDYC	1315	93	Sail	50		Non Copper	Pettit Vivid Free-3	1862	Shelter Island Boatyard	2	2012	0.0
SDYC	1318	89	Power	36	11	Low Copper	Interlux Ultra	3779	Driscoll	2	2010	55
SDYC	1321	94	Sail	37	13	Copper						
SDYC	1324	98	Sail	41	13	Non Copper	Pettit Ultima Eco	1208	SD Boatyard	4	2013	0
SDYC	1327	92	Sail	60	16	Low Copper	Pettit Vivid-3	1261	Driscoll	6	2011	25
SDYC	1330	99	Sail	74	17	Low Copper	Pettit Vivid-3	1261	Driscoll SI	8	2012	25
SDYC	1333	95	Power	78	19	Copper						
SDYC	1336	91	Power	70	17	Non Copper	Intersleek 900	FXA970/A	Driscoll	3	2013	0
SDYC	1339	97	Power	64	18	Low Copper	Interlux Micron Extra	5690	Shelter Island Boatyard	10	2011	35.0
SDYC	1342	84	Power	70	20	Copper	Pettit Z-Spar Protector	B-94	Driscoll	5	2012	60
SDYC	1345	74	Sail	59	10	Copper	Interlux Ultra	3669	Koehler	12	2012	55
SDYC	1348	94	Power	48	16	Copper	Interlux Super KL-6	K91BG	Shelter Island Boatyard	5	2011	70.0
SDYC	1351	99	Sail	50	12	Copper						
SDYC	1354	98	Sail	55	14	Copper						
SDYC	1357	96	Power	42	14	Non Copper	E-Paint-10	ECO-101	Shelter Island Boatyard	4	2013	0
SDYC	1360	97	Sail	43	11	Low Copper	Interlux Calif Bottomkote-7	YBA140	Koehler	4	2012	35
SDYC	1363	100	Power	50	11		Interlux Ultra	3669	Koehler	10	2014	55
SDYC	1366	96	Sail	36	12	Copper	Pettit Z-Spar Protector	B-94	Driscoll	5	2012	60
SDYC	1369	98	Sail	49	13	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2011	67
SDYC	1372	100	Sail	43	14	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	8	2010	55
SDYC	1375	78	Sail	42	14	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	1	2013	67.6
SDYC	1378	100	Sail	46	9	Low Copper	Interlux Bottomkote	10421	Driscoll	6	2009	43
SDYC	1381	100	Sail	53	15	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	6	2012	67.6
SDYC	1384	98	Sail	35	12	Copper	Interlux Ultra	3669	Shelter Island Boatyard	3	2011	66.5
SDYC	1387	100	Sail	41	13	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	12	2011	67.6
SDYC	1390	90	Power	44	14	Copper	Interlux K91		Shelter Island Boatyard	12	2011	70
SDYC	1393	97	Power	48	15	Copper	Sharkskin-7	6145	SD Boatyard	5	2012	45.0
SDYC	1396	76	Power	46	12	Copper	Proline 1088-6	Y1088C-01	Driscoll	5	2012	67.6
SDYC	1399	99	Power	48	14	Copper	Interlux Bottomkote	10421	Driscoll	11	2012	43.0
SDYC	1450	92	Power	53	14.5	Non Copper	Transocean Speed Ultra Fouling		Outside San Diego	5	2012	0.0
SDYC	1455	65	Power	49	14	Copper	Interlux Ultra	3779	Shelter Island Boatyard	11	2012	55.0
SDYC	1460	98	Sail	48	14	Low Copper	Interlux VC Offshore	V116	Shelter Island Boatyard	4	2010	67.0
SDYC	1465	67	Sail	52	14	Copper	Trinidad SR	1877	Outside San Diego County	11	2011	70
SDYC	1470	100	Sail	44	13	Low Copper	Proline 1088	Y1088C-02	Shelter Island Boatyard	6	13	67
SDYC	1475	99	Sail	42	13	Copper	Interlux Ultra	3669	Shelter Island Boatyard	4	2011	55
SDYC	1480	93	Power	47	15	Copper	Pettit Z-Spar Protector	B-94	Driscoll	2	2012	60
SDYC	1485	94	Sail	48	10	Copper	Pettit Z-Spar Protector	B-94	Driscoll	2	2012	60
SDYC	1490	97	Sail	50	16	Low Copper	SeaHawk AF33	3342		4	2006	33
SDYC	1495	94	Sail	42	14	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	4	2012	67.6
SDYC	1500	98	Power	48	15	Copper	Interlux Ultra	3779	Shelter Island Boatyard	2	2013	55
SDYC	1505	97	Power	31	11	Copper	Pettit Z-Spar Protector	B-94	Driscoll	11	2011	60
SDYC	1510	99	Power	25	8	Copper	Seaguard-2		Driscoll	10	2012	49.0
SDYC	1515	94	Power	48	15	Copper	Pettit Z-Spar Protector	B-91	Driscoll SI	8	2011	60.0
SDYC	1520	99	Power	13	5	Low Copper	Calif Bottomkote - 7	YBA140	Other	5	2011	35
SDYC	1525	99	Power	17	6	Low Copper	Calif Bottomkote - 7	YBA140	Other	5	2011	35
SDYC	1530	99	Power	25	8	Copper	Pettit Z-Spar Protector	B-94	Driscoll	5	2014	60
SDYC	1535	98	Power	25	8	Copper	Pettit Z-Spar Protector	B-94	Driscoll	2	2013	60
SDYC	1540	97	Power	28	8.5	Copper	Pettit Z-Spar Protector	B-94	Driscoll	2	2013	60
SDYC	1545	99	Power	28	8.5	Copper	Pettit Z-Spar Protector	B-91	Driscoll	2	2013	60

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1550	96	Sail	28	8	Copper	unknown					
SDYC	1555	99	Power	22	8	Low Copper	Interlux K91		Driscoll	3	2007	70
SDYC	1560	92	Sail	25	8	Copper						
SDYC	1565	75	Power	23	9	Low Copper	Interlux Interspeed	BRA642	Driscoll	7	2012	38
SDYC	1570	98	Power	26	6	Low Copper	Interlux Bottomkote Pro	69	Other	8	2014	22
SDYC	1575	84	Sail	25	8	Copper	unknown		other	1	2011	
SDYC	1580	83	Sail	29	10	Copper	Proline 1088-6	Y1088C-02	Driscoll			67.6
SDYC	1585	99	Power	19	6	Non Copper	Bluewater Shelter Island	8202	Other	6	2011	0
SDYC	1590	96	Sail	29	9	Low Copper	Proline 1088-6	Y1088C-02	Driscoll	12	2010	67.6
SDYC	1595	99	Sail	30	7	Copper	Interlux Ultra	3669	Koehler	8	2011	55
SDYC	1600	99	Power	22	8	Copper	Interlux Ultra	3669	Koehler	3	2011	55
SDYC	1605	97	Sail	27	9	Low Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	7	2009	67.6
SDYC	1610	95	Power	25	8	Copper	Interlux Ultra	3779	Driscoll			55
SDYC	1615	98	Power	23	8	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	1	2011	67.6
SDYC	1620	93	Power	21	8	Copper	Pettit Copper- Guard	1042	SD Boatyard	1	2013	45
SDYC	1625	93	Power	21	8	Copper	Proline 1088-6	Y1088C-02	Other	12	2012	67.6
SDYC	1630	95	Power	17	5	Low Copper	Interlux Aqua	YBA579	Shelter Island Boatyard	7	2011	35.0
SDYC	1635	98	Sail	30	6	Copper	Interlux Ultra	3779	Shelter Island Boatyard	4	2013	55
SDYC	1640	96	Power	21	8	Copper	Proline 1088-6	Y1088C-01	Outside San Diego County	5	2013	67.6
SDYC	1645	100	Power	21	9	Copper	Petit Z-Spar Protector	B-91	Driscoll	6	2014	60
SDYC	1650	97	Sail	26	6	Copper	Interlux Ultra	3779	Koehler	5	2013	55
SDYC	1655	97	Sail	23	7	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	11	2012	67.6
SDYC	1660	81	Power	26	8	Copper	Interlux Bottomkote	10421	Outside San Diego County	10	2012	43
SDYC	1665	98	Power	21	8	Copper	Interlux Ultra	3779	Driscoll	6	2014	55
SDYC	1670	70	Sail	27	8	Non Copper	VC Performance Epoxy	V127/A	Other	5	2008	0
SDYC	1675	97	Sail	29	9	Copper	Pettit Z-Spar Protector	B-91	Driscoll	8	2012	60.0
SDYC	1680	99	Power	27	8	Low Copper	Trilux33-3	YBA068	Driscoll	6	2010	16.95
SDYC	1685	92	Power	23	8	Low Copper	Interlux Calif Bottomkote-7	YBA143	Shelter Island Boatyard	6	2012	35.0
SDYC	1690	100	Sail	26	9	Copper						
SDYC	1695	98	Power	22	8	Low Copper	ABC 3-2	ABC3-92	SD Boatyard	10	2006	70
SDYC	1700	90	Power	27	8	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	1	2012	67.6
SDYC	1703	99	Power	18	7	Copper						
SDYC	1705	90	Power	55	18	Low Copper	Micron Extra-2	5696	Driscoll Mission Bay	11	2012	35
SDYC	1706	97	Sail	38	21	Copper	Interlux Bottomkote Pro	69	Driscoll	7	2014	22
SDYC	1709	100	Power	48	16							
SDYC	1710	100	Sail	40	12	Copper						
SDYC	1712	98	Power	50	15							
SDYC	1715	100	Power	42	14	Copper	Proline 1088-6	Y1088C-02	Driscoll	4	2011	67.6
SDYC	1715	99	Sail	53	14	Low Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	6	2009	67.6
SDYC	1718	100	Sail	38	10	Copper	Interlux Bottomkote	10421	Other	6	2014	43
SDYC	1720	86	Sail	47	13	Copper						
SDYC	1721	100	Sail	49	11	Copper						
SDYC	1724	96	Power	39	13	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	7	2010	55
SDYC	1725	67	Sail	48	17	Copper						
SDYC	1727	100	Sail	44	14	Copper	Trinidad VOC Blue	1277	Other	10	2011	60
SDYC	1730	94	Power	42	15	Non Copper	Intersleek 900 White	FXA970/A	Shelter Island Boat Yard	1	2012	0
SDYC	1730	92	Power	36	12	Copper	Pettit Z-Spar Protector	B-91	Driscoll	4	2012	67
SDYC	1733	100	Sail	47	14	Low Copper	Micron Extra-2	5696	Other	1	2013	35
SDYC	1735	95	Sail	36	11	Copper	unknown		The Boatyard	4	2013	
SDYC	1736	75	power	46	14	Copper	Pettit Z-Spar Protector	B-91	Driscoll			67

Appendix Table C-3.

Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1739	100	Sail	46	18	Copper	Trinidad SR	1277	Driscoll	3	2012	70
SDYC	1740	100	Power	37	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	3	2011	67.6
SDYC	1742	98	Power	45	14	Copper	Interlux Ultra	3779	Shelter Island Boatyard	10	2013	55
SDYC	1745	92	Power	48	14	Copper	Proline 1088-6	Y1088C-01	Knight & Carver	6	2011	67.6
SDYC	1745	99	Sail	33	7	Non Copper	Pettit Vivid Free-3	1262	Dirscoll	4	2011	0
SDYC	1748	100	Sail	38	13	Power	Unknown		Unknown			
SDYC	1750	95	Power	37	12	Low Copper	Proline 1088-6	Y1088C-02	Driscoll	2	2009	67.6
SDYC	1751	100	Power	43	12	Copper						
SDYC	1754	100	Power	44	13	Low Copper	Interlux Bottomkote Pro	69	Driscoll	1	2013	22
SDYC	1755	99	Power	40	12	Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2011	55
SDYC	1757	96	Sail	42	13	Copper	Interlux Ultra	3779	Shelter Island Boatyard	4	2013	55
SDYC	1760	83	Sail	40	23	Copper	Pettit Z-Spar Protector	B-91	Driscoll	5	2012	60
SDYC	1760	100	Power	32	12.4	Non Copper	Ceramkote	99M	Shelter Island Boatyard	6	2008	0
SDYC	1763	100	Sail	30	9	Low Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	6	2005	67.6
SDYC	1765	81	Sail	36	12	Copper	Ceramkote	99M	Shelter Island Boatyard	6	2009	
SDYC	1766	100	Sail	33	11	Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2012	55
SDYC	1769	80	Sail	35	11	Copper	Interlux Ultra	3669	Koehler	6	2013	55
SDYC	1770	99	Power	40	14	Copper	Pettit Ultima	1032	Driscoll	10	2012	60
SDYC	1772	100	Sail	35	10	Unknown	Unknown		Unknown	Unknown	2012	
SDYC	1775	97	Sail	32	7	Copper	Pettit Z-Spar Protector	B-94	Driscoll	6	2013	60
SDYC	1775	98	Power	36	13	Low Copper	Trinidad SR	1877	Driscoll	12	2010	70
SDYC	1778	86	Sail	32.7	9.15	Copper	Interlux Ultra	3779	Driscoll	9	2013	66.5
SDYC	1780	97	Sail	36	12	Copper	Pettit Z-Spar Protector	B-91	Driscoll	6	2014	60
SDYC	1781	100	Sail	40	13	Low Copper	Interlux Calif Bottomkote-7	YBA140	SD Boatyard	6	2010	35
SDYC	1784	94	Power	32	10	Copper	Interlux Ultra	3779	Shelter Island Boatyard	8	2011	55
SDYC	1785	100	Sail	36	12	Copper	Interlux Ultra	3779	Koehler	2	2011	55
SDYC	1787	95	Power	36	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2011	67.6
SDYC	1790	99	Sail	33	10	Low Copper	Trinidad SR	1877	Old Kettenberg Yard	6	2006	70.0
SDYC	1790	100	Power	32	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	6	2012	67.6
SDYC	1793	100	Sail	34	10	Copper						
SDYC	1795	98	Sail	40	18	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2010	55
SDYC	1796	99	Sail	33.0	9.0	Copper						
SDYC	1799	100	Sail	30	11	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55
SDYC	1800	100	Sail	41	13	Low Copper	Interlux Bottomkote	10421	Driscoll	10	2010	43
SDYC	1800	100	Power	36	12	Low Copper	Micron 66 Black	YBA473	Outside San Diego County	6	2013	35
SDYC	1801	98	Sail	50	12	Copper	uknown		Outside San Diego County	6	2005	
SDYC	1802	95	Sail	30	10	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	8	2007	67.6
SDYC	1802	99	Sail	40	13	Non Copper	Intersleek 900 Black	FXA979/A	Shelter Island Boatyard	3	2013	0
SDYC	1803	96		38.5	12.5	Copper						
SDYC	1804	91	Power	40	13	Copper	Pettit Z-Spar Protector	B-91	Driscoll	5	2013	60
SDYC	1805	99	Power	32	11	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	7	2010	55.0
SDYC	1805	98	Power	31	10	Low Copper	Proline 1088-6	Y1088C-01	Driscoll	5	2009	67.6
SDYC	1805	99	Power	40	12	Copper	Interlux Ultra	3779	Shelter Island Boatyard	8	2012	55
SDYC	1806	99	Sail	40	12	Low Copper	Ultrakote-6	2669N	SD Boatyard	1	2009	67
SDYC	1807	100	Power	38	13	Low Copper	Pettit Ultima	1032	Marine Group/ South Bay	8	2010	60
SDYC	1808	99	Sail	34	11		Unknown		Unknown	8	2013	
SDYC	1808	96	Sail	47	14	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	10	2011	67.6
SDYC	1809	100	Power	42	13.5	Copper						
SDYC	1810	99	Sail	37	11	Copper	Interlux Ultra	3669	Driscoll Mission Bay	3	2012	55
SDYC	1810	96	Power	40	14	Copper	Pettit Z-Spar Protector	B-94	Driscoll	10	2011	60

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1811	99	Power	31	9.5	Copper	Pettit Z-Spar Protector	B-94	Driscoll	12	2011	60
SDYC	1811	100	Sail	43	13	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	12	2010	67.6
SDYC	1812	97	Sail	40	12	Copper	Proline 1088-6	Y1088C-02	Nielsen Beaumont	3	2014	67.6
SDYC	1813	100	Sail	36	12	Copper	uknown by boatyard		Shelter Island Boatyard	8	2004	
SDYC	1814	100	Sail	33	9	Copper	Interlux Ultra	3669	Outside San Diego	5	2011	66.5
SDYC	1814	95	Power	60	16	Low Copper	Awlstar	BP532	Shelter Island Boatyard	4	2012	33.4
SDYC	1815	100	Power	34	10	Copper	Pettit Z-Spar Protector	B-91	Driscoll	7	2010	60
SDYC	1815	100	Sail	42	14	Copper	Interlux Ultra	3779	Shelter Island Boatyard	7	2012	55.0
SDYC	1816	98	Sail	30	8	Copper	Pettit Copper-Guard	1042	Driscoll	4	2012	45
SDYC	1817	99	Sail	32	7	Low Copper	Pettit Vivid-3	1261	Outside San Diego County	12	2011	25
SDYC	1817	100	Sail	30	11	Low Copper	Pettit Z-Spar Protector	B-94	Driscoll	6	2010	60
SDYC	1818	100	Power	33.6	10.3	Copper						
SDYC	1819	99	Electric	30	9	Copper	Interlux Ultra	3779	Shelter Island Boatyard	6	2012	55
SDYC	1820	100	Sail	32	8	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll	7	2012	35
SDYC	1820	100	Power	34	10	Low Copper	Pettit Z-Spar Protector	B-91	Driscoll	7	2010	67
SDYC	1820	100	Sail	31	10	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	7	2012	67.6
SDYC	1821	98	Sail	30	10	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	5	2013	67.6
SDYC	1822	98	Power	30.5	10.6	Copper						
SDYC	1823	100	Sail	34	10.6	Low Copper	Proline 1088 - 6	Y1088C-01	Koehler	7	2002	67.6
SDYC	1823	99	Sail	32	7	Low Copper	Interlux Aqua	YBA579	Koehler	5	2012	35
SDYC	1824	97	Power	34	13	Copper	Interlux Ultra	3779	Driscoll	12	2012	55.0
SDYC	1825	98	Power	32	11	Copper						
SDYC	1825	97	Power	40	12	Low Copper	Bluewater Copper Pro	8111	Shelter Island Boatyard	2	2009	67
SDYC	1826	86	Sail	30	11	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	12	2010	67.6
SDYC	1826	100	Sail	29	8	Copper			Other	4	2009	
SDYC	1827	99	Sail	30	11	Copper	uknown		Knight & Carver	6	2012	
SDYC	1828	99	Sail	36	12	Low Copper	Interlux Aqua	YBA579	Shelter Island Boatyard	2	2011	35
SDYC	1829	98	Sail	32	10	Copper	Interlux Bottomkote	52422	Shelter Island Boatyard			43
SDYC	1829	96	Sail	35	11	Copper	Interlux Ultra	3779	Shelter Island Boatyard	8	2012	55
SDYC	1830	99	Power	36	12	Low Copper	Interlux Ultra	3669	Shelter Island Boatyard	11	2009	55
SDYC	1830	98	Sail	34.5	11	Copper						
SDYC	1831	100	Sail	42	13	Unknown	Unknown	Unknown	Other	12	2012	
SDYC	1832	100	Sail	34	10	Copper						
SDYC	1832	97	Sail	42	13	Copper	Pettit Z-Spar Protector	B-94	Driscoll	8	2011	60
SDYC	1833	90	Power	40	13	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2011	67.6
SDYC	1834	99	Sail	42	14	Copper						
SDYC	1835	100	Sail	30	10	Low Copper	Interlux Ultra	3669	Knight & Carver	4	2010	55
SDYC	1835	100	Sail	40	13	Copper	Interlux Ultra	3779	Shelter Island Boatyard	6	2014	55
SDYC	1835	91	Power	40	12	Low Copper	Sharkskin-7	6145	Shelter Island Boatyard	2	2014	45
SDYC	1836	94	Power	32	11	Copper	Interlux Ultra	3779	Koehler	1	2013	55
SDYC	1837	97	Sail	40	14	Copper	Interlux Ultra	3669	Marine Group/ South Bay	11	2011	55
SDYC	1838	73	Sail	37	11	Copper	Interlux Ultra	3669	Shelter Island Boatyard	10	2012	55.0
SDYC	1839	100	Power	38	13	Copper	Coppercoat		Koehler	20	2012	85
SDYC	1840	92	Power	38	13		Unknown		Other	10	2011	
SDYC	1840	99	Sail	42	14	Copper			Driscoll			
SDYC	1841	95	Sail	35	12	Non Copper	no bottom paint - boat bath					0
SDYC	1842	98	Power	40	13	Copper						
SDYC	1843	98	Power	36	12	Copper	Pettit Z-Spar Protector	B-91	Driscoll			67
SDYC	1844	100	Power	44	15	Non Copper	Intersleek	FXA972/A	Shelter Island Boatyard	10	2011	0
SDYC	1845	99	Sail	41	6	Low Copper	Trinidad SR	1877	Driscoll	6	2010	70

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1845	100	Sail	28	6	Copper	Interlux Ultra	3669	Shelter Island Boatyard	6	2012	55
SDYC	1846	96	Power	22	7	Copper	Interlux VC Offshore	V116	Shelter Island Boatyard	3	2013	67
SDYC	1847	98	Power	28	8	Copper	Interlux Ultra	3669	Outside San Diego County	11	2012	55
SDYC	1848	88	Power	20	8	Copper			Other	6	2011	43.0
SDYC	1849	100	Power	22	7	Low Copper	Sharkskin-7	6145	Driscoll	7	2010	45
SDYC	1850	97	Sail	37	10	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	3	2013	67.6
SDYC	1850	99	Power	19	6	Low Copper	Pettit Vivid Free-3	1262	Marine Group Boat Works	7	2014	0.0
SDYC	1851	94	Power	22	8	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	2	2013	67.6
SDYC	1852	100	Power	18	8	Copper	Interlux Bottomkote	52422	Driscoll	6	2012	43
SDYC	1853	95	Power	24	7		Unknown		Marine Group/ South Bay	11	2012	
SDYC	1854	100	Power	29	9	Copper	Interlux Fiberglass Bottomkote Aqua	YBA579	Driscoll	2	2014	46.0
SDYC	1855	96	Sail	39	12	Copper	Interlux Ultra	3779	Koehler	5	2011	66.5
SDYC	1855	100	Sail	28	7	Copper	unknown					
SDYC	1856	97	Sail	28	10	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	6	2010	67.6
SDYC	1857	100	Sail	20	7	Low Copper	Trinidad VOC Blue or Green	1278	Other	3	2010	65.0
SDYC	1858	99	Power	25	8	Low Copper	Pettit Vivid-3	1861	Driscoll	1	2014	25
SDYC	1859	100	Power	26	8	Copper	Trinidad VOC Red	1678	Outside San Diego County	1	2013	75.8
SDYC	1860	95	Power	52	14	Copper	Pettit Z-Spar Protector	B-91	Driscoll	1	2013	60
SDYC	1860	100	Power	20	7	Low Copper	Proline 1088-6	Y1088C-02		6	2010	67.6
SDYC	1861	98	Power	28	8	Copper	Interlux Ultra	3669	Driscoll	4	2012	55
SDYC	1862	100	Sail	25	8	Copper	Pettit Copper-Guard	1042	Shelter Island Boatyard	7	2012	45.0
SDYC	1863	100	Sail	25	9	Low Copper	Trinidad-6	1275	Outside San Diego County	11	2006	70
SDYC	1864	100	Power	28	10	Low Copper	Interlux Bottomkote Pro	79	Knight & Carver	6	2009	22.0
SDYC	1865	99	Power	42	14	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	10	2014	67.6
SDYC	1865	100	Power	25	8	Non Copper	Bluewater Shelter Island	8202	Driscoll	6	2010	0
SDYC	1866	86	Sail	29	9	Low Copper	Interlux K91		Driscoll	6	2009	70.0
SDYC	1867	95	Sail	27	9	Low Copper	ABC 3-2	ABC3-92		4	2010	70.0
SDYC	1868	99	Sail	32	9	Low Copper	Trinidad - 6	1275	Marine Group Boat Works	10	2006	65
SDYC	1869	96	Sail	47	14	Copper	Pettit Z-Spar Protector	B-91		3	2012	60
SDYC	1870	99	Sail	38	13	Copper	Interlux Bottomkote	10421	Shelter Island Boatyard	11	2014	43
SDYC	1870	95	Power	20	6	Low Copper	Pettit Vivid-3	1861		5	2012	25
SDYC	1871	97	Power	30	9	Copper	Proline 1088-6	Y1088C-02	Driscoll	3	2013	67.6
SDYC	1872	99	Sail	28	9	Non Copper	Ceramkote	99M	Shelter Island Boatyard	2	2010	0
SDYC	1873	100	Sail	25	8	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll	1	2010	35
SDYC	1874	99	Power	34	17	Non Copper	Intersleek 900 White	FXA970/A	Shelter Island Boatyard	6	2013	0
SDYC	1875	95	Power	48	16	Low Copper	Interlux Ultra	3669	Other	10	2009	55.0
SDYC	1880	93	Sail	50	12	Copper						
SDYC	1885	100	Power	50	12	Copper	Interlux Ultra	3779	Koehler	4	2014	55
SDYC	1890	100	Power	38	14	Copper	Interlux Ultra	3779	Koehler	8	2011	55
SDYC	1895	92	Power	42	13	Copper	Proline 1088	Y1088C-01	Driscoll	4	2013	67
SDYC	1900	96	Power	48	15	Copper	Interlux Ultra	3779	Shelter Island Boatyard	4	2013	55
SDYC	1905	97	Power	50	16	Copper	Interlux Ultra	3779	Shelter Island Boatyard	7	2012	55
SDYC	1910	78	Sail	40	12	Low Copper	SeaHawk AF33	3345	Driscoll	12	2012	33
SDYC	1915	99	Sail	36	10	Copper	Interflux Calif Bottomkote-7	YBA143	Driscoll	1	2009	
SDYC	1920	99	Sail	45	14	Copper	Interlux Ultra	3669	Shelter Island Boatyard	3	2011	55
SDYC	1925	97	Sail	40	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	5	2011	67.6
SDYC	1930	93	Power	38	13	Non Copper	Ceramkote	99M	Shelter Island Boatyard	6	2009	0
SDYC	1935	88	Power	40	14	Low Copper	Micron66-2	YBA473	Koehler	6	2012	35
SDYC	1940	92	Sail	44	11	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	3	2013	67.6
SDYC	1945	81	Power	53	15	Low Copper	Interlux Calif Bottomkote-7	YBA143	Driscoll	4	2010	35

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SDYC	1950	99	Power	42	13	Low Copper	Micron Optima	YBA980	Shelter Island Boatyard	6	2010	28
SDYC	1951	92	Sail	36.0	12.0	Copper						
SDYC	1952	88	Sail	46	9	Low Copper	Prokote 67		Knight & Carver	6	2009	67
SDYC	1953	0				Non Copper	no boat assigned					
SDYC	1954	97	Power	40	14	Low Copper	Interlux Aqua	YBA579	Driscoll	6	2012	35
SDYC	1955	80	Sail	39	12	Copper	Pettit Z-Spar Protector	B-94	Driscoll	5	2013	60
SDYC	1956	84	Sail	45	13	Copper	Interlux Ultra	3669	Shelter Island Boatyard	5	2013	55
SDYC	1957	79	Sail	49	16	Copper	Interlux Ultra	3779	The Boatyard	10	2012	55
SDYC	1958	99	Power	36	13	Copper	Interlux Ultra	3779	Shelter Island Boatyard	5	2011	55
SDYC	1959	97	Sail	51	12	Copper						
SDYC	1960	94	Sail	51	14	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	4	2013	67.6
SDYC	1961	100	Sail	35	10	Copper	Pettit Z-Spar Protector	B-91	Driscoll	6	2012	67.0
SDYC	1962	98	Sail	47	14	Low Copper	SeaHawk AF33	3342	Shelter Island Boatyard	8	2011	33
SDYC	1963	92	Sail	42	13	Non Copper	Intersleek 900 White	FXA970/A	Shelter Island Boatyard	8	2013	0
SDYC	1964	99	Power	42	13	Copper	Pettit Z-Spar Protector	B-94	Driscoll SI	8	2012	60.0
SDYC	1965	98	Power	44	13	Non Copper	Bluewater Shelter Island	8202	Shelter Island Boatyard	4	2011	0
SDYC	1966	87	Sail	48	12	Low Copper	Pettit Vivid-3	1261	Shelter Island Boatyard	6	2011	25
SDYC	1967	100	Sail	46	13	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2010	67.6
SDYC	1968	99	Power	38	14	Copper	Interlux Ultra	3779	Nielsen Beaumont	8	2013	55
SDYC	1969	100	Sail	40	12	Low Copper	Interlux Calif Bottomkote-7	YBA140	Driscoll	7	2010	35.0
SDYC	1970	100	Sail	41	10	Low Copper	Interlux Ultra	3779	Koehler	2	2007	55
SDYC	1971	97	Sail	42	13	Low Copper	Pettit Vivid-3	1261	Driscoll	1	2011	25
SDYC	1972	100	Sail	38	12	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	5	2012	67.6
SDYC	1973	98	Sail	38	11	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	8	2013	67.6
SDYC	1974	79	Sail	41	11	Low Copper	Pettit Vivid Free-3	1862	Outside SD County	4	2012	25.0
SDYC	1975	96	Power	48	15	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	3	2011	67.6
SDYC	1976	96	Sail	42	24	Copper						
SDYC	1977	95	Power	90	21	Copper	Pettit Z-Spar Protector	B-94	Outside San Diego County	11	2011	60
SDYC	1978	98	Power	75	23	Low Copper	Interlux Interspeed	BRA641	Marine Group/ South Bay	6	2014	38
SDYC	1979	99	Power	75	21	Copper	Ultrakote-6	2669N	Driscoll	5	2012	67
SDYC	1980	84	Sail	79	16	Copper	Proline 1088-6	Y1088C-01	Driscoll	12	2012	67
SDYC	1981	90	Power	65	18	Copper	Pettit Copper-Guard	1042	Marine Group/ South Bay	11	2014	45
SDYC	1982	88	Sail	70	18	Copper						
SDYC	1983	84	Sail	65	16	Low Copper	Pettit Vivid-3	1261	Driscoll	1	2012	25
SDYC	1984	86	Sail	57	14.5	Copper	Proline 1088-6	Y1088C-01	Shelter Island Boatyard	11	2013	67
SDYC	1985	100	Power	63	18	Copper	Interlux Ultra	3779	Driscoll	1	2011	55
SDYC	1986	90	Power	60	17	Copper	Petit Ultima	1032	Outside San Diego County	7	2013	60
SDYC	1987	100	Power	53	15	Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2011	67.6
SDYC	1988	95	Sail	54	18	Low Copper	Trilux33-3	YBA068	Driscoll Mission Bay	11	2011	16.95
SDYC	1989	99	Power	42	13	Copper	Interlux Ultra	3779	Other	5	2014	55
SDYC	1990	99	Sail	57	16	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	7	2009	67
SDYC	1991	100	Sail	35	13	Low Copper	Proline 1088-6	Y1088C-02	Shelter Island Boatyard	6	2010	67.6
SDYC	1992	90	Power	38	10	Non Copper	No Bottom Paint - hydro hoist					
SDYC	1993	98	Sail	40	12	Copper	Interlux VC Offshore	V116	Shelter Island Boatyard			67
SDYC	1994	99	Sail	35	11	Low Copper	Trilux33-3	YBA068	Driscoll	11	2009	16.95
SDYC	1995	100	Sail	36	12	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	3	2009	55
SDYC	1996	81	Sail	41	12	Copper	Interlux Bottomkote	10421	Outside San Diego County	6	2012	43
SDYC	1997	100	Power	33	11	Copper	Proline 1088-6	Y1088C-02	Other	1	2014	67.6
SDYC	1998	100	Sail	36	10	Low Copper	Interlux Ultra	3779	Shelter Island Boatyard	7	2011	55
SDYC	1999	98	Power	36	10	Low Copper	Interlux Bottomkote Pro	69	Driscoll	10	2011	22

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SGYC	2757	100	sail	32	9'6"	low			3/1/2007purchase		2007	
SGYC	2760	100	sail	32	10'6"	low			10/1/2007 purchase		2007	
SGYC	2763	99	sail	32	9'1"	non	slip liner		7/1/2006			0
SGYC	2766	99	power	28	11	low	Interlux	3779	shelter island boatyard	11	2011	55
SGYC	2769	95	sail /trailer	30.2	7	non	none	none	none	none	none	none
SGYC	2772											
SGYC	2775	100	power	24	8	low			self	3	2011	
SGYC	2778											
SGYC	2781											
SGYC	2784	100	sail	30'2"	6'5"	non	No Paint					0
SGYC	2787	100	sail	30	9				3/1/2012 purchase		2012	
SGYC	2790	99	sail	27					shelter island boatyard	6	2013	67
SGYC	2793	75	power	28	9'6"	copper	Proline	Y1088c-02	shelter island boatyard	8	2014	67
SGYC	2796	100	power	37	12	low			shelter island boatyard	4	2011	
SGYC	2799	100	sail	30	10	copper	Interlux Ultra	3669f	shelter island boatyard	1	2013	55
SGYC	2802	85	sail	33	11	copper	interlux	3669	shelter island boatyard	11	2013	55
SGYC	2805	98	sail	29'11"	10'10"	non	Ceramkote 99	99m	shelter island boatyard	11	2008	0
SGYC	2808	80	sail	28	8	non	Ceramkote 99		shelter island boatyard	7	2013	0
SGYC	2811	100	sail	29'11"	10'10"	copper			shelter island boatyard	4	2012	
SGYC	2814	100	sail	28	7	low	Interlux		shelter island boatyard	10	2011	
SGYC	2817											
SGYC	2820	92	sail	33	9'2"	low	Proline	Y1088c-01	shelter island boatyard	6	2011	67
SGYC	2823	100	sail	30	10'10"	low			shelter island boatyard	10	2009	
SGYC	2826	100	sail	32	11'6"	low	Interlux Ultra	3449	shelter island boatyard	9	2011	
SGYC	2829	90	sail	30	10'10"	non	intersleek 900	900	shelter island boatyard	5	2011	0
SGYC	2832	97	sail	26	8	low	Interlux Micron Extra	5790	Knight & Carver Maritime	7	2011	35
SGYC	2835	100	sail	35	9	copper			shelter island boatyard	3	2012	
SGYC	2000	100	sail	30		low			shelter island boatyard	1	2011	
SGYC	2002	90	sail	36	12	low			shelter island boatyard	3	2009	
SGYC	2004	98	sail	32	11'9"	low	Interlux Micron	yba470	Driscoll	1	2010	35
SGYC	2006											
SGYC	2008	100	sail	29'11"	10'6"	copper			shelter island boatyard	8	2012	
SGYC	2010	100	power	35	12'9"	copper	Interlux	3779	shelter island boatyard	7	2014	55
SGYC	2012	95	sail	32	11'9"	low			2/1/2009 purchase		2009	
SGYC	2014	99	sail	30	10	low			shelter island boatyard	8	2010	
SGYC	2016	99	sail	31	10'6"	low	West Marine Bottom Shield	MSDS 411182200	Kettenburg Shelter Island	7	2014	28
SGYC	2018	80	sail	36'3"	11'9"	non	intersleek 900	fxa972-a	shelter island boatyard	2	2013	0
SGYC	2020	90	sail	30	10'6"	non	intersleek 900	fxa972-a	shelter island boatyard	1	2014	0
SGYC	2022	98	sail	36'3"	11'9"	low	Interlux Micron	yba470	Koehler	10	2011	35
SGYC	2024	95	sail	26'6"	9'3"	copper			Driscoll	7	2012	
SGYC	2026	98	sail	34	11'9"				shelter island boatyard	2	2012	
SGYC	2028	100	sail	32	11	copper	interlux	3669f	shelter island boatyard	2	2014	55
SGYC	2030	90	sail	38	12	low	interlux		shelter island boatyard	7	2010	
SGYC	2032	100	sail	33	8.6	non	slip liner	none	none	none	none	
SGYC	2034	100	sail	35	12'6"	copper	Pettit Protector	B-91	Driscoll	8	2013	60
SGYC	2036	100	sail	30	11	copper	interlux	3669f	shelter island boatyard	7	2014	55
SGYC	2038	100	power	31.9	11.1				Cutty Sark Marina Yard	4	2000	
SGYC	2040	99	sail	33	12'6"	copper	interlux	3779f	shelter island boatyard	4	2014	55
SGYC	2042	95	sail	30	10	low	interlux		shelter island boatyard	5	2006	
SGYC	2044	100	sail	38	12'9"	copper	Proline	y1088c-02	shelter island boatyard	11	2013	

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SGYC	2046	95	sail	27	8'10"	copper	interlux	3669	shelter island boatyard	6	2014	55
SGYC	2048	90	sail	40	10'8'	low			shelter island boatyard	2	2010	
SGYC	2050	100	sail				Proline	y1088c-02	shelter island boatyard	6	2010	
SGYC	2052	100	sail	34	10.8				10/1/2014, purchase		2014	
SGYC	2054	98	sail	30'	10	copper	Interlux		shelter island boatyard	6	2012	55
SGYC	2056											
SGYC	2058	100	sail	26	8	low	Pettit Trinidad	1086	self	1	2010	60
SGYC	2060	80	sail	36	12'2"	copper	interlux	3669	shelter island boatyard	2	2013	55
SGYC	2062	100	sail	25	7.2				shelter island boatyard	6	2009	
SGYC	2064	99	sail	36	12	copper	Pettit Trinidad	1082	shelter island boatyard	11	2012	60
SGYC	2066	100	sail	32	10				Driscoll	4	2012	67
SGYC	2068	100	sail	34	10	low			shelter island Boatyard	2	2002	
SGYC	2070	80	power	28	9	non	slip liner					0
SGYC	2072	100	sail	35	10	low			11/1/2009	11	2009	
SGYC	2074	100	sail	32	11				Explorer Marine Services	2	2014	67
SGYC	2076	100	sail	34	11	copper	interlux	3669	Nielson-Beaumont	4	2013	55
SGYC	2078											
SGYC	2080	95	sail	37	12	copper			Driscoll	8	2012	
SGYC	2082	100	power	40	12.2	low			self	11	2010	
SGYC	2084	100	sail	42	14'3"	copper	interlux	3669	shelter island boatyard	5	2014	55
SGYC	2086	90	power	42	13'6"	low			shelter island boatyard	1	2011	
SGYC	2088											
SGYC	2090	100	power	43	15	low			Driscoll	6	2006	
SGYC	2092	80	sail	40	10	low	Interlux Ultra		Koehler	2	2009	55
SGYC	2094	100	sail	42	13'10"	copper	Interlux Ultra			11	2013	55
SGYC	2096	60	sail	46	14	copper	Proline	y1088c-01	shelter island boatyard	11	2012	67
SGYC	2098	100	power	42	12.1				1/12013 purchase		2013	
SGYC	2100	99	sail	43	12	low			shelter island boatyard	2	2008	
SGYC	2450	98	sail	38	12	low	Proline		shelter island boatyard	1	2010	35
SGYC	2455	100	sail	35	11'6"	low	interlux		shelter island boatyard	10	2009	35
SGYC	2460	100	sail	42	13	copper	Pettit Protector	B-91	Driscoll	9	2013	60
SGYC	2465	30	sail	41	11	low	Interlux	yba142	Driscoll	5	2011	35
SGYC	2470	80	sail	41	13	low			shelter island boatyard	8	2012	
SGYC	2475	100	sail	38	12	copper			shelter island boatyard	1	2012	
SGYC	2480											
SGYC	2485	90	sail	42	11	low	Proline	y1088c-02	shelter island boatyard	6	2008	67
SGYC	2490	100	power	43	14	low	Proline	y1088c-02	shelter island boatyard	11	2011	35
SGYC	2495					non	vacant					0
SGYC	2500	97	sail	36	12'6"	copper	Interlux Ultra	3669	shelter island boatyard	4	2014	55
SGYC	2505	90	sail	42	13'10"		copper		6/1/2014 purchase		2014	
SGYC	2510	100	power	39	13'6"	low			shelter island boatyard	4	2010	
SGYC	2515	85	sail	33'6"	10	low	Proline	y1088c-07	shelter island boatyard	1	2011	67
SGYC	2520	90	sail	37	10	copper	Pettit Trinidad		Koehler	11	2013	60
SGYC	2525											
SGYC	2530	99	sail	42	13'6"	copper	Interlux Micron 66	5696	shelter island boatyard	2	2014	35
SGYC	2535		sail	43	12'2"		Interlux					
SGYC	2540	85	sail	44	13'6"	copper			Driscoll	11	2013	52
SGYC	2545	100	sail	34	14	low	Interlux Ultra		Koehler Kraft Boat Yard	4	2010	
SGYC	2550	90	sail	40	12	low			Knight & Carver Maritime	6	2011	
SGYC	2555	98	sail	34	12'6"	non	No Paint					0

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SGYC	2560	100	sail	37'	12'	copper	Proline	y1088c-03	Knight & Carver Maritime	8	2012	67
SGYC	2565	100	sail	38	6	low			shelter island boatyard	5	2009	
SGYC	2570	100	sail	36	11'9"	copper	interlux	3669	Koehler	7	2014	55
SGYC	2575	100	power	30	10	non	slip liner					0
SGYC	2580											
SGYC	2585	95	sail	34	11	low			shelter island boatyard	5	2010	35
SGYC	2590	100	power	30'	12'	copper	interlux	3779f	shelter island boatyard	4	2013	55
SGYC	2595	90	sail	34	11	copper	interlux	3669	shelter island boatyard	5	2014	55
SGYC	2600	100	sail	35'6"	10'10"	low	Pettit Trinidad		shelter island boatyard	1	2009	60
SGYC	2605	100	power	36	12'4"	low			shelter island boatyard	9	2010	
SGYC	2610	90	power	37'9"	12'2"							
SGYC	2615	100	sail	43	12'6"	low	proline	y1088c	shelter island boatyard	4	2010	35
SGYC	2620	50	sail	39'9"	13'8"	copper	Pettit Z-Spar	B-94	shelter island boatyard	10	2014	60
SGYC	2625	90	power	42'6"	13'6"	copper	Interlux Ultra	Int-3449	shelter island boatyard	6	2012	55
SGYC	2630	100	sail	43	13	low	Proline	y1088c-02	shelter island boatyard	1	2011	67
SGYC	2635	85	sail	40'	13'5"	copper	Proline	y1088c-01	shelter island boatyard	6	2013	67
SGYC	2640	99	sail	47	14'8"	low			Driscoll	6	2011	
SGYC	2645	100	sail	40'	12'6"	copper	Interlux Micron CSC	int-5583q	shelter island boatyard	12	2012	35
SGYC	2650	98	power	48	15'6"	low			12/8/2008 purchase		2008	
SGYC	2655	100	sail	36	11'5"	low			Koehler	6	2011	
SGYC	2660	80	sail	49	13	low	Interlux		Shelter Island Boatyard	10	2008	
SGYC	2665											
SGYC	2670	97	power	50'3"	15"7"	copper	interlux	3779	Nielson-Beaumont	1	2013	55
SGYC	2675	100	power	47'6"	14'9"	copper	interlux	y3779f	Nielson-Beaumont	7	2014	55
SGYC	2680	100	sail	41	11'9"	low	San Carlos Boat Yard, MX		San Carlos Boat Yard, MX	4	2004	
SGYC	2685	85	power	39	18	copper	Proline	y1088c-02	shelter island boatyard	10	2012	67
SGYC	2690	100	sail	43	12	low	Pettit Trinidad	1082	Knight & Carver Maritime	9	2004	60
SGYC	2695	85	sail	36	12'7"	copper	Proline	y1088c-02	shelter island boatyard	4	2012	67
SGYC	2700	100	power	50	16					9	2013	
SGYC	2705											
SGYC	2710	75	power	42	15	copper	interlux	3779g	shelter island boatyard	1	2013	55
SGYC	2715	100	sail	40	12'8"	low	interlux	3559	shelter island boatyard	6	2010	
SGYC	2720	98	power	42	14	copper	Proline	y1088c-01	Nielson-Beaumont	8	2013	67
SGYC	2725	100	power	31	12	low			shelter island boatyard	4	2011	
SGYC	2730	100	power	39		copper			Knight & Carver Maritime	8	2012	
SGYC	2735	99	sail	37	11'6"	copper	interlux	3669f	shelter island boatyard	8	2012	55
SGYC	2740	100	power	42	15	low			shelter island boatyard	6	2011	
SGYC	2745	95	sail	39	12'8"	low			shelter island boatyard	3	2011	
SGYC	2750	80	sail	41'10"	13'10"	copper	Pettit		shelter island boatyard	5	2012	
SGYC	2755	100	poer	41	13		Interlux Ultra	3669	shelter island boatyard	3	2011	
SGYC	2760	95	power	46	15				Shelter Island Boatyard	3	2012	
SGYC	2765	100	sail	33	10.6		Proline 1088	y1088c-01	Shelter Island Boatyard	4	2006	
SGYC	2770	85	sail	57	14'6"	copper	Pettit		shelter island boatyard	1	2013	
SGYC	2775											
SGYC	2780	100	sail	37	10'10"	low	Proline	y1088c-02	shelter island boatyard	6	2011	
SWYC	3827	92	S	50	12	Low	Pettit red		SI	8	2003	
SWYC	3832	100	S	47	15	Cu	Trinidad Pro Black	1088	SI	10	2013	70
SWYC	3837	96	S	44	13	Cu	Seahawk Tropickote black	2145	Baja Naval	11	2013	76
SWYC	3842	96	S	45	12	Cu	Interlux Ultra blue	3669	SI	2	2014	55
SWYC	3847	82	S	46	14	Cu	Interlux Ultra Blue	3669	SI	10	2014	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3852	93	P	44	14	Low			SI	2	2011	70
SWYC	3857	100	S	49	9	Cu						
SWYC	3862	100	S	46	13	Cu	Trinidad SR blue	1277	Dr	8	2014	60
SWYC	3867	100	S	47	13	Cu				9	2009	
SWYC	3872	100	P	48	13	Low	Interlux Ultra	3669	KK	4	2010	55
SWYC	3877	98	P	42	14	Low	Bluewater 67 Hard blue	8111	SI	10	2009	67
SWYC	3882	100	P	47	16	Low			SI	6	2011	
SWYC	3887	100	S	42	13	Low	Pro-Line 1088	Y1088C	SI	4	2006	67
SWYC	3892	86	P	44	15	Low			Dr	8	2011	
SWYC	3897	92	P	44	15	Cu	Pro-Line 1088 blue	Y1088C	SI	4	2013	67
SWYC	3902	100	P	45	14	Cu	Pro-Line 1088	Y1088C		5	2009	67
SWYC	3907	96	P	42	15	Cu	Interlux Ultra red	3449	SI	3	2013	55
SWYC	3912	100	S	47	13	Cu						
SWYC	3917	90	S	50	12	Cu	Z-Spar Protector	B-91	Dr	3	2014	60
SWYC	3922	100	P	42	14	Low	Interlux Ultra Blue	3669	SI	2	2010	55
SWYC	3927	100	P	30	10	Cu	Z-Spar Protector	B-91	Dr	2	2013	60
SWYC	3932	92	S	32	10	Cu	Interlux Ultra blue	3669	SI	6	2012	55
SWYC	3937	100	S	35	10	Cu						
SWYC	3942	100	S	33	7	Low	Interlux Trilux	YBA060	KK	6	2011	17
SWYC	3947	98	S	29	10	Cu	Z-Spar Protector Blue	B-91	Dr	8	2014	60
SWYC	3302	100	S	30	11	Cu						
SWYC	3305	98	P	32	11	Cu	Interlux Ultra 3449 red	3449	SI	6	2014	55
SWYC	3308	95	S	33	11	Cu	Interlux Ultra Blue	3669	SI	7	2014	55
SWYC	3311	92	S	33	11	Low	Interlux Epoxycop blue	K51	SI	10	2011	42
SWYC	3314	100	S	28	10	Cu			SI		2012	
SWYC	3317	100	S	32	8	Cu	Interlux Ultra	3669	SI	10	2013	55
SWYC	3320	100	S	26	7	Cu						
SWYC	3323	100	S	30	11	Cu			Apr-14			
SWYC	3326	96	S	28	9	Cu	Pettit Trinidad blue	1275	SI	6	2013	70
SWYC	3329	96	S	30	10	Cu	Interlux Ultra		SI	6	2012	55
SWYC	3332	100	S	33	10	Cu						
SWYC	3335	100	S	30	11	Cu						
SWYC	3338	100	S	27		Cu						
SWYC	3341	100	P	30	9	Cu						
SWYC	3344	100	P	29	11	Cu			Dr	8	2104	
SWYC	3347	94	S	30	10	Cu	Interlux Ultra Blue	3669F	SI	10	2014	55
SWYC	3350	100	P	27	11	Cu						
SWYC	3353	100	S	28	8	Cu			Dana Pt	8	2013	
SWYC	3356	96	P	24	8	Cu	Interlux Ultra	3669	SI	2	2014	55
SWYC	3359	100	S	35	11	Cu				5	2011	
SWYC	3362	95	S	32	10	Low	Pro-Line 1088	Y1088C	Dr	3	2010	67
SWYC	3365	100	S	33	9	Cu			SI	10	2012	
SWYC	3368	98	S	30	11	Cu	Interlux Ultra Blue	3669	SI	9	2014	55
SWYC	3371	100	S	36	12	Cu						
SWYC	3374	100	S	30	10	Low	Pettit		Dr	5	2008	
SWYC	3377	100	S	27	10	Cu				8	2012	
SWYC	3380	100	P	24	8	Low			SI	3	2011	
SWYC	3383	100	S	30		Cu						
SWYC	3386	100	S	30		Cu						
SWYC	3389	96	S	29	10	low	Pettit Vivid White	1161	SI	6	2013	25

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3392	100	P	35	10	Low	Interlux Ultra	3669	SI	11	2010	55
SWYC	3395	0	vacant			Non						0
SWYC	3398	94	P	30	11	Cu	Interlux Ultra Blue	3669	SI	1	2014	55
SWYC	3401	100	S	30	11	Cu						
SWYC	3952	100	S	28	9	Low	Interlux Ultra Red	3449	SI	6	2011	55
SWYC	3953	92	P	44	15	Cu	Proline 1088 blue	Y1088C	SI	4	2014	55
SWYC	3954	100	P	22	8	Cu			SI	11	2012	
SWYC	3955	98	P	27	8	Cu	Z-Spar Protector black	B-94	Dr	6	2014	60
SWYC	3956	96	S	30	11	non	Intersleek 900 White	FXA970/A	SI	2	2013	0
SWYC	3957	96	P	26	8	Cu	Proline 1088 black	Y1088C	self	7	2013	67
SWYC	3958	96	S	31	11	Cu	Interlux Ultra black	3779	SI	9	2014	55
SWYC	3959	100	P	34	11	Cu	Interlux Ultra Blue	3669		3	2012	55
SWYC	3960	100	S	32	9	Cu	Interlux Ultra	3669		4	2012	55
SWYC	3961	100	S	30	9	Cu	Interlux Ultra black	3779	SI	1	2014	55
SWYC	3962	96	S	31	11	Low	Z-Spar The Protector	B-91	Dr	6	2010	60
SWYC	3963	100	S	30	11	Cu				9	2012	
SWYC	3964	100	S	39	7	Low	Interlux Ultra Green	3559	KK	1	2011	55
SWYC	3965	100	S	32	11	Low	Trinidad SR black	1877	Dana Pt	5	2011	60
SWYC	3966	100	S	31	10	Cu						
SWYC	3967	98	S	34	11	Cu					1996	
SWYC	3968	100	S	30		Cu						
SWYC	3969	96	S	34	12	Low	Interlux Ultra Black	3779	Dr	7	2010	55
SWYC	3970	100	S	34	11	Low	Interlux Ultra Black	3779	SI	3	2011	55
SWYC	3971	100	S	32	7	Low	Interlux Ca Bottomkote	YBA143	Dr	2	2010	35
SWYC	3972	100	S	30	10	non	Intersleek 900 blue	FXA972/A	KC	1	2011	0
SWYC	3973	100	P	30		Cu						
SWYC	3974	100	S	30	10	Cu	Interlux Ultra blue	3669F	SI	6	2014	55
SWYC	3975	100	S	33	11	non	Interlux Pacifica	YBA160	SI	10	2010	0
SWYC	3976	90	P	32	10	Low			SI	11	2010	
SWYC	3977	100	P	32		Cu						
SWYC	3978	100	P	31	10	Cu				1	2011	
SWYC	3979	0	vacant			Non						0
SWYC	3980	100	P	29	9	Low	Interlux ACT	Y6690B		5	2013	29
SWYC	3981	100	P	26	9	Cu						
SWYC	3982	100	S	27	9	Low	Interlux Ultra Blue	3669	SI	2	2010	55
SWYC	3983	0	vacant			Non						0
SWYC	3984	100	S	31	12	Non	Interlux Interspeed 5640	BZA646	SI	2	2013	0
SWYC	3985	100	P	26	9	Cu			SI	9	2012	
SWYC	3986	100	P	24	9	Cu				3	2011	
SWYC	3987	100	P	32	11	Cu	Interlux Ultra red	3449	self	11	2013	55
SWYC	3988	0	vacant			Non						0
SWYC	3989	92	P	40	14	Cu	Interlux Ultra Blue	3669	SI	6	2012	55
SWYC	3990	90	S	42	12	Cu	Interlux Ultra Blue	3669	SI	1	2013	55
SWYC	3991	100	P	37	12	Low			SI	6	2006	
SWYC	3992	86	P	41	13	Cu	Interlux Ultra Blue	3669	SI	6	2014	55
SWYC	3993	100	S	39	13	Low	Interlux Ultra Blue	3669	SI	9	2010	55
SWYC	3994	100	S	42	13	Low			Dr	5	2006	
SWYC	3995	100	P	44	14	Cu						
SWYC	3996	98	P	38	14	Low	Interlux Bottom Kote Blue	10421	SI	8	2011	43
SWYC	3997	100	P	38	14	Cu	Pro-Line 1088	Y1088C		9	2012	67

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3998	100	P	43	14	Cu						
SWYC	3999	100	P	39	12	Cu	Pettit green		Dr			
SWYC	4000	100	P	39	12	low	Micron Extra VOC	5790		6	2013	35
SWYC	4001	94	S	38	11	Cu	Interlux Ultra Blue	3669	KK	10	2014	55
SWYC	3003	84	S	40	12	Cu	Ultra-Kote	2669N	SI	8	2010	67
SWYC	3005	100	S	42	14	Cu	Pro-line blue		The Boat Yard	4	2012	
SWYC	3007	90	S	35	8	Cu			KK	11	2009	
SWYC	3009	84	S	39	13	Low	Interlux Ultra black	3779	Dr	5	2009	55
SWYC	3011	100	P	38		Cu						
SWYC	3013	100	S	42	15	Cu	Interlux Ultra Blue	3669	SI	7	2013	55
SWYC	3015	92	S	30	13	Low	Pettit		Dr	4	2011	
SWYC	3017	92	S	37	12	Cu	Pro-Line 1088	Y1088C	SI	6	2012	67
SWYC	3019	90	S	28	10	Cu	Interlux Ultra Blue	3669	SI	6	2014	55
SWYC	3021	100	P	30	10	Low	Proline 1088 black	Y1088C	SI	12	2011	67
SWYC	3023	94	P	38	13	non	CeRam-Kote	99M	SI	5	2011	0
SWYC	3025	100	P	37	13	Cu			SI	6	2013	
SWYC	3027	100	P	38	13	Cu			SI			
SWYC	3029	98	P	42	13	Cu	Interlux Ultra blue	3669	SI	5	2014	55
SWYC	3031	100	P	36	12	Cu	Pro-line 1088C black	1088C	KK	3	2014	67
SWYC	3033	100	P	38	13	Cu						
SWYC	3035	88	P	36	13	Low	Pro-Line 1088	Y1088C	SI	11	2011	67
SWYC	3037	88	P	35	13	Cu	Interlux Ultra black	3779	SI	4	2014	55
SWYC	3039	100	P	40	13	Cu	Interlux Ultra Kote Blue	2669N		1	2012	67
SWYC	3041	100	S	42	13	Cu	Interlux Ultra black	3779	SI	7	2014	55
SWYC	3043	100	P	35	13	Cu	Interlux Ultra Blue	3669	SI	6	2012	55
SWYC	3045	100	S	42	13	Cu						
SWYC	3047	90	P	39	13	Cu	Interlux Ultra black	3779	SI	1	2013	55
SWYC	3049	100	P	47	14	low	Interlux Micron 66 black	YBA473	SI	12	2013	35
SWYC	3051	92	S	49	14	Cu	Pro-line 1088	Y1088C	SI	1	2013	67
SWYC	3053	100	S	56	16	Low	Pettit Vivid Red	1661	SI	3	2011	25
SWYC	3055	84	S	46	13	Cu	Pro-Line 1088 black	Y1088C	SI	6	2012	67
SWYC	3057	94	S	47	14	Cu	Pro-Line 1088 black	Y1088C-02	SI	2	2013	67
SWYC	3059	96	S	45	15	Low	Pro-Line 1088 blue	Y1088C	SI	8	2011	67
SWYC	3061	100	P	48	14	non	Intersleek 900 White	FXA970/A	SI	5	2013	0
SWYC	3063	100	S	51		Cu						
SWYC	3065	100	P	49	15	non	Interlux Pacifica	YBA160		12	2010	0
SWYC	3067	96	S	37	12	non	Intersleek 900 blue	FXA972/A	SI	3	2013	0
SWYC	3069	92	P	38	13	non	Intersleek 900 black	FXA979/A	SI	4	2013	0
SWYC	3071	100	P	33	10	Cu						
SWYC	3073	100	S	40	13	Cu	Interlux Ultra black	3779	SI	12	2012	55
SWYC	3075	100	P	37	11	Low	Interlux Ultra Blue	3669	SI	5	2011	55
SWYC	3077	92	S	34	11	Cu	Interlux		SI	12	2013	
SWYC	3079	100	S	34	11	Low			Dr	12	2010	
SWYC	3081	93	S	32	11	Cu	Z-Spar Protector black	B-94	SI	4	2012	60
SWYC	3083	100	S	34		Cu						
SWYC	3085	100	S	34	11	Cu					2010	
SWYC	3087	100	S	31	10	Cu						
SWYC	3089	90	P	33	10	Low	Pettit Trinidad SR blue	1277	SI	1	2011	60
SWYC	3091	98	S	40	13	Cu	Interlux Ultra black	3779	SI	4	2012	55
SWYC	3093	92	P	34	12	Cu	Z-Spar Protector black	B-94	Dr	12	2013	60

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3095	98	S	32	10	Cu						
SWYC	3097	95	S	34	12	Cu	Z-Spar Bottom Pro Gold Red	41167706	Dr	10	2014	60
SWYC	3099	100	S	40	12	Cu						
SWYC	3101	96	P	38	12	Cu	Interlux Ultra Blue	3669	SI	12	2013	55
SWYC	3103	90	S	29	10	Low	Interlux Ultra Blue	3669	SI	5	2010	55
SWYC	3105	94	P	30	8	Cu	Interlux Ultra black	3779	Basin Marine	1	2012	55
SWYC	3107	100	S	32	11	Cu						
SWYC	3109	100	S	35	9	low	Seahawk AF33 red	3341	KC	2	2012	33
SWYC	3111	97	S	32	12	Low			Dr	6	2011	
SWYC	3113	100	S	35	11	Cu	Interlux black		SI	4	2014	
SWYC	3115	92	P	33	13	Low	Interlux Ultra Black	3779	SI	10	2011	55
SWYC	3117	93	S	37	12	Low			Dr	2	2011	
SWYC	3119	100	P	40	13	Low	Pro-Line 1088	Y1088C	SI	12	2011	67
SWYC	3121	100	S	37	13	Cu	Pro-line 1088 black	Y1088C		8	2013	67
SWYC	3123	96	S	32	12	Cu	Z-Spar Protector	B-91	Dr	10	2013	60
SWYC	3125	100	P	36		Cu						
SWYC	3127	96	P	38	14	Low	Interlux Super KL Blue	K91BG	Anacapa	1	2007	70
SWYC	3129	100	S	35	11	Cu	Interlux Ultra Blue	3669	KK	3	2014	55
SWYC	3131	100	S	37	14	Cu						
SWYC	3133	100	S	37	11	Low	Pro-Line 1088	Y1088C		5	2010	67
SWYC	3135	92	S	39	12	Cu					2013	
SWYC	3137	100	S	36	12	Low	Z-Spar Protector	B-91	Dr	6	2011	60
SWYC	3139	100	S	32	10	low	Pettit Vivid White	1161	SI	2	2014	25
SWYC	3141	100	P	32	11	Cu			SI		2009	
SWYC	3143	100	P	32	11	Low			SI	2	2008	
SWYC	3145	96	S	39	12	Cu	Interlux Ultra blue	3669	Dr	4	2013	55
SWYC	3147	100	S	41		Cu						
SWYC	3149	96	P	28	10	non	Interlux Pacifica black	YBA163	SI	7	2008	0
SWYC	3151	95	S	35	11	Low	Interlux Super KL Blue	K91BG	Dr	4	2009	70
SWYC	3153	100	S	34	11	Cu	Pettit Trinidad Pro blue	1082	SI	3	2013	70
SWYC	3155	100	S	38	13	Cu			SI	1	2012	
SWYC	3157	100	S	33	9	Cu	Pro-Line 1088	Y1088C		2	2008	67
SWYC	3159	98	S	32	10	Low	Z-Spar Protector black	B-94	Dr	6	2011	60
SWYC	3161	100	P	42	15	Cu				4	2012	
SWYC	3163	100	S	42		Cu						
SWYC	3165	95	S	41	13	Low	Z-Spar Protector blue	B-91	Grand Marina	2	2010	60
SWYC	3167	100	S	41	13	Low	Pro-Line 1088	Y1088C	Seaview, Seattle	5	2009	67
SWYC	3169	100	P	44	13	Cu	Interlux Ultra Black	3779	SI	8	2012	55
SWYC	3171	100	P	36	11	Cu	Interlux Ultra Blue	3669		10	2012	55
SWYC	3173	100	P	40	13	Cu	Pettit blue		KK	10	2012	
SWYC	3175	100	S	41	9	Cu			SI	3	2013	
SWYC	3177	92	S	37	12	Cu	Z-Spar Protector black	B-94	Dr	6	2013	60
SWYC	3179	92	P	37	12	Cu	Interlux Ultra black	3779	SI	2	2014	55
SWYC	3181	100	S	42	13	Cu				11	2006	
SWYC	3183	94	P	39	13	Cu	Pro-line 1088 blue	Y1088C	self	4	2014	67
SWYC	3185	100	S	40	24	non	Sherman Williams SeaVoyage	N51B301	MG	5	2013	0
SWYC	3187	96	S	45	14	Low			SI	8	2011	
SWYC	3189	100	S	48	14	Cu						
SWYC	3191	100	S	46	13	Cu						
SWYC	3193	100	S	47	16	Cu	Interlux Ultra Blue	3669	SI	11	2012	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3195	96	S	48	16	Cu	Interlux Ultra black	3779	SI	6	2014	55
SWYC	3197	90	P	48	16	Low			Dr	10	2010	
SWYC	3199	100	P	43	13	Cu	Pro-line		SI	5	2012	
SWYC	3201	100	S	46	12	Low	Interlux Micron Extra	5690	SI	11	2001	35
SWYC	3262	100	P	48	15	Cu	Interlux Ultra Black	3779		11	2012	55
SWYC	3263	96	P	45	15	Cu	Pro-line 1088 Blue	Y1088C	SI	6	2013	67
SWYC	3264	100	P	58	20	Low	Pro-Line 1088	Y1088C	KC	2	2008	67
SWYC	3265	100	S	51	15	Cu	Interlux Ultra Blue	3669		6	2011	55
SWYC	3266	100	P	49	15	Low	Pro-Line 1088	Y1088C	SI	4	2004	67
SWYC	3267	100	P	50	14	Cu	Z-Spar Protector	B-91		3	2011	60
SWYC	3268	100	S	50	13	Cu						
SWYC	3269	100	P	55	17	Low	Pettit Trinidad Anti-fouling	1275	SI	5	2010	70
SWYC	3270	80	P	52	16	Cu	Pro-Line 1088 Black	Y1088C	SI	4	2012	67
SWYC	3271	90	S	54	17	Low	Interlux Ultra Blue	3669	SI	8	2011	55
SWYC	3272	100	P	50	15	Cu	Z-Spar Protector	B-91	Dr	3	2013	60
SWYC	3273	100	P	63	15	Cu	Seahawk black		Dr	6	2013	
SWYC	3274	88	P	51	17	Cu	Pro-Line 1088 black	Y1088C	KC	11	2012	67
SWYC	3275	100	S	61	13	Cu	Interlux Ultra blue	3669	KK	12	2013	55
SWYC	3276	100	S	52		Cu						
SWYC	3152	100	P	64	15	Cu	Z-Spar Protector	B-91		8	2011	60
SWYC	3153	92	P	55	14	Low	Interlux Ultra black	3779	KK	3	2011	55
SWYC	3154	100	P	58	16	Cu	Z-Spar Bottom Pro Gold	41127706	SI	2	2013	60
SWYC	3155	100	S	54		Cu						
SWYC	3156	80	P	36	13	Low	Interlux Ultra Blue	3669	KC	12	2011	55
SWYC	3157	100	P	36	14	Cu			Dr	6	2014	
SWYC	3158	96	S	36	11	Cu	Pettit Unepoxy jade green	1328	SI	5	2012	53
SWYC	3159	92	S	34	12	Cu	Z-Spar Protector	B-91	NB	10	2013	60
SWYC	3160	100	P	40	13	Cu						
SWYC	3161	100	S	29	10	Cu	Interlux Ultra Blue	3669		2	2011	55
SWYC	3162	90	S	37	11	Cu	Pettit Trinidad black	1875	Cummings Marine	7	2014	70
SWYC	3163	100	S	35	11	Cu						
SWYC	3164	100	S	38	13	Low	Pro-Line 1088	Y1088C	SI	4	2010	67
SWYC	3165	94	S	37	12	Low	Pro-Line 1088	Y1088C	SI	5	2010	67
SWYC	3166	100	S	37	12	Cu						
SWYC	3167	96	S	36	11	Low	Pro-line 1088 blue	Y1088C	SI	8	2008	67
SWYC	3168	93	S	40	14	Low	Z-Spar The Protector blue	B-91	Dr	6	2010	60
SWYC	3169	100	S	32	10	Cu						
SWYC	3170	100	S	37		Cu						
SWYC	3171	100	P	36	13	Cu			SI	7	2009	
SWYC	3172	100	P	39		low	CA Bottom Kote blue	YBA140	Dr	2	2014	35
SWYC	3173	94	P	36	13	Cu	Interlux Ultra Blue	3669	SI	6	2014	55
SWYC	3174	0				Non						0
SWYC	3175	100	P	26	10	Cu	Pro-Line 1088	Y1088C		6	2010	67
SWYC	3176	92	S	28	10	Cu	Z-Spar Protector red	B-90	Dr	2	2013	60
SWYC	3177	0				Non						0
SWYC	3178	100	P	18		Cu						
SWYC	3179	96	S	34	11	Cu	Interlux Ultra blue	3669	SI	3	2013	55
SWYC	3180	100	P	26	9	Low	Interlux Ultra blue	3669	SI	6	2010	55
SWYC	3181	96	S	33	9	Low	Interlux Ultra Black	3779	SI	5	2011	55
SWYC	3182	98	P	31	14	Cu	Interlux Ultra Black	3779	SI	3	2014	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3183	92	S	38	12	Cu	Interlux Ultra blue	3669	SI	9	2013	55
SWYC	3184	100	S	34	11	non	Intersleek 900 White	FXA970/A	SI	6	2013	0
SWYC	3185	90	S	38	12	Cu	Z-spar The Protector blk	B-94	SI	10	2013	60
SWYC	3186	100	P	34	12	Low	Seahawk Sharkskin	6142	Dr	5	2007	45
SWYC	3187	100	S	38	12	Cu	Pro-Line 1088	Y1088C		6	2011	67
SWYC	3188	100	S	32		Cu	Pettit Trinidad SR	1277	Dr	10	2013	60
SWYC	3189	100	S	37	12	Cu						
SWYC	3190	97	S	38	12	Low	Interlux Ultra Blue	3669	SI	3	2011	55
SWYC	3191	100	P	38	13	Low	Interlux Ultra Black	3779	SI	6	2010	55
SWYC	3192	100	S	30	10	Cu						
SWYC	3193	100	S	32	10	Low	Z-spar The Protector	B-91	Dr	10	2010	60
SWYC	3194	92	S	36	12	Cu	Interlux Ultra w/Biolux blue	3669	SI	5	2014	55
SWYC	3195	97	S	30	11	Cu	Interlux Ultra w/Biolux blue	3669	SI	5	2013	55
SWYC	3196	90	P	36	13	Low	Pro-Line 1088 blue	Y1088C	SI	4	2010	67
SWYC	3197	100	P	39	13	Cu	Interlux Ultra Blue	3669	KK	5	2014	55
SWYC	3198	100	S	41	12	Cu						
SWYC	3199	100	S	37	12	Low	Interlux Ultra blue	3669	KK	9	2010	55
SWYC	3200	100	P	34		Cu						0
SWYC	3201	100	S	40	12	Cu	Interlux Ultra Blue	3669		9	2012	55
SWYC	3202	100	S	42	13	Cu				7	2012	
SWYC	3203	100	S	38	13	Low	Interlux		SI	4	2010	
SWYC	3204	100	S	39	11	Cu				6	2011	
SWYC	3205	100	S	44	11	Cu	Pro-Line 1088 blue	Y1088C	self	10	2012	67
SWYC	3206	94	S	43	14	Cu			SI	6	2013	
SWYC	3207	100	P	34		Cu				10	2014	
SWYC	3208	100	S	38	11	Cu	Interlux Ultra Blue	3669	KK	6	2013	55
SWYC	3209	90	S	38	12	Cu	Interlux Ultra black	3779	SI	9	2013	55
SWYC	3210	94	S	45	14	Cu	Interlux Ultra Blue	3669	SI	6	2012	55
SWYC	3211	100	P	38	12	Cu						
SWYC	3212	100	S	31	10	Low	Interlux Ultra	3669	SI	7	2011	55
SWYC	3213	90	P	44	14	Low	Pro-Line 1088 blue	Y1088C	SI	10	2010	67
SWYC	3214	100	S	34	13	Cu				12	2011	
SWYC	3215	100	S	39	12	Cu	Z-Spar Protector	B-94	Dr	3	2014	60
SWYC	3216	100	P	33	12	Cu						
SWYC	3217	100	S	34		Cu						
SWYC	3218	100	S	35	12	Low	Interlux Ultra blue	3669	SI	3	2010	55
SWYC	3219	98	S	34	11	Low	International red		SI	1	2011	
SWYC	3220	100	S	31	11	Cu						
SWYC	3221	100	S	36	12	Cu	Pettit Protector red	B-90	Dr	1	2014	60
SWYC	3222	88	S	32		Low	Interlux Ultra blue	3669	SI	7	2011	55
SWYC	3223	92	S	30	11	Low	Pro-Line 1088 blue	Y1088C	SI	6	2010	67
SWYC	3224	100	S	31	11	Cu	Pro-line 1088	Y1088C	SI	11	2012	67
SWYC	3225	100	S	30		Cu						
SWYC	3226	100	S	34	11	Cu				1	2008	
SWYC	3227	94	S	36	12	Cu	Interlux Ultra	3669	SI	3	2013	55
SWYC	3228	100	S	32	11	Cu			SI	6	2012	
SWYC	3229	92	S	34	11	Cu					2006	
SWYC	3230	100	S	28	10	Low	Interlux Ultra Blue	3669	KK	3	2010	55
SWYC	3231	90	P	28	8	Cu	Interlux Ultra black	3779	SI	3	2013	55
SWYC	3232	100	S	27	10	Cu	Pro-Line 1088 blk	Y1088C	SI	7	2012	67

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3233	98	P	25	10	Cu	Interlux Ultra Blue	3669	MG	9	2014	55
SWYC	3234	100	P	21	8	Low	Interlux Ultra	3669F	SI	5	2009	55
SWYC	3235	100	P			Cu						
SWYC	3236	100	S	22	7	Low	Interlux Micron Extra	5690	self	6	2011	35
SWYC	3237	100	S	24	7	Low	Pettit Trinidad SR green	1377	self	5	2010	60
SWYC	3238	100	P	28	6	Cu	Interlux Ultra black	3779	KK	10	2012	55
SWYC	3239	100	P	20		Cu						
SWYC	3240	100	S	21	8	Low	Pro-Line 1088	Y1088C	SI	7	2010	67
SWYC	3241	96	P	27	8	Cu	Interlux BottomKote blk	52422	Brewer Cap, NY	6	2014	43
SWYC	3242	0				Non						0
SWYC	3243	100	P	25	8	Cu						
SWYC	3244	100	S	25	8	non	Interlux Pacifica	YBA160		6	2006	0
SWYC	3245	100	P	24		non	Ultima Eco Black	1808		4	2013	0
SWYC	3246	100	S	23	8	Cu			Dr	10	2013	
SWYC	3247	100	S	19	8	Cu	Pettit Hydrocoat	1240	International Marine	6	2013	40
SWYC	3248	100	P	25	9	Cu	Interlux			6	2012	
SWYC	3249	100	P	14	6	Cu	Nautical Super Pro Guard	NAU770	Schock Boats	5	2013	70
SWYC	3250	100	P	25		Cu				5	2012	
SWYC	3251	100	S	35	12	Cu						
SWYC	3252	92	S	35	11	Cu	Z-Spar Protector black	B 94	Dr	3	2014	60
SWYC	3802	100	S	33	11	Cu					2006	
SWYC	3803	100	P	35	11	Low	Interlux		SI	4	2011	
SWYC	3804	100	S	32	11	Cu			Dr	7	2013	
SWYC	3805	100	P	33	12	Cu						
SWYC	3806	100	S	38	11	Cu				2	2007	
SWYC	3807	100	S	37		Cu						
SWYC	3808	0	vacant			Non						0
SWYC	3809	100	P	35	11	Cu						
SWYC	3810	94	S	39	12	Low	International Ultra blue	3669	SI		2010	55
SWYC	3811	100	S	33	11	Low	Interlux ACT	Y7790B	Dr	3	2011	29
SWYC	3812	100	S	39	11	Cu	Pro-Line 1088 blue	Y1088C-01	KK	1	2014	67
SWYC	3813	100	S	34	12	non	Ceramkote	99M	Dr	10	2011	0
SWYC	3814	100	S	36	12	Low	Interlux Ultra Blue	3669	KK	6	2008	55
SWYC	3815	92	S	35	11	Low	Interlux		SI	11	2011	
SWYC	3816	90	S	36	12	Low	Z-Spar The Protector	B-91	Dr	10	2010	60
SWYC	3817	100	S	35	10	Cu						
SWYC	3818	100	S	34	11	Cu	Pro-Line 1088	Y1088C		2	2011	67
SWYC	3819	100	S	41	14	Low	Pro-Line 1088	Y1088C	SI	10	2010	67
SWYC	3820	100	S	39	12	Cu	Pettit Trinidad Pro blue	1082	SI	2	2012	70
SWYC	3821	100	P	32	11	Low	black		Newport	5	2011	
SWYC	3822	100	P	36	11	Cu	Pro-Line 1088	Y1088C		4	2011	67
SWYC	3823	100	S	41	12	Cu			SI	8	2013	
SWYC	3824	94	P	36	12	Cu	Interlux Ultra Black	3779	SI	1	2014	55
SWYC	3825	100	P	37	13	non	Interlux Pacifica	YBA160		2	2011	0
SWYC	3826	100	S	36	11	non	Intersleek 900 White	FXA970/A	SI	8	2013	0
SWYC	3827	98	P	25	8	Cu	Interlux Ultra black	3779	KK	9	2014	55
SWYC	3828	100	S	34	11	Low	Interlux Super KL	K93BG	Dr	1	2008	70
SWYC	3829	100	P	22		Cu	Pettit black		SI Inflatables	6	2014	
SWYC	3830	100	S	28	9	Cu				8	2012	
SWYC	3831	100	S	26	8	non	EP2000 white	EP-401	SI	8	2008	0

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SWYC	3832	100	S	29	9	non	unpainted			12	2002	0
SWYC	3833	100	S	28	9	Cu				6	2010	
SWYC	3834	0	vacant			Non						0
SWYC	3835	100	P	20		Cu						
SWYC	3836	0	vacant			Non						0
SWYC	3837	100	P	20	5	Low	Z-Spar Protector	B-91	Dr	7	2010	60
SWYC	3838	0	vacant			Non						0
SWYC	3839	100	S	24	7	Cu						
SWYC	3840	100	S	26		Cu						
SWYC	3841	100	S	27	5	Cu					2009	
SWYC	3842	100	P	28	8	Cu	Pro-line black		self	10	2013	
SWYC	3843	0	vacant			Non						0
SWYC	3844	100	P	13		Cu						
SWYC	3845	0	vacant			Non						0
SWYC	3846	90	S	25	8	Cu	Interlux Ultra blue	3669	KK	3	2014	55
SWYC	3847	0	vacant			Non						0
SWYC	3848	100	P	21	8	Cu	Interlux Ultra black	3779	SI	10	2014	55
SWYC	3849	100	S	24	6	Low	Interlux Ultra Blue	3669	SI	5	2010	55
SWYC	3850	0	vacant			Non						
SWYC	3851	100	S	27	8	Low	Pro-Line 1088	Y1088C	SI	5	2010	67
SWYC	3852	100	S	25	8	Cu	Z-Spar Bottom Pro Gold	41127706	SI	3	2012	60
SWYC	3853	100	S	22		Cu	Interlux		SI	2	2013	
SWYC	3854	0	vacant			Non						0
SWYC	3855	100	P	24	8	Cu						
SWYC	3856	100	S	21	7	Low	Interlux Ultra Blue	3669	self	2	2011	55
SWYC	3857	100	S	21	7	Low	Interlux Ultra Blue	3669	self	2	2011	55
SWYC	3858	100	S	21	7	Low	Interlux Ultra Blue	3669	self	2	2011	55
SWYC	3859	0	vacant			Non						0
SWYC	3860	0	vacant			Non						0
SWYC	3861	0	vacant			Non						0
SWYC	3862	100	S	33	8	Cu	Pro-Line 1088	Y1088C	Dr	6	2013	67
LPYC	11001	100	Power	15	7	Low Copper	Interlux Super KL	K91BG	Driscolls		2005	30
LPYC	11002	100	Power	18		Non Copper	Seahawk Mission Bay	4010	Driscolls		2012	0
LPYC	11003	100	Power	22		Copper			Koehler Kraft		2012	67
LPYC	11004	60	Power	21		Low Copper	Petit	B94	Driscolls		2009	30
KKC	6704	0%	VACANT			NON						
KKC	6707	90%	SAIL	30	10	UNKNOWN	UKN					UKN
KKC	6710	0%	VACANT	0	0	NON						
KKC	6713	90%	POWER	39	13	LOW	INTERLUX ULTRA		SHELTER ISLAND BOATYARD	FEB	2009	
KKC	6716	80%	SAIL	34	13	copper	INTERLUX	66		JULY	2013	
KKC	6719	0%	VACANT	0	0	NON						
KKC	6722	70%	SAIL	32	10	LOW	Proline 1088-6		Driscoll MB	JUN	2009	
KKC	6725	95%	POWER	28	9	LOW	UKN				2010	UKN
KKC	6728	80%	Power	35	13	NON	INTERSLEEK 900 BLACK	FXA979/A	Shelter Island Boatyard	OCT	2013	0%
KKC	6731	95%	POWER	35	12	LOW	UKN			MAY	2011	UKN
KKC	6734	70%	SAIL	30	10	LOW	UKN			Apr	2011	UKN
KKC	6737	78%	POWER	32	10	UKN	UKN		UKN			UKN
KKC	6740	90%	POWER	34	13	UNKNOWN	UKN			MAY	2014	UKN
KKC	6743	70%	SAIL	30	10	UNKNOWN	UKN					UKN
KKC	6746	90%	SAIL	35	11	UNKNOWN	UKN			SEPT	2013	UKN

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6749	90%	POWER	30	10	NON	CERAM-KOTE 99		SHELTER ISLAND BOATYARD	DEC	2013	0%
KKC	6752	97%	POWER	34	12	LOW	Interlux Ultr	160	Shelter Island Boatyard	NOV	2010	65%
KKC	6755	90%	POWER	32	12	UNKNOWN	UKN					UKN
KKC	6758	90%	POWER	32	11	LOW	INTERLUX			JULY	2010	65%
KKC	6761	80%	SAIL	33	12	NON				JAN	2011	
KKC	6764	25%	SAIL	36	11	copper	Proline 1088	168	Shelter Island Boatyard	JUNE	2013	65%
KKC	6767	0%	VACANT			NON						
KKC	6770	60%	SAIL	32	9	UNKNOWN	UKN		UKN			UKN
KKC	6773	90%	SAIL	34	10	UNKNOWN	UKN			OCT	2012	UKN
KKC	6776	90%	POWER	35	12	UNKNOWN	UKN			MARCH	2012	UKN
KKC	6779	80%	SAIL	30	9	UNKNOWN	UKN			JULY	2012	UKN
KKC	6782	85%	POWER	33	13	LOW					2008	
KKC	6785	70%	POWER	26	10	UNKNOWN	UKN			MAY	2012	UKN
KKC	6788	25%	POWER	28	10	UNKNOWN	UKN			JUNE	2013	UKN
KKC	6791	70%	POWER	32	10	UNKNOWN	UKN			FEB	2013	UKN
KKC	6794	80%	SAIL	32	11	NON	INTERLUX INTERSLEEK	B-90	Shelter Island Boatyard	MARCH	2013	0%
KKC	6797	55%	POWER	32	10	UNKNOWN	UKN			AUG	2012	UKN
KKC	6800	100%	SAIL	32	10	NON	INTERSLEEK 900 BLACK	FXA979/A	SHELTER ISLAND BOATYARD	FEB	2013	0%
KKC	6803	50%	POWER	35	13	copper	INTERLUX ULTRA	160	BASIN MARINE	APR	2012	65%
KKC	6806	0%	HYDRAHOIST	34	12	NON						0%
KKC	6809	85%	POWER	22	8	UNKNOWN	UKN					UKN
KKC	6812	50%	POWER	33	12	UNKNOWN	INTERLUX			JULY	2013	UKN
KKC	6815	0%	VACANT			NON						
KKC	6818	95%	SAIL	35	10	UNKNOWN	UKN				2012	UKN
KKC	6821	55%	SAIL	34	10	LOW	UKN		DRISCOLL MB		2011	UKN
KKC	6824	95%	SAIL	36	11	LOW	UKN				2004	UKN
KKC	6827	70%	POWER	28	10	NON	NO PAINT					0%
KKC	6830	80%	POWER	35	11	UNKNOWN	UKN			JULY	2013	UKN
KKC	6833	85%	SAIL	36	12	NON	INTERSLEEK 900 WHITE	FXA970/A	Shelter Island Boatyard	APR	2012	0%
KKC	6836	80%	SAIL	34	12	UNKNOWN	UKN		UKN			UKN
KKC	6001	90%	SAIL	31	22	NON	EP-2000 WHITE	EP-401	Shelter Island Boatyard	DEC	2011	
KKC	6003	95%	SAIL	34	10	LOW	UKN				2000	UKN
KKC	6005	65%	MULTIHULL	35	20	NON	INTERSEEK 900	B-90	Driscoll MB	OCT	2008	
KKC	6007	60%	SAIL	34	10	NON	E PAINT EP2000	EP-401				0%
KKC	6009	0%	VACANT	0	0	NON						
KKC	6011	85%	POWER	34	12	UNKNOWN	UKN					UKN
KKC	6013	90%	SAIL	34	10	UNKNOWN	UKN					UKN
KKC	6015	95%	POWER	40	13	UNKNOWN			Driscoll MB	JUN	2014	
KKC	6017	80%	POWER	30	12	UNKNOWN	UKN					UKN
KKC	6019	40%	SAIL	28	10	LOW	Proline 1088	168	Shelter Island Boatyard	July	2009	65%
KKC	6021	90%	POWER	35	11	COPPER	UKN		Shelter Island Boatyard	JUNE	2014	UKN
KKC	6023	80%	SAIL	29	10	copper	Pettit Protector	164	Driscoll MB	August	2012	65%
KKC	6025	0%	VACANT			NON						
KKC	6027	50%	POWER	23	6	LOW	PETTIT VIVID	1361	Shelter Island Boatyard	SEPT	2011	
KKC	6029	75%	POWER	44	13	UNKNOWN	UKN					UKN
KKC	6031	95%	POWER	30	13	UNKNOWN	UKN					UKN
KKC	6033	0%	VACANT			NON						
KKC	6035	50%	POWER	26	7	COPPER	INTERLUX HIGH COPPER		DRISCOL			UKN
KKC	6037	90%	POWER	42	16	UKKNOWN	UKN				2013	0%
KKC	6039	90%	SAIL	27	9	LOW	UKN		DRISCOLL	MAY	2013	UKN

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6041	90%	SAIL	40	13	LOW			Driscoll MB	JUN	2012	
KKC	6043	60%	SAIL	30	9	NON	INTERSLEEK 900 WHITE	FXA970/A	SHELTER ISLAND BOATYARD	FEB	2013	0%
KKC	6045	70%	POWER	40	14	UNKNOWN	INTERLUX	3779	NIELSON BEAUMONT	JUNE	2014	UKN
KKC	6047	75%	POWER	28	10	UNKNOWN	UKN					UKN
KKC	6049	25%	POWER	40	12	UNKNOWN	UKN					UKN
KKC	6051	45%	SAIL	25	8	UNKNOWN	UKN					UKN
KKC	6053	0%	VACANT			NON						
KKC	6055	45%	POWER	21	9	UNKNOWN	UKN			JUNE	2012	UKN
KKC	6057	95%	POWER	35	13				SHELTER ISLAND BOATYARD	AUG	2012	UKN
KKC	6059	50%	POWER	40	13	UNKNOWN	UKN			SEPT	2012	UKN
KKC	6061	95%	POWER	28	10	UNKNOWN	UKN					UKN
KKC	6063	50%	POWER	36	12	UNKNOWN	UKN		Shelter Island Boatyard	JUNE	2014	UKN
KKC	6065	90%	POWER	28	10	LOW	WEST BOTTOM PRO			APR	2009	UKN
KKC	6067	70%	POWER	38	14	UNKNOWN			BAVARIA			UKN
KKC	6069	95%	SAIL	30	11	LOW	UKN			MAY	2009	UKN
KKC	6071	60%	SAIL	37	12	copper	Pettit Zspar	164	Driscoll MB	Mar	2012	
KKC	6073	0%	HYDRAHOIST	30	10	NON						0%
KKC	6075	95%	POWER	42	42	UKNOWN	UKN					UKN
KKC	6077	0%	VACANT			NON						
KKC	6079	95%	POWER	38	12	UNKNOWN	UKN					UKN
KKC	6081	80%	POWER	40	13	UNKNOWN	UKN			MAY	2013	
KKC	6083	80%	SAIL	31	15	LOW	Ultralux	160	Shelter Island Boatyard	NOV	2011	
KKC	6085	75%	SAIL	42	15	UNKNOWN	UKN			OCT	2013	UKN
KKC	6087	75%	POWER	30	11	UNKNOWN	UKN				2012	
KKC	6089	70%	POWER	33	12	UNKNOWN	UKN			SEPT	2013	
KKC	6091	85%	SAIL	30	10					MARCH	2013	
KKC	6093	95%	SAIL	29	10	UNKNOWN	UKN				2013	UKN
KKC	6095	50%	SAIL	29	10	LOW	UKN			MAY	2010	UKN
KKC	6097	90%	POWER	30	10	LOW	UKN			DEC	2010	UKN
KKC	6099	95%	SAIL	30	10	LOW	UKN				2005	UKN
KKC	6101		VACANT			NON						
KKC	6451	90%	SAIL	30	8	LOW	INTERLUX ULTRA		KOEHLER KRAFT	MAY	2008	UKN
KKC	6456	90%	SAIL	30	8	LOW	UKN				2007	UKN
KKC	6461	0%	VACANT			NON						0%
KKC	6466	70%	SAIL	27	9	UNKNOWN	UKN					UKN
KKC	6471	40%	POWER	31	10	LOW	UKN			MAR	2011	UKN
KKC	6476	35%	POWER	30	8	UNKNOWN	UKN					UKN
KKC	6481	100%	SAIL	36	10	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOATYARD	MAY	2014	UKN
KKC	6486	95%	POWER	24	8	low	ANTI-FOUL VIVID	1361	SHELTER ISLAND BOATYARD	NOV	2013	UKN
KKC	6491	95%	POWER	56	15	LOW	INTERLUX	78	SHELTER ISLAND BOATYARD	JAN	2014	
KKC	6496	90%	POWER	42	14	UNKNOWN	UKN					UKN
KKC	6501	88%	POWER	35	13	COPPER	PETTIT TRINIDAD	175	Driscoll SD	MAR	2012	
KKC	6506	85%	POWER	60	15	COPPER	INTERLUX		Shelter Island Boatyard		2012	UKN
KKC	6511	75%	POWER	41	12	LOW	UKN		Shelter Island Boatyard		2009	UKN
KKC	6516	30%	POWER	60	10	UNKNOWN	UKN					UKN
KKC	6521	75%	SAIL	36	11	UNKNOWN			Shelter Island Boatyard	MAY	2012	
KKC	6526	85%	POWER	48	15	UNKNOWN	UKN					UKN
KKC	6531	80%	POWER	55	15	LOW	PETTIT		PORT TOWNSEND SHIPYARD	JUNE	2013	
KKC	6536	75%	POWER	41	12	LOW	PROLINE 1088C	168	KNIGHT AND CARVER	FEB	2012	UKN
KKC	6541		VACANT			NON						

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6546	90%	SAIL	41	12.6	COPPER	INTERLUX ULTRA	160		FEB	2012	65%
KKC	6551	25%	POWER	58	18	UNKNOWN	UKN					UKN
KKC	6556	90%	SAIL	42	14	LOW	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD	AUG	2011	UKN
KKC	6561	80%	POWER	57	16.1		TRINIDAD SR BLUE		RICHMOND CA	MARCH	2013	UKN
KKC	6566	90%	POWER	30	8	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD	JAN	2012	UKN
KKC	6571	55%	POWER	53	16	UNKNOWN	UKN					UKN
KKC	6576	60%	SAIL	42	14	UNKNOWN	UKN					UKN
KKC	6581	60%	SAIL	54	16	COPPER	MODIFIED EPOXY	147	Shelter Island Boatyard	SEPT	2013	UKN
KKC	6586	40%	POWER	42	16	UNKNOWN	UKN		SHELTER ISLAND BOAT YARD		2014	UKN
KKC	6591	60%	SAIL	54	14	UNKNOWN	UKN					UKN
KKC	6596	80%	SAIL	36	12	UNKNOWN	UKN		SHELTER ISLAND BOAT YARD	JULY	2014	UKN
KKC	6601	95%	POWER	60	16.4	COPPER	INTERLUX ULTRA	3669F	SHELTER ISLAND BOAT YARD	NOV	2012	55%
KKC	6606	70%	POWER	42	14	COPPER	INTERLUX		SHELTER ISLAND BOAT YARD	FEB	2014	UKN
KKC	6611	90%	POWER	60	14	UNKNOWN	UKN					UKN
KKC	6616	90%	POWER	37	14	UNKNOWN	UKN					UKN
KKC	6621	20%	POWER	60	18	UNKNOWN	UKN					UKN
KKC	6626	50%	SAIL	42	13	UNKNOWN	UKN		Shelter Island Boatyard	NOV	2013	UKN
KKC	6631	70%	POWER	48	16	UNKNOWN	UKN					UKN
KKC	6636	80%	POWER	35	12	UKNOWN	UKN					UKN
KKC	6641		VACANT			NON						
KKC	6646	88%	POWER	41	13	copper	INTERLUX		Shelter Island Boatyard	FEB	2013	UKN
KKC	6651	90%	SAIL	52	16	UNKNOWN	INTERLUX ULTRA		Shelter Island Boatyard	APRIL	2014	67%
KKC	6656	25%	POWER	33	12	UNKNOWN	UKN		Shelter Island Boatyard	OCT	2013	0%
KKC	6661	90%	SAIL	63	17	UNKNOWN	UKN					UKN
KKC	6666	95%	POWER	38	14	LOW	Proline 1088	168		June	2010	65%
KKC	6671	80%	POWER	51	15	LOW	INTERLUX		Shelter Island Boatyard	OCT	2011	55%
KKC	6676	90%	SAIL	44	14	LOW				Mar	2010	40%
KKC	6681	95%	POWER	58	14	UNKNOWN	UKN					UKN
KKC	6686	70%	POWER	59	15	LOW	INTERLUX ULTRA	3779F	SHELTER ISLAND BOAT YARD	FEB	2011	UKN
KKC	6691		VACANT			NON						
KKC	6696		VACANT			NON						
KKC	6701	80%	POWER	43	15.2	LOW	INTERLUX 1088	168	Shelter Island Boatyard	APR	2010	0%
KKC	6706	80%	POWER	38	13	LOW	Interlux Micron	YBA 470	Driscoll MB	Oct	2012	39%
KKC	6711	50%	POWER	48	12	LOW	PETIT PRO		Shelter Island Boatyard	FEB	2011	65%
KKC	6716	30%	SAIL	34	14	UNKNOWN	INTERLUX		SHELTER ISLAND BOAT YARD	APRIL	2014	UKN
KKC	6721	90%	POWER	41	14	UNKNOWN	UKN					UKN
KKC	6726	90%	SAIL	40	12	UNKNOWN	UKN					UKN
KKC	6731	45%	POWER	42.9	13.9	LOW	PROLINE 1088C	168	KNIGHT AND CARVER	NOV	2012	40%
KKC	6736	90%	POWER	38	15	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD	SEPT	2012	
KKC	6741	60%	POWER	48	14	LOW	INTERLUX		SHELTER ISLAND BOAT YARD		2011	UKN
KKC	6746	90%	POWER	38	13	LOW	INTERLUX			APR	2011	0%
KKC	6751	100%	POWER	46	12	LOW	UKN				2007	UKN
KKC	6756	75%	SAIL	42	14	LOW	PROLINE 1088	168	Shelter Island Boatyard	MAY	2013	UKN
KKC	6761	20%	POWER	36	16	LOW	UKN		Shelter Island Boatyard	SEPT	2011	UKN
KKC	6766		VACANT			NON						
KKC	6771	90%	POWER	44	12.8	UNKNOWN			Shelter Island Boatyard	JUNE	2012	
KKC	6776	90%	POWER	43	14	UNKNOWN	UKN					UKN
KKC	6781	40%	SAIL	44	12.8	UNKNOWN			KNIGHT AND CARVER	June	2012	
KKC	6786	30%	POWER	33	12	UNKNOWN	UKN					UKN
KKC	6791	30%	POWER	48	14	UNKNOWN	UKN					UKN

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6796	90%	POWER	48	15	UNKNOWN			Shelter Island Boatyard	August	2012	
KKC	6801	30%	SAIL	38	14	UNKNOWN	UKN					UKN
KKC	6806	80%	SAIL	46	13	UNKNOWN	UKN					UKN
KKC	6811		VACANT			NON						
KKC	6816	95%	POWER	47	16	LOW			Driscoll MB	Dec	2010	UKN
KKC	6821		VACANT			NON						
KKC	6826	92%	POWER	43	14	UNKNOWN	UKN					UKN
KKC	6831	70%	POWER	38	14	UNKNOWN	PROLINE					UKN
KKC	6836	90%	POWER	50	16	UKNOWN	UKN		NIELSON BEAUMONT		2014	UNK
KKC	6841	87%	POWER	40	14	LOW	UKN			AUG	2011	UKN
KKC	6846	40%	POWER	40	16	LOW	UKN			NOV	2009	
KKC	6851	85%	POWER	50	16	UNKNOWN	UKN					UKN
KKC	6856	95%	SAIL	43	12	LOW	UKN		Shelter Island Boatyard		2008	UKN
KKC	6861	80%	POWER	41	14	UNKNOWN	UKN					UKN
KKC	6866	20%	SAIL	38	13	UNKNOWN	UKN				2012	UKN
KKC	6871	75%	SAIL	42	13	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD		2014	UKN
KKC	6876	95%	POWER	43	14	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD	MAY	2014	UKN
KKC	6881	90%	POWER	42	14	NON			Driscoll MB	August	2011	0%
KKC	6886	95%	SAIL	39	12	COPPER	UKN					UKN
KKC	6891	80%	POWER	44	15	NON	Hempasil	31070	REDONDO MB	FEB	2014	0%
KKC	6896	95%	SAIL	36		LOW	Ultrakote		Shelter Island Boatyard	May	2010	
KKC	6901	95%	POWER	50	17	LOW	PETTIT TRINIDAD		Shelter Island Boatyard	JAN	2010	UKN
KKC	6906	90%	SAIL	41	13	LOW	PETTIT TRINIDAD		KNIGHT AND CARVER	MAY	2010	40%
KKC	6911	0%	VACANT			NON						
KKC	6916	95%	SAIL	42	13	LOW	Interlux Ultra	160	Koehler Kraft	July	2012	40%
KKC	6921	90%	POWER	50	15	UNKNOWN	UKN					UKN
KKC	6926	60%		40	14	UNKNOWN	UKN					UKN
KKC	6931	90%	POWER	50	14	UKNOWN	UKN		CABO	NOV	2012	40%
KKC	6936	85%	POWER	60	20	LOW	PETTITE TRINIDAD		WINDWARD YACHT CENTER		2010	UKN
KKC	6941	0%	VACANT			NON						
KKC	6946	75%	POWER	55	16	UNKNOWN	UKN					UKN
KKC	6301	65%	POWER	86	22	LOW	PROLINE 1088c	168	MARINE GROUP	SEPT	2010	40%
KKC	6304	90%	POWER	57	14.5	LOW	INTERLUX		Driscoll MB	MARCH	2010	40%
KKC	6307	60%	POWER	57	16	UNKNOWN	UKN		OXNARD		2012	UKN
KKC	6310	30%	POWER	70	17	UNKNOWN	UKN					UKN
KKC	6313	40%	SAIL	60	17	UNKNOWN	UKN					UKN
KKC	6316	65%	POWER	72	20	UNKNOWN	UKN					UKN
KKC	6319	35%	POWER	74	22	LOW	PETTIT VSPAR	B94	Driscoll MB	OCT	2011	60%
KKC	6322	92%	POWER	57	17	COPPER	Interlux Ultra	160	Shelter Island Boatyard	Feb	2012	55%
KKC	6325	90%	POWER	52	15	UNKNOWN	UKN					UKN
KKC	6328	90%	POWER	60	18	UNKNOWN	UKN					UKN
KKC	6331	70%	POWER	60	17	LOW	UKN				2011	UKN
KKC	6334	85%	POWER	60	17	UNKNOWN	UKN					UKN
KKC	6337	65%	POWER	55	17.6	LOW	Interluxe Ultra	160	Shelter Island Boatyard	May	2010	65%
KKC	6340	75%	SAIL	70	18	UNKNOWN	UKN					UKN
KKC	6343	55%	POWER	66	19	UNKNOWN	UKN					UKN
KKC	6346	95%	POWER	85	20	LOW	PETIT TRINIDAD		MARINE GROUP	DEC	2012	40%
KKC	6349	95%	POWER	57	17	COPPER	INTERLUX ULTRA		Shelter Island Boatyard	JULY	2014	65%
KKC	6352	90%	POWER	75	20	UNKNOWN	UKN					UKN
KKC	6355	45%	POWER	60	18	UNKNOWN	UKN					UKN

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6358	100%	POWER	90	20	LOW	PROLINE	1088-6		FEB	2009	UKN
KKC	6361	95%	POWER	60	18	LOW	PETTITT TRINIDAD SR	174	Shelter Island Boatyard	DEC	2011	65%
KKC	6364	60%	POWER	59	16	UNKNOWN	UKN					UKN
KKC	6367	70%	POWER	70	15	UNKNOWN	UKN					UKN
KKC	6370	95%	POWER	59	16	NON	PETTIT		Shelter Island Boatyard	JULY	2011	
KKC	6373	35%	SAIL	100	20	UNKNOWN	UKN		MARINE GROUP	MAY	2013	UKN
KKC	6376	90%	POWER	80	20	LOW	UKN			JUNE	2005	UKN
KKC	6379	45%	POWER	78	21	LOW	UKN			OCT	2005	UKN
KKC	6382	60%	POWER	60	15	UNKNOWN	UKN					UKN
KKC	6385	90%	POWER	46	14	LOW	UKN			FEB	2010	UKN
KKC	6388		VACANT			NON						
KKC	6391	40%	SAIL	70	15	UNKNOWN	UKN		DRISCOL	NOV	2014	UKN
KKC	6394	0%	VACANT			NON						0%
KKC	6397	60%	SAIL	45	14	LOW	INTERLUX		SELF APPLIED	JULY	2011	65%
KKC	6400	75%	POWER	58	16	LOW			SHELTER ISLAND BOAT YARD	FEB	2010	40%
KKC	6951	75%	POWER	50	17	UNKNOWN	UKN					UKN
KKC	6952	95%	SAIL	57	16	LOW	INTERLUX BOTTOM KOTE	79	ENSENADA	JULY	2008	UKN
KKC	6953	35%	POWER	59	18	UNKNOWN	UKN					UKN
KKC	6954	90%	POWER	59	14	UNKNOWN	UKN					UKN
KKC	6955	95%	POWER	65	18	UNKNOWN	UKN					UKN
KKC	6956	50%	POWER	50	16	UNKNOWN	UKN					UKN
KKC	6957	40%	POWER	60	18	UNKNOWN	UKN					UKN
KKC	6958	0%	VACANT			NON						
KKC	6959		VACANT			NON						
KKC	6960	95%	POWER	50	16	LOW	INTERLUX ULTRA	160	Shelter Island Boatyard	August	2009	65%
KKC	6961	15%	POWER	70	18	UNKNOWN	UKN					UKN
KKC	6962	90%	SAIL	55	15	NON	Interlux VC	V116	Driscoll MB	June	2010	0%
KKC	6963	70%	SAIL	62	16	LOW	ULTRA COTE BLACK	169		OCT	2011	UKN
KKC	6964		VACANT			NON						
KKC	6965	80%	POWER	57	16	UNKNOWN			Shelter Island Boatyard	MAR	2012	
KKC	6966	80%	SAIL	52	14	UNKNOWN	VIVID	1361	Shelter Island Boatyard	MAY	2012	
KKC	6967	90%	POWER	62	16	LOW	UltraCote	169	Shelter Island Boatyard	OCT	2011	
KKC	6968	95%	POWER	50	16	UNKNOWN	UKN					UKN
KKC	6969	95%	POWER	61	18	COPPER	PROLINE1088	168	Shelter Island Boatyard	NOV	2012	65%
KKC	6970	35%	SAIL	44	13	UNKNOWN	PETTITE		SHELTER ISLAND BOAT YARD	OCT	2014	UKN
KKC	6971	95%	POWER	58	18	UNKNOWN	PROLINE	1088/01	SHELTER ISLAND BOAT YARD	FEB	2014	UKN
KKC	6972	95%	SAIL	47	13	LOW	TRINIDAD SR	174	Shelter Island Boatyard	MAR	2006	65%
KKC	6973	90%	POWER	70	18	UNKNOWN	UKN					UKN
KKC	6974	45%	SAIL	52	13	UNKNOWN	UKN					UKN
KKC	6975	85%	SAIL	59	17	LOW	INTERLUX ULTRA		Shelter Island Boatyard	SEPT	2010	
KKC	6976	100%	SAIL	50	12	UNKNOWN	UKN					UKN
KKC	6977	45%	MULTIHULL	48	25	UNKNOWN	UKN					UKN
KKC	6978	95%	POWER	43	14	UNKNOWN	UKN					UKN
KKC	6979	95%	SAIL	48	11	UNKNOWN	WEST BOTTOM PRO		KOEHLER	OCT	2013	UKN
KKC	6980	0%	VACANT			NON						
KKC	6981	95%	SAIL	50	13	UNKNOWN	PETTIT Z-SPAR	B94	Shelter Island Boatyard	DEC	2012	60%
KKC	6982	70%	SAIL	62	17	UNKNOWN	UKN					UKN
KKC	6983	90%	SAIL	39	12	UNKNOWN	UKN					UKN
KKC	6984	95%	POWER	58	18	LOW	Interlux Ultra	160	Shelter Island Boatyard	May	2010	65%
KKC	6985	90%	POWER	47	15	UNKNOWN			Shelter Island Boatyard	NOV	2012	

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6986	90%	SAIL	28	12	UNKNOWN	UKN					UKN
KKC	6987	0%	VACANT			NON						
KKC	6988	90%	SAIL	27	10	UNKNOWN	UKN					UKN
KKC	6989	100%	POWER	42	13	LOW					2002	
KKC	6990	80%	POWER	31	12	UNKNOWN	UKN					UKN
KKC	6991	25%	SAIL	30	11	UNKNOWN	UKN					
KKC	6992		VACANT			NON						
KKC	6993		HYDRAHOIST	31	10	NON			Shelter Island Boatyard	APR	2005	
KKC	6994	95%	POWER	45	15	UNKNOWN			SHELTER ISLAND BOAT YARD	NOV	2013	
KKC	6995	80%	SAIL	32	11	UNKNOWN	INTERLUX ULTRA		SHELTER ISLAND BOAT YARD	JAN	2014	UKN
KKC	6996	40%	SAIL	40	10	UNKNOWN	UKN					UKN
KKC	6997	90%	SAIL	32	12	UNKNOWN	UKN					UKN
KKC	6998		VACANT			NON						
KKC	6999	90%	POWER	37	12	LOW				JAN	2010	
KKC	7000	90%	POWER	43	15	COPPER	Interlux Ultra	160	Shelter Island Boatyard	SEPT	2012	65%
KKC	6002	90%	SAIL	28	10	LOW	INTERLUX ULTRA		DRISCOLL	August	2005	
KKC	6004	0%	VACANT			NON						
KKC	6006	40%	POWER	32	10	UNKNOWN	UKN					
KKC	6008	95%	POWER	45	15	UNKNOWN	UKN					UKN
KKC	6010	92%	SAIL	27	8	UNKNOWN	UKN					UKN
KKC	6012	90%	SAIL	50	12	LOW	ZSPAR B94	164	Ventura Harbor Boat Yard	DEC	2011	40%
KKC	6014	95%	POWER	32		LOW	Interlux Ultra	160	Aquarius Marina	SEPT	2011	32%
KKC	6016	95%	POWER	34	10	UNKNOWN	UKN					UKN
KKC	6018	30%	POWER	26	8	NON	NO PAINT					0%
KKC	6020		VACANT			NON						
KKC	6022	20%	POWER	25	8	UNKNOWN	UKN					UKN
KKC	6024		VACANT			NON						
KKC	6026	95%	POWER	34	12	LOW	UKN			FEB	2011	UK
KKC	6028	30%	POWER	45	14	UNKNOWN	UKN					UKN
KKC	6030	45%	SAIL	42	14	UNKNOWN	UKN					UKN
KKC	6032	95%	POWER	33	11	UNKNOWN	UKN					UKN
KKC	6034	90%	SAIL	43	14	NON	INTERLUX PACIFICA	YBB263	SHELTER ISLAND	JAN	2012	
KKC	6036	65%	SAIL	35	10	UNKNOWN	UKN					UKN
KKC	6038	98%	SAIL	35	11	LOW	Interlux		Driscoll MB	OCT	2010	65%
KKC	6040	45%	SAIL	27	8	UNKNOWN	UKN					UKN
KKC	6042	25%	POWER	45	15	UNKNOWN	UKN					UKN
KKC	6044	85%	SAIL	33	9	UNKNOWN	UKN					
KKC	6046	99%	SAIL	40	13	LOW	Proline 1088	168	Shelter Island Boatyard	July	2011	65%
KKC	6048	95%	SAIL	24	5	UNKNOWN	UKN					
KKC	6050	45%	POWER	42	14	LOW	UKN				2004	
KKC	6052	25%	POWER	30	11	UNKNOWN	UKN					UKN
KKC	6054	45%	SAIL	46	14	LOW	PETTIT TRINIDAD	174	Ventura Harbor Boat Yard	DEC	2011	
KKC	6056	90%	POWER	32	11	UNKNOWN	UKN					UKN
KKC	6058	30%	POWER	37	10	UNKNOWN	UKN					UKN
KKC	6060	30%	SAIL	32	8	UNKNOWN	UKN					UKN
KKC	6062	15%	POWER	45	16	UNKNOWN	UKN					UKN
KKC	6064	95%	POWER	26	9	copper	PRO-LINE 1088	168	Driscoll MB	OCT	2013	65%
KKC	6066	35%	POWER	43	14	LOW	PETTIT TRINIDAD		Shelter Island Boatyard	JULY	2011	UKN
KKC	6068	88%	SAIL	30	10	UNKNOWN	UKN					UKN
KKC	6070		VACANT			NON						

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6072	0%	HYDRAHOIST	20	9	NON						0%
KKC	6074	95%	POWER	42	14	COPPER	Pro-Line 1088	168	Shelter Island Boatyard	NOV	2012	65%
KKC	6076	45%	SAIL	30	10	UNKNOWN	UKN					UKN
KKC	6078	75%	SAIL	44	12	UNKNOWN	UKN					UKN
KKC	6080	85%	POWER	20	9	UNKNOWN	UKN					UKN
KKC	6082	25%	POWER	47	12	UNKNOWN	UKN					UKN
KKC	6084	95%	POWER	34	11	COPPER	Interlux	160	Shelter Island Boatyard	July	2012	65%
KKC	6086		VACANT			NON						
KKC	6088	30%	SAIL	35	11							
KKC	6090		VACANT			NON						
KKC	6092	80%	SAIL	32	11	LOW	UKN		KNIGHT AND CARVER	FEB	2011	UKN
KKC	6094	60%	SAIL	45	13	LOW	PROLINE VINYL		SHELTER ISLAND	JUN	2008	UKN
KKC	6096	0%	VACANT			NON						
KKC	6098	0%	VACANT			NON						
KKC	6100	95%	SAIL	30	10	UNKNOWN	UKN					UKN
KKC	6102	85%	POWER	43	14	UNKNOWN	UKN					UKN
KKC	6104	75%	SAIL	30	12	UKNOWN	UKN					UKN
KKC	6106	80%	SAIL	45	12	UKNOWN	UKN					UKN
KKC	6108		VACANT			NON						
KKC	6110	95%	POWER	45	13	LOW	PETIT TRINIDAD			SEPT	2011	UKN
KKC	6112	85%	POWER	27	8.5	UNKNOWN	UKN					
KKC	6114	25%	SAIL	42	14	UNKNOWN	SPAR PRO GOLD			SEPT	2014	UKN
KKC	6116	90%	POWER	32	11	LOW	Epoxy Modified	147	Neilsen Beaumont	May	2007	20%
KKC	6118	85%	SAIL	45	12	LOW	INTERLUX CA BK	YBA143	SHELTER ISLAND BOATYARD	MAR	2010	
KKC	6120	20%	POWER	32	12	UNKNOWN	UKN					UKN
KKC	6122	95%	POWER	46	14	UNKNOWN	UKN					UKN
KKC	6124		VACANT			NON						
KKC	6126	0%	VACANT			NON						
KKC	6128	35%	POWER	26	10	UNKNOWN	UKN					UKN
KKC	6130	85%	POWER	45	15	LOW	SEA HAWK SHARKSKIN	6140		JAN	2010	UKN
KKC	6132	95%	POWER	28	10	UNKNOWN	UKN					UKN
KKC	6134		VACANT			NON						
KKC	6136	95%	POWER	28	10	UNKNOWN	UKN					
KKC	6138		VACANT			NON						
KKC	6140	0%	VACANT			NON						UKN
KKC	6142		VACANT			NON						
KKC	6144	100%	HYDRAHOIST	30	12	NON						0%
KKC	6146		VACANT			NON						
KKC	6148	15%	POWER	29	10	UNKNOWN	UKN					UKN
KKC	6150		VACANT			NON						
KKC	6152	95%	POWER	40	12	UNKNOWN	UKN					
KKC	6154	40%	SAIL	40	15	UNKNOWN	UKN			JULY	2013	UKN
KKC	6156	95%	POWER	40	15	UNKNOWN			Marina Del Ray Boat Yard	JAN	2013	UKN
KKC	6158	75%	POWER	40	14	UNKNOWN	PETIT TRINIDAD					UKN
KKC	6160	95%	SAIL	32	8	UNKNOWN			Shelter Island Boatyard	June	2012	
KKC	6162	92%	SAIL	42	15	LOW	UKN			JUN	2011	UKN
KKC	6164	90%	POWER	40	14	COPPER	INTERLUX ULTRA		SHELTER ISLAND BOATYARD	NOV	2012	UKN
KKC	6166	95%	SAIL	37	9	UNKNOWN	UKN					UKN
KKC	6168		VACANT			NON						
KKC	6170	75%	POWER	42	14	LOW	Interlux Ultra	160	Neilsen Beaumont	July	2011	65%

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6172	90%	SAIL	38	12	UNKNOWN	UKN					UKN
KKC	6174	90%	SAIL	40	14	LOW				Sept	2009	
KKC	6176	60%	HYDRAHOIST	37	11.5	NON						0%
KKC	6178	90%	POWER	38	13	LOW			DRISCOLL	AUG	2010	UKN
KKC	6180	90%	SAIL	36	13	LOW	INTERLUX ULTRA			JUNE	2009	UKN
KKC	6182	15%	POWER	38	13	UNKNOWN						UKN
KKC	6184	30%	SAIL	36	11	COPPER	Pettit Trinidad Pro	174	Shelter Island Boatyard	SEPT	2012	65%
KKC	6186	35%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6188	45%	POWER	38	12	LOW			Koehler Kraft	FEB	2010	
KKC	6190	90%	POWER	41	13	UNKNOWN	UKN					UKN
KKC	6192	98%	POWER	38	13	UNKNOWN				DEC	2013	
KKC	6194	0%	VACANT			NON						
KKC	6196		VACANT			NON						
KKC	6198	70%	POWER	39	14	LOW	INTERLUX ULTRA		Neilsen Beaumont	JULY	2012	67%
KKC	6200	90%	POWER	38	13	UNKNOWN	UKN					UKN
KKC	6261	85%	SAIL	42	13	LOW	UKN			JULY	2011	UKN
KKC	6262	100%	HOUSEBOAT	39	13	LOW				OCT	2009	
KKC	6263	25%	SAIL	40	10	UNKNOWN	UKN					UKN
KKC	6264	25%	POWER	37	13	UNKNOWN	UKN					UKN
KKC	6265	0%	VACANT			NON						
KKC	6266	95%	POWER	35	12	LOW					2007	
KKC	6267	90%	POWER	44	15	COPPER	Interlux Ultra	160	Shelter Island Boatyard	May	2012	65%
KKC	6268	45%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6269	90%	POWER	48	15	UNKNOWN	UKN					UKN
KKC	6270	95%	SAIL	36	12	UNKNOWN	UKN					UKN
KKC	6271	35%	SAIL	43	14	UNKNOWN	UKN					UKN
KKC	6272	95%	SAIL	39	12	LOW	PETTIT TRINIDAD	6	SHELTER ISLAND BOATYARD	SEPT	2009	
KKC	6273		VACANT			NON						
KKC	6274	85%	SAIL	36	12	UNKNOWN	UKN					UKN
KKC	6275	90%	SAIL	50	15	LOW	Proline 1088	168	Shelter Island Boatyard	Oct	2010	67%
KKC	6151	88%	POWER	38	14	UNKNOWN	UKN					UKN
KKC	6152	50%	POWER	48	14	UNKNOWN	UKN					UKN
KKC	6153	90%	SAIL	38	11	UNKNOWN	UKN					UKN
KKC	6154	40%	POWER	51	17	UNKNOWN	UKN					UKN
KKC	6155	90%	POWER	36	13	UNKNOWN	UKN					UKN
KKC	6156	80%	POWER	50	15.6	COPPER			Shelter Island Boatyard	SEPT	2014	67%
KKC	6157	90%	POWER	38	12	LOW	PETTIT TRINIDAD		Shelter Island Boatyard	FEB	2010	UKN
KKC	6158	0%	VACANT			NON						
KKC	6159	50%	SAIL	41	14	LOW	PETTIT TRINIDAD		ENSENADA	APR	2008	
KKC	6160		VACANT			NON						
KKC	6161	30%	SAIL	36	13	UNKNOWN	UKN					UKN
KKC	6162	85%	POWER	40	13.5	COPPER	INTERLUX	3669		JUNE	2012	55%
KKC	6163	90%	SAIL	36	11	LOW	UKN		DRISCOLL	AUG	2010	
KKC	6164	0%	VACANT			NON						
KKC	6165	65%	POWER	38	12	UNKNOWN	UKN					UKN
KKC	6166	85%	POWER	40	13	UNKNOWN	UKN					UKN
KKC	6167	90%	SAIL	37	18	UNKNOWN	UKN					UKN
KKC	6168	90%	POWER	38	13	UNKNOWN	UKN					UKN
KKC	6169	35%	POWER	24	9	UNKNOWN	UKN					UKN
KKC	6170	98%	SAIL	38	6	LOW			Shelter Island Boatyard	MAY	2005	

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6171	90%	SAIL	38	12	UNKNOWN	UKN					UKN
KKC	6172	40%	POWER	37	14	UNKNOWN	UKN					UKN
KKC	6173	85%	SAIL	38	12	LOW	ZSPAR B94	165	self applied	Jan	2007	65%
KKC	6174	35%	SAIL	37	11	COPPER	Interlux Ultra	160	Shelter Island Boatyard	July	2012	65%
KKC	6175	95%	POWER	36	11	UNKNOWN	UKN					UKN
KKC	6176	0%	VACANT			NON						
KKC	6177	55%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6178	90%	POWER	35	12.5	UNKNOWN	UKN		SHELTER ISLAND BOAT YARD	NOV	2014	UKN
KKC	6179	90%	SAIL	42	13	UNKNOWN	UKN					UKN
KKC	6180	80%	POWER	39	14	UNKNOWN	UKN					UKN
KKC	6181	25%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6182	60%	POWER	40	14	COPPER	Interlux Ultra	160	Neilsen Beaumont	July	2012	65%
KKC	6183	0%	VACANT			NON						
KKC	6184	100%	SAIL	37	11							
KKC	6185	90%	POWER	36	13	NON	INTERSLEEK 900 BLACK	FXA979/A	SHELTER ISLAND BOAT YARD	JUN	2013	0%
KKC	6186	90%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6187	40%	SAIL	39	12	LOW				Oct	2010	
KKC	6188	90%	SAIL	40	11	LOW	UKN			DEC	2007	
KKC	6189	98%	SAIL	42	13	LOW	INTERLUX ULTRA		Shelter Island Boatyard	JUN	2010	67%
KKC	6190	15%	SAIL	36	11	UNKNOWN	UKN					UKN
KKC	6191		VACANT			NON						
KKC	6192	95%	SAIL	35	11	UNKNOWN	UKN					UKN
KKC	6193	98%	SAIL	36	12	LOW	INTERLUX		Shelter Island Boatyard	FEB	2011	40%
KKC	6194		VACANT			NON						
KKC	6195	95%	SAIL	37	12	UNKNOWN	INTERLUX			SEPT	2014	UKN
KKC	6196	65%	POWER	47	13	UNKNOWN	UKN					UKN
KKC	6197		VACANT			NON						
KKC	6198	85%	POWER	45	15	LOW	UKN		DRISCOLL	JUN	2008	
KKC	6199	90%	POWER	43	10	UNKNOWN	UKN					UKN
KKC	6200	75%	SAIL	46.9	12	UNKNOWN	UKN		Marina Del Ray Boat Yard	SEPT	2013	UKN
KKC	6201	92%	POWER	48	16	LOW	UKN			NOV	2007	
KKC	6202	60%	POWER	43	12	UNKNOWN	INTERLUX BOTTOM KOTE		self applied	MAY	2013	UKN
KKC	6203	90%	POWER	46	14	LOW	UKN			FEB	2007	UKN
KKC	6204		VACANT			NON						
KKC	6205	90%	POWER	48	14	UNKNOWN	UKN					UKN
KKC	6206	0%	VACANT			NON						
KKC	6207	93%	POWER	43	16	LOW	Proline 1088	168	Shelter Island Boatyard	Nov	2011	40%
KKC	6208	65%	POWER	36	13	UNKNOWN	UKN					UKN
KKC	6209	25%	SAIL	44	12	LOW	TRINIDAD SR	174	Shelter Island Boatyard	May	2010	65%
KKC	6210	0%	VACANT			NON						
KKC	6211	90%	POWER	48	15	LOW	UKN			NOV	2005	UKN
KKC	6212	85%	POWER	44	15	LOW	PROLINE 1088-6			MAR	2006	UKN
KKC	6213	75%	POWER	48	16	UNKNOWN	UKN					UKN
KKC	6214	0%	VACANT			NON						
KKC	6215	95%	POWER	43	13	COPPER	Cukote	156	Driscoll MB	SEPT	2012	65%
KKC	6216	90%	POWER	43	15	UNKNOWN	UKN		DRISCOLL MB	NOV	2013	UKN
KKC	6217	90%	POWER	50	16	LOW	PROLINE 1088-6		Shelter Island Boatyard	MAR	2008	
KKC	6218		VACANT			NON						
KKC	6219	88%	POWER	45	15	UNKNOWN	PROLINE LOLO	1088	SHELTER ISLAND BOATYARD	JULY	2013	UKN
KKC	6220	25%	SAIL	35	17.5	UNKNOWN	INTERLUX HARD		Shelter Island Boatyard	FEB	2014	

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6221	92%	POWER	39	14	LOW	PROIINE 1088-6		Shelter Island Boatyard	OCT	2010	UKN
KKC	6222	90%	SAIL	34	12	NON	2000E EPOXY WHITE	FXA970/A	SHELTER ISLAND BOAT YARD	DEC	2013	0%
KKC	6223	90%	SAIL	44	13	LOW	Proline 1088	168		Feb	2010	65%
KKC	6224	75%	POWER	34	12	UNKNOWN	UKN					UKN
KKC	6225	95%	POWER	48	15	LOW	Interlux Ultra	160	Shelter Island Boatyard	SEPT	2010	65%
KKC	6226	75%	POWER	33	13	UNKNOWN	UKN					UKN
KKC	6227	60%	POWER	40	15	UNKNOWN	UKN					UKN
KKC	6228	25%	POWER	46	16	UNKNOWN	UKN		DRISCOLLS MB	NOV	2014	UKN
KKC	6229	80%	POWER	46	14	LOW	UKN			JAN	2007	UKN
KKC	6230	25%	POWER	36	12	UNKNOWN	UKN					UKN
KKC	6231		VACANT			NON						
KKC	6232	65%	SAIL	35	12	UNKNOWN	UKN					UKN
KKC	6233	20%	POWER	48	16	COPPER	Interlux Ultra	160	Shelter Island Boatyard	Dec	2012	60%
KKC	6234	60%	POWER	27	9	UNKNOWN	PROLINE		DRISCOLLS MB	JAN	2014	UKN
KKC	6235	100%	POWER	50	16	LOW	Sherwin Williams	P-30	KNIGHT AND CARVER	APR	2010	65%
KKC	6236	90%	POWER	35	9	UNKNOWN	UKN					UKN
KKC	6237	95%	POWER	47	14	UNKNOWN	UKN					UKN
KKC	6238	90%	POWER	32	12	UNKNOWN						
KKC	6239	98%	SAIL	50	14	LOW				August	2002	40%
KKC	6240	90%	SAIL	36	12	UNKNOWN	UKN					UKN
KKC	6241	98%	POWER	49	15	LOW				Dec	2010	
KKC	6242	50%	SAIL	34	12	UNKNOWN	UKN					UKN
KKC	6243		VACANT			NON						
KKC	6244	93%	POWER	25	9	UNKNOWN	UKN					UKN
KKC	6245	70%	SAIL	48	15	LOW	PETTIT		Shelter Island Boatyard	JUN	2011	
KKC	6246	40%	POWER	30	10	UNKNOWN	UKN					UKN
KKC	6247	40%	SAIL	48	15	UNKNOWN	UKN					UKN
KKC	6248	40%	SAIL	41	14	NON	VC PERFORMANCE Epoxy	V127/A	SHELTER ISLAND BOAT YARD	JAN	2014	0%
KKC	6249	98%	SAIL	50	16	LOW	MISSION BAY BLUE	4002	DRISCOLL	SEPT	2007	
KKC	6250		VACANT			NON	UKN					
KKC	6251	95%	POWER	43	15	LOW	Z Spar Gold	164	Driscoll MB	FEB	2012	40%
KKC	6801	80%	POWER	49	15	LOW	INTERLUX KL-6		Shelter Island Boatyard	MAR	2007	
KKC	6802	98%	POWER	51	15	LOW	Blue Water 8601		Driscolll MB	OCT	2008	40%
KKC	6803	85%	SAIL	50	13	NON	Interlux Micron		Shelter Island Boatyard	June	2011	
KKC	6804	0%	VACANT			NON						
KKC	6805	40%	SAIL	50	13	UNKNOWN	UKN					UKN
KKC	6806	45%	POWER	47	15	UNKNOWN	UKN					UKN
KKC	6807	90%	POWER	43	15	copper	Interlux Ultra	160	Shelter Island Boatyard	Apr	2012	65%
KKC	6808	90%	POWER	50	15	LOW	UKN			NOV	2011	
KKC	6809	0%	VACANT			NON						UK
KKC	6810	88%	POWER	50	16	LOW			MIKELSON YACHTS		2010	
KKC	6811	98%	POWER	48	15	LOW	PROLINE 1088-6		SHELTER ISLAND BOATYARD	AUG	2008	
KKC	6812	20%	SAIL	47	14	LOW	UKN					UKN
KKC	6813	0%	VACANT			NON						
KKC	6814	80%	SAIL	50	13	UNKNOWN	UKN					UKN
KKC	6815	0%	VACANT			NON						
KKC	6816	95%	POWER	46		NON			Shelter Island Boatyard	APRIL	2014	
KKC	6817	35%	POWER	53	15							
KKC	6818	93%	POWER	43	15	COPPER	Interlux Ultra	160	Shelter Island Boatyard	Mar	2012	65%
KKC	6819	0%	VACANT			NON						

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
KKC	6820	90%	POWER	54	17	UNKNOWN	UKN					UKN
KKC	6821	60%	POWER	41	13	LOW	Interlux Ultra	160	KNIGHT AND CARVER	Nov	2011	65%
KKC	6822		VACANT			NON						
KKC	6823		VACANT			NON						
KKC	6824		VACANT			NON						
KKC	6825	25%	POWER	41	14	UNKNOWN	UKN					UKN
KKC	6826		VACANT			NON						
KKC	6827	70%	MULTIHULL	40	16	UNKNOWN	UKN					UKN
KKC	6828	65%	MULTIHULL	30	15	UNKNOWN	UKN					UKN
KKC	6829	10%	MULTIHULL	45	15	UNKNOWN	UKN					UKN
KKC	6830	100%	HYDRAHOIST	15	8	NON						0%
KKC	6831	60%	SAIL	78	17	LOW	PETTIT B-94 PROTECTOR		DRISCOLLS	MAY	2014	67%
KKC	6832	40%	POWER	90	20	UNKNOWN	UKN					UKN
KKC	6833	88%	POWER	97	22	UNKNOWN	UKN					UKN
KKC	6834	90%	MULTIHULL	38	22	LOW	UKN			MAR	2010	UKN
KKC	6835	30%	POWER	108	24	UNKNOWN	UKN					UKN
KKC	6836	45%	POWER	142	25	UNKNOWN	UKN					UKN
KKC	6837	60%	POWER	160	25	UNKNOWN	UKN					UKN
KKC	6838	15%	POWER	205	25	UNKNOWN	UKN		KNIGHT & CARVER			UKN
KKC	6839	15%	SAIL	140	20	UNKNOWN	UKN					UKN
SIM	1	90	S	23	9	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	2	95	P	21	8.6	COPPER	Interlux Ultra	3779	SIBY	12	2013	55
SIM	3	100	P	19	8	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	4	100	P	13	5	LOW-COPPER	Proline	1088	Unknown- Aged	5	2006	33
SIM	5	90	P	17	7.8	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	6	90	P	18	7.9	LOW-COPPER	Unknown	n/a	Factory Applied- Aged	11	2010	
SIM	7	50	S	21	6.3	COPPER	Interlux Ultra Kote	2669N	Self Applied	3	2014	67
SIM	8	50	S	21	6.3	COPPER	Interlux Ultra Kote	2669N	Self Applied	8	2014	67
SIM	9	95	P	16	5	LOW-COPPER	Trilux	TBA060	Self Applied	10	2013	17
SIM	10	30	P	18	7.9	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	11	95	P	14	6	LOW-COPPER	Unknown	n/a	Knight&Carver- Aged	6	2010	
SIM	12	100	P	17	6.5	COPPER	Unknown	n/a	Self Applied	2	2014	
SIM	13	100	P	15	7	LOW-COPPER	Interlux Ultra Kote	2669N	Driscoll SI- Aged	9	2011	33
SIM	14	80	S	22	8	NON-COPPER	Maringlide Tape	n/a	Self Applied	n/a	2013	0
SIM	15	90	P	29	10	COPPER	Interlux Ultra Kote	2669N	Driscoll- SI	2	2013	67
SIM	16	100	P	26	8.9	LOW-COPPER	Pettit Vivid Black	1861	Self Applied	11	2013	25
SIM	17	100	P	25	7	COPPER	Interlux Ultra	3669	SIBY	7	2013	55
SIM	18	100	P	12	6	COPPER	Unknown	n/a	Self Applied	12	2012	
SIM	19	100	P	26	8	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	20	50	S	23	8	LOW-COPPER	Unknown	n/a	Aged	1	2008	
SIM	21	85	P	28	11	COPPER	Interlux Black	n/a	Driscoll-SI	5	2014	67
SIM	100	90	S	56	15	LOW-COPPER	Seahawk Solutions	3345	Delta Marine	6	2013	33
SIM	101	50	P	38	13	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	102	100	P	30	10	NON-COPPER	No Paint	n/a	n/a	n/a	n/a	0
SIM	103	100	S	45	13.6	LOW-COPPER	Interlux Ultra	3669	Driscoll-SI	10	2010	39
SIM	104	90	P	41	13.1	NON-COPPER	Intersleek	FXA 979A	SIBY	3	2013	0
SIM	105	95	P	42	13	LOW-COPPER	Awlgrip Awlstar	BP231	Self Applied	10	2012	33
SIM	106	98	S	48	14.5	LOW-COPPER	Interlux Micron	66	SIBY- Aged	2	2011	33
SIM	107	98	S	46	13.5	COPPER	Interlux Ultra	3669	SIBY	4	2012	55
SIM	108	98	S	47	14.5	LOW-COPPER	Micron	YBA 473	SIBY	12	2013	35

Appendix Table C-3.

Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SIM	109	98	P	47	14.11	COPPER	Unknown	n/a	Knight&Carver	8	2012	
SIM	110	95	S	45	14.9	COPPER	Interlux Ultra	3669	SIBY	9	2012	55
SIM	111	98	P	39	13.2	COPPER	Unknown	n/a	Southcoast Shipyard	4	2012	
SIM	112	95	S	45	14	COPPER	Interlux Ultra	3669	SIBY	1	2012	55
SIM	113	92	P	46	13	COPPER	Unknown	n/a	Self Applied	11	2013	
SIM	114	100	P	50	16	COPPER	Interlux Ultra	3669	SIBY	4	n/a	55
SIM	115	75	Guest Slip									
SIM	116	99	P	45	14	COPPER	Interlux Ultra	3559	Nielsen Beaumont	7	2013	55
SIM	117	100	S	46	14.5	LOW-COPPER	Pettit Vivid Black	1861	Driscoll SI- Aged	2	2011	33
SIM	118	100	P	44	13.9	LOW-COPPER	Unknown	n/a	Aged	9	2011	
SIM	119	100	P	40	14.2	COPPER	Unknown	n/a	Unknown	10	2013	
SIM	120	90	P	48	16.8	COPPER	Unknown	n/a	Unknown	5	2014	
SIM	121	100	S	46	13.9	LOW-COPPER	Pettit Trinidad	1875	SIBY- Aged	4	2011	33
SIM	122	90	S	38	11.4	LOW-COPPER	International	YBA063	SIBY	10	2010	17
SIM	123	100	S	41	12.1	LOW-COPPER	Unknown	n/a	Self Applied- Aged	2	2011	
SIM	124	98	S	49	14.6	NON-COPPER	Tri-Butyl Tin	44	BVI-Virgin Gorda-Aged	4	2011	0
SIM	125	97	S	47	14.7	NON-COPPER	Prograd Ablative	993	Nielsen Beaumont	n/a	n/a	0
SIM	126	97	S	41	12	COPPER	Proline	1088	SIBY	6	2013	67
SIM	200	95	P	30	10.4	COPPER	Interlux Ultra	3779	Driscolls- MB	4	2014	55
SIM	201	50	P	40	13.3	LOW-COPPER	Interlux Ultra	3669	SIBY- Aged	12	2010	33
SIM	202	100	P	31	9.6	COPPER	Unknown	n/a	Unknown	6	2013	
SIM	203	100	S	40	13.5	COPPER	Bluewater Marine	8111	SIBY	12	2012	67
SIM	204	50	P	32	8	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	205	100	S	40	13.5	LOW-COPPER	Interlux Micron	5696	SIBY	6	2012	35
SIM	206	97	P	30	10.4	LOW-COPPER	Unknown	n/a	Knight&Carver-Aged	2	2011	
SIM	207	100	S	40	13.5	LOW-COPPER	Interlux Micron	5696	SIBY	2	2012	35
SIM	208	100	S	30	11	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	209	100	S	40	13.5	LOW-COPPER	Interlux Micron	5696	SIBY	10	2012	35
SIM	210	96	S	32	9.8	COPPER	Interlux Ultra	3559	Koehler Craft	3	2013	55
SIM	211	100	S	39	13.3	LOW-COPPER	Unknown	n/a	Unknown-Aged	2	2011	
SIM	212	96	S	27	9	COPPER	Proline	1088	SIBY	5	2014	67
SIM	213	100	P	38	13.4	LOW-COPPER	Unknown	n/a	Koehler Craft-Aged	3	2011	
SIM	214	92	S	33	10.8	COPPER	Interlux Ultra	3669	SIBY	6	2012	55
SIM	215	88	S	38	8.5	LOW-COPPER	Unknown	n/a	Marine Group-Aged	6	2011	
SIM	216	91	P	21	8.1	LOW-COPPER	West Marine Bottom	n/a	Boat House Anaheim	12	2013	28
SIM	217	100	S	40	12.6	LOW-COPPER	Interlux Micron	5693	SIBY	10	2014	35
SIM	218	67	P	26	9	COPPER	Unknown	n/a	Unknown	12	2013	
SIM	219	100	S	38	13.5	NON-COPPER	Interlux Intersleek	FXA 979A	Driscolls	6	2012	0
SIM	220	98	S	32	11	NON-COPPER	Interlux Intersleek	FXA 979A	SIBY	6	2013	0
SIM	221	100	S	37	11.5	COPPER	Interlux Ultra	3669	SIBY	9	2014	55
SIM	222	100	S	34	10	COPPER	Interlux Ultra	3669	SIBY	10	2014	55
SIM	223	99	P	29	11	COPPER	Unknown	n/a	Unknown	5	2014	
SIM	224	97	S	28	6	LOW-COPPER	Pettit Trinidad	1278	Unknown- Aged	6	2011	33
SIM	225	100	P	42	14	COPPER	Unknown	n/a	Knight&Carver	1	2013	
SIM	226	100	P	33	10	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	228	97	S	33	11	LOW-COPPER	Proline	1088	SIBY-Aged	7	2011	33
SIM	230	100	S	31	7.4	LOW-COPPER	Proline	1088	SIBY-Aged	10	2008	33
SIM	232	92	S	27	8.11	LOW-COPPER	Proline	1088	SIBY-Aged	9	2011	33
SIM	233	100	P	70	18	COPPER	Sherwin Williams	Q10	Driscoll- SI	9	2014	48
SIM	300	100	P	32	8	COPPER	Interlux Ultra	3559	SIBY	8	2013	55

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SIM	301	100	P	38	12.3	COPPER	Seahawk Sharkskin	6142	Knight&Carver	9	2012	45
SIM	302	98	P	37	12.2	LOW-COPPER	Interlux Ultra	3669	SIBY- Aged	4	2011	33
SIM	303	100	P	40	13.7	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	304	95	P	38	10	LOW-COPPER	Interlux Ultra	3669	SIBY-Aged	2	2011	33
SIM	305	99	P	36	12.9	COPPER	Pettit Protector	B-94	Driscoll	9	2013	60
SIM	306	100	S	39	12	LOW-COPPER	Proline	1088	SIBY-Aged	11	2011	33
SIM	307	86	P	34	14	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	308	100	S	38	12.3	LOW-COPPER	Unknown	n/a	Unknown-Aged	8	2009	
SIM	309	100	P	43	13	LOW-COPPER	Unknown	n/a	Unknown-Aged	6	2011	
SIM	310	100	S	42	12.11	COPPER	Pettit Zspar Protector	B-91	Driscoll	12	2012	60
SIM	311	84	P	32	7.6	LOW-COPPER	Interlux Micron	5693	Albertsons NY	7	2013	35
SIM	312	100	S	42	13	LOW-COPPER	Petit Zspar Protector	B-91	Driscoll- SI	6	2010	60
SIM	313	96	P	38	13	COPPER	Interlux Ultra	2779-N	Koehler Kraft	5	2012	67
SIM	314	97	P	36	12	COPPER	Unknown	n/a	Unknown	8	2013	
SIM	315	99	P	36	6.2	LOW-COPPER	Interlux Ultra	n/a	Unknown-Aged	6	2010	33
SIM	316	100	P	36	12.5	COPPER	Interlux Ultra	3669	Driscoll-SI	7	2012	55
SIM	317	89	S	36	13	COPPER	Unknown	n/a	Unknown	6	2012	
SIM	318	100	S	43	12.9	COPPER	Interlux Ultra	3669	Oceanside Marine Ctr	6	2014	55
SIM	319	100	P	40	14	COPPER	Unknown	n/a	Knight&Carver	2	2012	
SIM	320	97	S	44	9.5	LOW-COPPER	Unknown	n/a	Mexico-Aged	7	2010	
SIM	321	99	P	37	12.5	COPPER	Interlux Ultra	3449	SIBY	5	2014	55
SIM	322	100	S	45	14	LOW-COPPER	Pettit	1261	Greg Moore-Mobile	8	2013	25
SIM	323	100	P	42	13.3	COPPER	Interlux Ultra	3779	SIBY	10	2014	55
SIM	324	92	S	44	13	COPPER	Interlux Ultra	3669	SIBY	1	2014	55
SIM	325	95	S	39	13	COPPER	Interlux Ultra	3779	SIBY	8	2012	55
SIM	326	92	P	39	13.8	COPPER	Interlux Ultra	3779	SIBY	4	2013	55
SIM	327	90	S	38	12	LOW-COPPER	Proline	1088	SIBY	6	2014	67
SIM	400	100	P	32	11.7	LOW-COPPER	Pettit Zspar Protector	B-90	Four Winns-Aged	10	2008	33
SIM	401	95	P	38	13.3	COPPER	Unknown	n/a	Knight&Carver	2	2012	
SIM	402	100	P	17	6	COPPER	Interlux Ultra	3779	SIBY	9	2014	55
SIM	403	84	P	22	8	LOW-COPPER	Interlux Ultra	3779	SIBY-Aged	8	2010	33
SIM	404	100	S	28	7.7	LOW-COPPER	Seahawk	6142	Driscoll SI- Aged	6	2008	33
SIM	405	50	S	33	11.6	LOW-COPPER	Proline	1088	SIBY	4	2013	67
SIM	406	92	S	30	10.1	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	407	93	S	24	8	COPPER	Interlux Ultra	3779	Oceanside Marine Ctr	6	2013	55
SIM	408	98	S	30	10.9	COPPER	Interlux Ultra	3669	SIBY	1	2013	55
SIM	409	100	S	30	12	COPPER	Interlux Ultra	3669	SIBY	6	2014	55
SIM	410	100	S	27	8	NON-COPPER	Interlux	V127	Self Applied	1	2012	0
SIM	411	92	S	34	11.5	COPPER	Interlux Ultra	3669	Koehler Kraft	6	2013	55
SIM	412	100	S	30	10	LOW-COPPER	Interlux Micron	5693	Seattle	8	2012	35
SIM	413	100	P	30	11	LOW-COPPER	Unknown	n/a	SIBY	11	2011	
SIM	414	95	S	30	9	COPPER	Interlux Ultra	3669	SIBY	11	2013	55
SIM	415	99	P	25	8.6	LOW-COPPER	Interlux Ultra	3779	Oceanside- Aged	9	2011	33
SIM	416	100	S	29	7.6	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	417	100	S	30	10.6	COPPER	Interlux Ultra	3449	Marine Group	7	2014	55
SIM	418	100	S	30	11	COPPER	Interlux Ultra	3669	SIBY	9	2012	55
SIM	419	93	P	30	11.3	COPPER	Unknown	n/a	Unknown	1	2012	
SIM	420	100	P	31	10.5	COPPER	Unknown	n/a	Unknown	6	2013	
SIM	421	100	S	30	9.6	COPPER	Unknown	n/a	Unknown	4	2013	
SIM	422	100	P	28	9.2	COPPER	Pettit	B-94	Driscoll	6	2014	60

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
SIM	423	96	S	30	10.9	COPPER	Interlux Ultra	3559	SIBY	4	2014	55
SIM	424	100	P	22	8.6	COPPER	Pettit Zspar Protector	B-94	Sunset Aquatic Center	1	2014	60
SIM	425	100	P	27	9	COPPER	Interlux Ultra	3449	SIBY	1	2014	55
SIM	426	100	P	28	9	NON-COPPER	No paint	n/a	n/a	n/a	n/a	0
SIM	427	97	S	30	10.8	LOW-COPPER	Interlux Ultra	3669	Driscoll-MB- Aged	12	2011	33
SIM	428	99	S	30	11	LOW-COPPER	Pettit Trinidad	1082	Dolphin Diver	9	2011	33
SIM	429	97	S	32	10.1	COPPER	West Marine Ablative	20651	Nielsen Beaumont	8	2013	40
SIM	430	100	P	26	8.5	COPPER	Unknown	n/a	Unknown	7	2013	
SIM	431	96	P	28	9.5	NON-COPPER	No paint	n/a	n/a	n/a	n/a	0
SIM	432	97	P	30	10	COPPER	Unknown	n/a	SIBY	7	2013	
SIM	433	100	S	30	10.2	LOW-COPPER	Unknown	n/a	Santa Barbara Yard	10	2010	
SIM	434	97	P	54	13.6	NON-COPPER	Epaint	ECO-301	SIBY	6	2012	0
SIM	500	100	P	48	15	LOW-COPPER	Interlux Ultra	3449	Koehler Kraft	10	2013	55
SIM	501	100	S	39	12.8	LOW-COPPER	Interlux Ultra	2669N	Knight&Carver-Aged	10	2011	33
SIM	502	100	P	30	11.5	LOW-COPPER	Unknown	n/a	Unknown- Aged	12	2010	
SIM	503	98	S	35	10	LOW-COPPER	Pettit Trinidad	1275	Marina Del Rey-Aged	6	2010	33
SIM	504	96	P	35	13	LOW-COPPER	Intersleek	FXA 979A	SIBY-Aged	12	2011	33
SIM	505	75	S	48	13.9	COPPER	Interlux Ultra	3779	SIBY	10	2013	55
SIM	506	100	S	36	12	NON-COPPER	No paint	n/a	n/a	n/a	n/a	0
SIM	507	100	S	40	12.6	COPPER	Interlux Ultra	3449	SIBY	6	2014	55
SIM	508	100	S	36	12.5	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	509	89	P	39	13.3	COPPER	Proline	1088	SIBY	7	2012	67
SIM	510	88	S	36	12	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	511	100	S	41	12	LOW-COPPER	Interlux Micron	5693	Everett Washington	6	2013	35
SIM	512	100	P	35	9.8	NON-COPPER	No paint	n/a	n/a	n/a	n/a	0
SIM	513	85	S	42	13.9	COPPER	Proline	1088	SIBY	3	2013	67
SIM	514	100	P	32	13.2	COPPER	Interlux Ultra	3779	SIBY	3	2014	55
SIM	515	97	S	38	13	COPPER	Unknown	n/a	Knight&Carver	n/a	n/a	
SIM	516	100	S	34	11.9	COPPER	Interlux Ultra	3669	Koehler Kraft	9	2012	55
SIM	517	97	P	44	13.6	COPPER	Pettit Zspar Protector	B-91	Maria Del Rey	2	2014	60
SIM	518	88	P	38	13.6	COPPER	Unknown	n/a	Unknown	n/a	n/a	
SIM	519	100	S	41	13.2	COPPER	Interlux Ultra	3779	SIBY	1	2014	55
SIM	520	95	S	36	11	COPPER	Pettit Zspar Protector	B-91	Driscoll- SI	4	2014	60
SIM	521	92	S	44	12.5	LOW-COPPER	Interlux Ultra	3669	Koehler Kraft- Aged	8	2011	33
SIM	522	100	P	36	13	COPPER	Interlux Ultra	3669	SIBY	1	2013	55
SIM	523	99	S	40	12.2	LOW-COPPER	Interlux Ultra	2669N	SIBY-Aged	9	2011	33
SIM	524	99	P	38	13.1	COPPER	Interlux Ultra	3779	Bethel Harbor	7	2012	55
SIM	525	78	S	37	11.8	NON-COPPER	Epaint	EP-2000	Driscoll- SI	11	2013	0
SIM	526	100	P	64	17.3	COPPER	Unknown	n/a	SIBY	n/a	n/a	
SIM	600	100	P	80	20	COPPER	Pettit Trinidad	1275	Baja Noval	5	2014	70
SIM	601	80	P	111	25	COPPER	International Interspeed	460	Marine Group	10	2014	41
SIM	604	92	P	80	21	NON-COPPER	Seahawk Mission Bay	4005	Driscoll- MB	7	2012	0
SIM	610	99	P	127	23.8	COPPER	Interlux Ultra	3779	Marine Group	10	2014	55
SIM	616	84	P	92	20.5	LOW-COPPER	Interlux Ultra	3779	Driscoll- SI- Aged	4	2011	33
SIM	618	97	P	140	30	LOW-COPPER	Pettit Zspar Protector	B-94	Marine Group- Aged	11	2011	33
BCM	9810	97	S	38	12	COPPER			SIBY	1	2012	
BCM	9813	100	P	28		LOW COPPER	ULTRA BLUE	3669	SIBY	2	2011	
BCM	9816	100	S	30	9.5	COPPER						
BCM	9819	100	S	36		COPPER	ULTRA BLUE	3669	SIBY	1	2014	55
BCM	9822	100	S	32	10.1	LOW COPPER			DRISCOLL	7	2010	

Appendix Table C-3.

Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
BCM	9825	100	P	33	10	COPPER						
BCM	9828	100	P	36	12.9	LOW COPPER			SIBY	12	2011	
BCM	9831	100	P	36	7.3	COPPER	ULTRA BLUE	3669	SIBY	8	2012	55
BCM	9834	100	P	34	11	LOW COPPER	ULTRA BLACK	3779	SIBY	5	2011	
BCM	9837	100	P	36		COPPER	ULTRA BLACK	3779	SIBY	6	2012	55
BCM	9002	100	S	29		COPPER						
BCM	9004	86	S	27	9.3	LOW COPPER			SIBY		2010	
BCM	9006	100	S	26	4.6	COPPER			32012			
BCM	9008	100	S	24		COPPER						
BCM	9010	100	P	22		COPPER						
BCM	9012	0				NON COPPER						
BCM	9014	100	P	40	10.6	COPPER	ULTRA GREEN	3559	SIBY	3	2012	55
BCM	9016	100	P	30		COPPER						
BCM	9018	100	P	36	14	COPPER						
BCM	9020	100	33	12		COPPER						
BCM	9022	93	P	26	8.6	LOW COPPER			KOEHLER	5	2011	
BCM	9024	100	P	33	12.5	LOW COPPER	BOTTOM SHIELD	10175156	OCBY	3	2014	28
BCM	9026	100	P	34.5	11.8	LOW COPPER	PETTIT PROTECTOR	890VOC	NB	10	2010	
BCM	9028	100	P	32	11.6	COPPER	ULTRA BLUE	3669	SIBY	7	2013	55
BCM	9030	99	P	34	11	COPPER	ULTRA BLUE	3669	SIBY	5	2012	55
BCM	9032	55	S	38	22	COPPER	Z SPAR	B-91	DRISCOLL	7	2014	60
BCM	9034	86	S	26	11	LOW COPPER				2	2011	
BCM	9036	100	S	25		LOW COPPER			DRISCOLL	6	2011	
BCM	9038	100	S	22	8	COPPER						
BCM	9040	100	P	26	8.6	COPPER	ULTRA BLACK	3779	DRISCOLL MB	5	2012	55
BCM	9042	0				NON COPPER						
BCM	9044	100	P	13.3		LOW COPPER			SELF	6	2011	
BCM	9046	100	S			NON COPPER	INTERSLEEK 900	FXA979/A	SIBY	10	2013	0
BCM	9048	99	P	40	14.1	LOW COPPER	TRINIDAD	1088	Vee Jay Marine	5	2006	
BCM	9050	100	P	48	14	LOW COPPER	PROLINE	1088	SIBY	7	2011	
BCM	9052	100	P	38	13	COPPER	ULTRA BLACK	3779	SIBY	7	2013	55
BCM	9054	100	S	50		COPPER						
BCM	9056	100	P	40.5	14.3	COPPER						
BCM	9058	97	P	52	14.6	COPPER			42014			
BCM	9060	94	S	44	13.5	LOW COPPER	TRINIDAD	1088	SIBY	5	2011	
BCM	9062	100	P	42	13.6	LOW COPPER	ULTRA BLACK	3779	SIBY	6	2011	
BCM	9064	100	S	31	11							
BCM	9066	99.5	S	30	10.1							
BCM	9068	88	P	29.11	10.1	COPPER	PROLINE	1088	SIBY	7	2014	67
BCM	9070	100	S	29	11	LOW COPPER	WEST MARINE		82005	8	2005	
BCM	9072	100	S	35.5		LOW COPPER	PROLINE	1088	SIBY	5	2011	
BCM	9074	100	S	29.11	10.1	COPPER	TRINIDAD	1082	KOEHLER	8	2014	70
BCM	9076	100	S	30	10.1	COPPER	ULTRA RED	3449	NB	3	2014	55
BCM	9078	100	S	32	9.6	COPPER	TRINIDAD	1086	KOEHLER	6	2012	70
BCM	9080	100	S	27		COPPER						
BCM	9082	96	S	33	11.8	COPPER			12014			
BCM	9084	100	P	57	16.5	COPPER						
BCM	9086	100	S	45	13	COPPER				1	2002	
BCM	9088	93	S	41	12.6	COPPER	PROLINE	1088	SIBY	3	2014	67
BCM	9090	100	P	46	14.6	LOW COPPER	ULTRA BLUE	3669	DRISCOLL	3	2010	

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
BCM	9092	100	S	42	13.6	COPPER						
BCM	9094	100	S	46	13.8	COPPER						
BCM	9096	100	S	40	13.6	COPPER						
BCM	9098	100	S	40	13	LOW COPPER			SIBY	3	2011	
BCM	9100	96	P	42	14.6	LOW COPPER			KNIGHT & CARVER	1	2011	
BCM	9102	100	S	32	11.5	LOW COPPER	ULTRA KOTE	2779	KOEHLER	8	2011	
BCM	9452	80	P	27	8.9	COPPER	Z SPAR	B 90	DRISCOLL	10	2012	60
BCM	9457	77	S	30	10.6	LOW COPPER	BOTTOM KOTE	69	HYLEBOS	2	2012	22
BCM	9462	94	S	30	9	COPPER	ULTRA BLUE	3669	SIBY	7	2014	55
BCM	9467	100	S	27	8.83	COPPER						
BCM	9472	100	P	29	8.5	LOW COPPER	MICRON	5583	PHOENIX	5	2014	35
BCM	9477	100	S	35	11.5	COPPER	ULTRA BLACK	3779	SIBY	12	2012	55
BCM	9482	100	S	27		COPPER						
BCM	9487	100	S	30		COPPER	PROLINE	1088	SIBY	3	2012	67
BCM	9492	100	S	30	10.1	COPPER						
BCM	9497	100	P	56	16.4	COPPER	Z SPAR	B90	DRISCOLL	8	2013	60
BCM	9502	100	P	38	13	COPPER						
BCM	9507	93	P	36	12	COPPER	ULTRA BLACK	3779	SIBY	1	2013	55
BCM	9512	93	S	37.5	13	COPPER	ULTRA BLACK	3779	SIBY	1	2014	55
BCM	9517	100	S	34	11	COPPER	ULTRA BLACK	3779	SIBY	12	2013	55
BCM	9522	100	S	37.4	12.1	COPPER						
BCM	9527	100	P	36.3	12.1	COPPER						
BCM	9532	96	S	35	11.4	LOW COPPER	COPPER PRO	SCX67	KKMI	7	2008	
BCM	9537	100	P	48	12	COPPER	PROLINE	1088	SIBY		2012	67
BCM	9542	100	P	42	12	LOW COPPER	TRINIDAD	1088	SIBY	9	2010	
BCM	9547	100	S	43	12	LOW COPPER	MICRON	5583	KOEHLER	7	2011	35
BCM	9552	100	S	46		COPPER						
BCM	9557	100	S	44	13	COPPER			102014			
BCM	9562	100	S	41.3		COPPER						
BCM	9567	100	P	35		COPPER						
BCM	9572	100	S	37.7	12.8	LOW COPPER					2011	
BCM	9577	100	S	44		COPPER						
BCM	9582	100	S	47	15	COPPER	TRINIDAD	1088	OPEQUIMAR	5	2012	70
BCM	9587	100	P	43	13.6	COPPER						
BCM	9592	100	S	36	11.6	COPPER						
BCM	9597	96	S	38		LOW COPPER	ULTRA BLACK	3779	SIBY	5	2010	
BCM	9602	82	S	37.9	11.11	COPPER	Z SPAR	B91	SIBY	2	2014	60
BCM	9607	86	S	36	11.9	LOW COPPER	PROLINE	1088	SIBY	4	2009	
BCM	9612	100	S	36	12.5	LOW COPPER			BAJA NAVAL		2011	
BCM	9617	96	S	36	10	LOW COPPER			BAY MARINE	6	2011	
BCM	9622	92	S	37	12.6	COPPER						
BCM	9627	89	S	38	20.5	COPPER	Z SPAR	B91	DRISCOLLS	7	2012	60
BCM	9632	73	S	44	13	COPPER	Z SPAR	B94	DRISCOLLS	5	2014	60
BCM	9637	100	S	34	11.6	LOW COPPER	ULTRA BLACK	3779	SIBY	5	2011	
BCM	9642	100	S	42	14.5	LOW COPPER			KNIGHT & CARVER	8	2010	
BCM	9647	95	S	44	8	COPPER						
BCM	9652	100	S	46	14	LOW COPPER	PROLINE	1088	SIBY		2005	
BCM	9657	100	P	39	13.03	COPPER						
BCM	9662	96	S	42	13.1	LOW COPPER	TRINIDAD		SIBY	3	2011	
BCM	9667	100	S	40.6	12.1	LOW COPPER			122011			

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
BCM	9672	100	P	52	13	COPPER						
BCM	9677	100	S	30	10.1	LOW COPPER	PROLINE	1088	SIBY	11	2011	
BCM	9682	95	S	32	11.6	LOW COPPER			SIBY	4	2009	
BCM	9687	95	S	35	10	LOW COPPER	ULTRA BLACK	3779	SIBY	7	2010	
BCM	9692	97	S	31	10	COPPER						
BCM	9697	100	P	30	9.9	COPPER	ULTRA BLUE	3669	SIBY	1	2012	55
BCM	9702	92	S	30	10.1	COPPER						
BCM	9707	97	S	30.2	11	LOW COPPER	PROLINE	1088	SIBY	5	2011	
BCM	9712	99	S	30	9.6	COPPER	VC OFFSHORE	V118	PETERSON	9	2012	41
BCM	9717	100	S	24	9	LOW COPPER	MICRON	5693	DRISCOLL	4	2014	35
BCM	9722	100	P	32	11	COPPER						
BCM	9727	84	p	65		COPPER						
BCM	9732	0				NON COPPER						
BCM	9737	99	S	32	11.8	LOW COPPER	TRINIDAD		SIBY	3	2011	
BCM	9742	96	S	32	11.6	COPPER	PROLINE	1088	SIBY	4	2014	67
BCM	9747	100	S	34	11.5	COPPER						
BCM	9752	100	P	28	9.6	COPPER						
BCM	9757	97	S	36	11.5	COPPER						
BCM	9762	99	S	36	11.9	COPPER	PROLINE	1088	SIBY	1	2013	67
BCM	9767	100	S	33	9.6	COPPER						
BCM	9772	100	S	35	10.5	COPPER	ULTRA BLACK	3779	KOEHLER	2	2013	55
BCM	9777	96	S	33	9.7	LOW COPPER	ULTRA BLACK	3779	SIBY	6	2011	
BCM	9782	100	S	36	11.6	COPPER						
BCM	9787	92	S	36	11	COPPER						
BCM	9792	100	S	33.5	11.5	COPPER						
BCM	9797	95	S	34	11.6	COPPER	PROLINE	1088	SIBY	8	2012	67
BCM	9802	100	S	28		COPPER						
BCM	9807	100	S	32.8	12	COPPER						
BCM	9812	100	S	33	11.5	LOW COPPER	ULTRA BLUE	3669	SIBY	11	2013	55
BCM	9817	96	S	30	11	COPPER	ULTRA BLUE	3669	SIBY	7	2013	55
BCM	9822	97	S	27	9.5	COPPER						
BCM	9827	100	S	29		COPPER						
BCM	9832	90	S	34	11.9	COPPER	ULTRA BLUE	3669	SIBY	2	2013	55
BCM	9837	84	S	33	11.1	LOW COPPER	ULTRA GREEN	3559	DRISCOLL MB	9	2010	
BCM	9842	100	P	40		COPPER						
BCM	9847	100	S	34	10	LOW COPPER	ULTRA BLACK	3779		4	2010	
BCM	9852	100	S	27		COPPER						
BCM	9857	96	S	31	9.75	COPPER						
BCM	9862	92	S	31	10.4	LOW COPPER	PROLINE	1088	DRISCOLL	9	2010	
BCM	9867	99	S	37.1	11.7	COPPER						
BCM	9872	100	S	30	9.6	COPPER						
BCM	9877	99.5	S	24	8.2	LOW COPPER	ULTRA RED	3449	SIBY	2	2011	
BCM	9882	100	S	32	11.9	LOW COPPER	BOTTOMSHIELD	10175156	DRISCOLL	3	2011	28
BCM	9887	100	S	30	10.1	COPPER						
BCM	9892	95	S	34	11.3	COPPER						
BCM	9897	0				NON COPPER						
BCM	9902	0				NON COPPER						
BCM	9907	0				NON COPPER						
BCM	9912	0				NON COPPER						
BCM	9917	0				NON COPPER						

Appendix Table C-3.
Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
BCM	9922	0				NON COPPER						
CN	12001	70	Power	17	7	Copper	Interlux Ultra		Done by Previous Owner	2-Jan	2013	
CN	12008	90	Power	75	19							
CN	12074	50	Power	48	16							
CN	12099	0										
CN	12111	50	Power	58	18							
CN	12120	50	Power	44	13							
CN	12121	50	Power	46	14							
CN	12161	90	Sail	41	10	Copper	Biolux Green		Walsh Marine	7	2012	
CN	12200	70	Power	52	15	New						
CN	12222	70	Power	53	16							
CN	12333	0										
CN	12444	0										
CN	12550	90	Sail	30	10							
CN	12666	0										
CN	12773	0										
CN	12809	50	Power	56	15							
CN	12828	90	Power	22	8	Non Copper	Z Spar	BP-94	Driscoll	Jan-00	2012	
CN	12858	50	Power	56	15							
CN	12909	50	Power	56	16							
CN	12912	0										
GC	10800					Unknown						
GC	10805	100	POWER	19'8"	8'	Unknown						
GC	10810		EMPTY									
GC	10815	100	POWER	39'	10'	Unknown						
GC	10820		POWER	40'		Copper	Interlux Ultra	3669F	Shelter Island Boat Yard	11	14	55
GC	10825	100	POWER	38'	13'5"	Non-Copper	Interlux	Pacifica Plus	Koehler	4	12014	0
GC	10830	100	POWER	45'	14'7"	Copper	Trinidad	PET-1877Q	DR		2007	60
GC	10835	100	POWER	28'6"	10'	Unknown						
GC	10840	100	POWER	38"	13"	Low Copper	Interlux	Micron CSC	NB	10	2009	35
GC	10845	100	SAIL	41'	12'	Copper	Z-Spar	PETIT	Other		2012	60
GC	10850	100	SAIL	40	11'4"	Copper	Proline	1088-03	Shelter Island Boat Yard	11	14	55
GC	10855	100	SAIL	29' 11"	10' 10"	Copper	Trinidad	PETIT		5	2012	70
GC	10860	100	POWER	48'	14' 3"	Low Copper	Interlux	Micron Extra	NB	1	2013	35
GC	10865		EMPTY									
GC	10870		EMPTY									
GC	10875	100	POWER	42'	14'4"	Low Copper	Petit	West Marine/PCA Gold	NB	12	2012	40
GC	10880	100	SAIL	55'	13'6"	Unknown						
GC	10885	100	SAIL	40'	11'6"	Unknown						
GC	10890	100	SAIL	53'	14' 6"	Low Copper	Micron 66	YBA473	PDF Hawaii	10	2012	35
GC	10895		EMPTY									
GC	10900	100	POWER	46.0	12.0	Low Copper	Ultima SR40	West Marine/PCA Gold	NB	6	2012	40
GC	10905	100	POWER	53'	15'	Copper	Interlux Ultra	Y3779F	NB	3	2012	55
GC	10910	100	POWER	43'	14'11"	Unknown						
GC	10915	100	POWER	58'	15'10"	Unknown						
GC	10920	90	SAIL	42'	23'	Low Copper	Interlux	Micron 66	Citadel Marine (WA)	9	2013	36
GC	10925	100	POWER	68'	15'	Copper	Proline 1088	1088	Other	2	2010	67
GC	10930		EMPTY									
GC	10935	100	SAIL	65'	16'	Low Copper	Interlux	Micron CSC	NB	8	2012	35
GC	10940		EMPTY									

Appendix Table C-3.

Shelter Island Yacht Basin SIML TMDL Group Vessel Tracking Data 2014 - Marinas 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
GC	10945	100	POWER	54'	17'	Copper	Sharkskin	SH-6145	NB	6	2005	45
GC	10300	92	POWER	58'	20'	Non-Copper	hydrocoat	1204	Marine Group Boat Works	10	2014	40
GC	10303	100	POWER	75'	20'6"	Unknown						
GC	10306		EMPTY									
GC	10309	100	SAIL	80'	16'	COPPER	Petit	Protector	Driscoll Mission Bay	2	2014	54
GC	10312	100	POWER	85'	20'2"	Unknown						
TONGA	10318	100	Power	48		Copper	cukote	3445GL				47
TONGA	10321	100	Power	39		Low Copper	micron	YBC583				35
TONGA	10324	100	Power	43		Copper	cukote	3445GL				47
TONGA	10327	100	Power	35		Copper	cukote	3445GL				47
TONGA	10330	100	Power	56			unknown					
TONGA	10333	100	Power	31			unknown					
TONGA	10336	100	Power	48			unknown					
TONGA	10339	100	Power	81			unknown					
TONGA	10342	100	Power	35			unknown					
TONGA	10345	100	Power	43		Copper	petit	BP94				61
TONGA	10348	100	Power	51			unknown					
TONGA	10351	100	Power	47			unknown					

APPENDIX D

WATER QUALITY RESULTS

This page intentionally left blank

FIELD DATA SHEETS

This page intentionally left blank

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-REF

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 08:00 Ended: (hh:mm) 08:58

GPS: (WGS84) Lat. 32.70411 Long. 117.23224

Tide (ft): Time of Slack High Tide:

Water Depth (ft): 65

Weather conditions: Cloudy

Wind (mph): 0.9

Current Speed and Direction: 2 Knots, ESE

Water Visibility (ft): 15

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.24	34.1	20.2
During sample collection	8.27	34.1	20.2
End of sample collection	8.28	34.2	20.2
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Collected plankton sample 10L, 20µm filtered into 250mL

Sample collection time: 08:12

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-6

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 09:08 Ended: (hh:mm) 10:03

GPS: (WGS84) Lat. 32.70875 Long. 117.23513

Tide (ft): Time of Slack High Tide:

Water Depth (ft): Ac ~~7.6~~ 15

Weather conditions: partly cloudy

Wind (mph): 4.7

Current Speed and Direction: 1 Knot ESE

Water Visibility (ft): 7.6

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.24	34.5	21.7
During sample collection	8.25	34.4	21.6
End of sample collection	8.29	34.5	21.3
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Construction at Scripps pier across bay
2 motor boats passed after chemistry cast, before tox cast
in-water hull cleaning boat passed by going east during tox cast #2

Sample collection time: 09:17

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-5

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 10:10 Ended: (hh:mm) 10:50

GPS: (WGS84) Lat. 32.71214 Long. 117.23306

Tide (ft): Time of Slack High Tide:

Water Depth (ft): 23

Weather conditions: Sunny, Partly cloudy

Wind (mph): ~~23~~ AC 10.5

Current Speed and Direction: 2-4

Water Visibility (ft): 9'6"

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.27	34.4	22.1
During sample collection	8.26	34.4	21.9
End of sample collection	8.26	34.4	22.0
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: tide and wind countering, swinging a little
Between F2 + E2
Collected sample 066 bow.
Sample collected at 10:17

Sealube hull cleaner headed
west during 2nd tox cast.

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-4

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 11:00 Ended: (hh:mm) 11:44

GPS: (WGS84) Lat. 32.71684 Long. 117.23203

Tide (ft): Time of Slack High Tide:

Water Depth (ft): 17

Weather conditions: Sunny, partly cloudy

Wind (mph): 8.3

Current Speed and Direction: Slack

Water Visibility (ft): 9' 0"

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.28	34.3	22.4
During sample collection	8.27	34.3	22.2
End of sample collection	8.27	34.3	22.2
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Small boat races

plankton tow #2 10L, 20µm into 250mL

Sample collected at 11:07

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-3

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 11:55   Ended: (hh:mm)

GPS: (WGS84) Lat. 32.71552   Long. 117.22987

Tide (ft):   Time of Slack High Tide:

Water Depth (ft): AC ~~8.7'~~ 21

Weather conditions: Sunny

Wind (mph): 9.6

Current Speed and Direction: 2 Knots SE

Water Visibility (ft): 8.7'

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.27	34.3	22.2
During sample collection	8.27	34.3	22.2
End of sample collection	AC 8.~~8~~27	34.5	22.2
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Hull cleaning boat headed west during 2nd tox cast.

Sample Collection time: 12:15

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-2

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 12:45 Ended: (hh:mm) 13:45

GPS: (WGS84) Lat. 32.71419 Long. 117.22929

Tide (ft): Time of Slack High Tide:

Water Depth (ft): 15

Weather conditions: Sunny, clouds (fog) to west and Southea~~st~~

Wind (mph): 3.8

Current Speed and Direction: 0-1 E

Water Visibility (ft): 11.5

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.28	34.3	22.4
During sample collection	8.28	34.4	22.4
End of sample collection	8.30	34.5	22.4
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Hull cleaner left at 12:50, across lane from sampling site. Some other potential cleaning activity; suds noted on surface - source unknown - moved to adjacent site but didn't start until 1st cust #1, cleaned at other site while we were sampling

Sample collection: 13:13

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-1

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 13:53

Ended: (hh:mm) 14:37

GPS: (WGS84) Lat. 32.71824

Long. 117.22601

Tide (ft):

Time of Slack High Tide:

Water Depth (ft): 17

Weather conditions: Sunny, clouds south and north

Wind (mph): 7.1

Current Speed and Direction: 2 knots, mixed

Water Visibility (ft): A ← ~~9.0~~ 10.5

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.28	34.5	23.0
During sample collection	8.28	34.5	23.1
End of sample collection	8.29	34.5	23.2
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes:

sample collection time 14:00
no boat cleaning activities noted

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-1 Rep

Date: (mm/dd/yyyy) 8/12/14

Time Started: (hh:mm) 14:38

Ended: (hh:mm) 14:53 end SIYB-1Rep ~~14:56~~ AC 14:56 FB

GPS: (WGS84) Lat. 32.71820 Long. 117.22606

Tide (ft):

Time of Slack High Tide:

Water Depth (ft): 17

Weather conditions: Sunny, clouds north and south

Wind (mph): 13.0

Current Speed and Direction: 2 knots east

Water Visibility (ft): 11.0

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station	8.29	34.5	23.0
During sample collection	8.28	34.6	23.2
End of sample collection	8.29	34.5	23.2
Average value			

*Water quality measured at the same depth as sample collection (i.e. within 1 meter from the surface).

Notes: Topside cleaning observed on boat across bay, wind in our direction

Sample collection time: 14:43

FIELD WATER QUALITY DATA SHEET

Station Identification: __________

Date: (mm/dd/yyyy) __________

Time Started: (hh:mm) __________ Ended: (hh:mm) __________

GPS: (WGS84) Lat. __________ Long. __________

Tide (ft): __________ Time of Slack High Tide: __________

Water Depth (ft): __________

Weather conditions: 8/11/14 Prelim/ Recognasance

Wind (mph): __________

SIYB-6- Pobre Dulce @ 8 feet u/s

Current Speed and Direction: __________

Water Visibility (ft): 9.2'/9.8'/10.5'/10.5' → SIYB-1 Fred Duf feet

Time of Measurement	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station			
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:

FIELD QA/QC

This page intentionally left blank

MOBILIZATION CHECKLIST

Date/Time: 8/12/14 7:10

Mark each box with Y, N, or NA

Prior to Field Operations:

Reconnaissance survey completed one day prior to the sampling event to make sure conditions for sampling are appropriate (i.e. no algal blooms, weather conditions)	Y
Mobilization and equipment check list has been evaluated by Port staff	Y
Health and Safety Briefing occurred prior to departure	Y
Sampling instrument cleaned with soap and deionized water	Y
Vessel uses copper free hull paint	Y
Monitoring Plan and QAPP readily available to persons in the field	Y
Staff has received proper training and signed off on QAPP review prior to field activities	Y
Sample transport to the lab(s) has been arranged to meet holding times	Y

FIELD SAMPLING QA CHECKLIST

Station Location: Eq Rinsate **Date/Time:** 8/12/14 7:20

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	N/A
Vessel has been anchored (or tied off) * at dock	N/A
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N/A
Tide recorded	N/A
Weather conditions recorded	N/A
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci disk	N/A
Time of sampling recorded	Y
Water depth at sample site recorded	N/A
General site observations recorded	N/A
Check for boat cleaning operations in the area – if active, move to a new station	N/A

2. Sampling procedures:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	N/A
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment * DI Rinse	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N/A
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
Sampling depth recorded	N/A
Sample bottles filled in the following order: metals, organics, ~~toxicity~~	Y

N/A = not applicable

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
[✓ Equipment rinsate blank] and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

None to report

Sample time = 0730

Signature of QA/QC Personnel: Barry J. Snyder **Date/Time** 8/12/14 16:15

Print Name/Company: Barry Snyder / AMEC

Port QA

8/12/14
16:25

FIELD SAMPLING QA CHECKLIST

Station Location: Re 7 **Date/Time:** 8/12/14 8:03

Chem water sample collected 8:12

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded ~18 ft ~6 m	N
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci disk	Y *
Time of sampling recorded	Y
Water depth at sample site recorded	Y
General site observations recorded	X
Check for boat cleaning operations in the area – if active, move to a new station	Y

* see notes on back re: secchi

2. Sampling procedures:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

Current prevented use of secchi disc.
Two pole method need to collect water samples due to current speed
Plankton sample collected - 10L thru 20 um

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14 16:15

Print Name/Company: Barry Snyder / AMEC

Port QA Thomas LaCoelle 8/12/14 16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB - 6 **Date/Time:** 8/12/14 9:08

Mark each box with Y, N, or NA chem sample 9:17

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
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 secci 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 *

* see notes

2. Sampling procedures:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:
construction activities going on at Scripps Pier

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14 16:15

Print Name/Company: Barry Snyder / AMEC

Port QA 8/12/14 16:25

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB-5 **Date/Time:** 8/12/14 10:10

sampling time 10:17

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	~~Y~~ BS N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

Between F2 + E2. slightly off station due to wind. weathervaning closer to station

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14 16:15

Print Name/Company: Barry Snyder / AMEC

Port QA 8/12/14 16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB - 4 **Date/Time:** 8/12/14 11:00

sample collected 11:07

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes: (Sabots)

small sail boats racing in area

plankton sample collected 10 L thru a 20 um filter

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14

Print Name/Company: Barry Snyder / AMEC 16:15

Port QA [illegible] 8/12/14
16:25

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN TMDL MONITORING
2014

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB-3 **Date/Time:** 8/12/14

11:55 on Station
12:15 water collection

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

on station at 11:55 - lunch break
collected water sample at 12:15
for chem

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14

Print Name/Company: Barry Snyder / AMEC 16:15

Port QA 8/12/14
16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB - 2 **Date/Time:** 8/12 12:45

sample collected 13:13

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received ~~a~~ blank field sheet	Y
Vessel has been anchored ([✓ or tied off])	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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*

* see note section

2. Sampling procedures:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

There was a boat cleaner next to an adjacent vessel, but he did not get in water to clean.

Active hull cleaning going on south of site. Waited for 20 minutes of cleaner left before water sample was collected.

hull cleaner move to another site in next to south west

Top side cleaning occurring at adjacent sites.

No excessive water use going on at site.

some suds in the area on water's surface

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14 16:15

Print Name/Company: Barry Snyder / AMEC

Port QA 8/12/14 16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB-1 **Date/Time:** 8/12/14
on-site 13:53
sample 14:00 collected

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	Y
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

None

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14

Print Name/Company: Barry Snyder / AMEC 16:15

Port QA 8/12/14
16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB- 1 Rep **Date/Time:** 8/12/14 14:40 14:45

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N
Tide recorded	
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci 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:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	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
Sampling depth recorded	Y
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

No toxicity for field rep west.
Top side work to the ~~North west~~

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14

Print Name/Company: Barry Snyder / AMEC 16:15

Port QA 8/12/14
16:25

FIELD SAMPLING QA CHECKLIST

Station Location: SIYB - FB **Date/Time:** 8/12/14

Mark each box with Y, N, or NA

Field Procedures

1. Upon arriving at the sampling location, the following site observations are being recorded:

Port QA personnel has received a blank field sheet	Y
Vessel has been [✓ anchored] (or tied off)	Y
Station GPS coordinates (approx. ± 3 m) and station identification verified and recorded	N/A
Tide recorded	N/A
Weather conditions recorded	N/A
Surface water conditions (incl. currents) recorded (Including H2O clarity by secci disk	N/A
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	Y

2. Sampling procedures:

A. Water Samples

Field staff wearing fresh, powder free nitrile gloves	Y
Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Sampling instrument given site water rinse prior to deployment	N/A
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
Sample bottles are lab certified, contaminant free in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sampling depth delineated on sampling instrument with a clear marking (sampling must occur within 1 m of surface)	N/A
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
Sampling depth recorded	N/A
Sample bottles filled in the following order: metals, organics, toxicity	Y

FIELD SAMPLING QA CHECKLIST

Staff avoided contaminating samples at all times	Y
COC seals have been placed over individual sample bottles	Y
Equipment rinsate blank and [✓ field blank] have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. Data Recording:

Water samples properly logged on COC form	Y
Proper persons have signed the COC	Y
Field notes have been recorded for this site before moving to the next	Y

4. 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

5. PPE properly removed and disposed of upon station completion Y

Additional Notes:

None

Signature of QA/QC Personnel: Barry Snyder **Date/Time** 8/12/14

Print Name/Company: Barry Snyder / AMEC 16:15

Port QA 8/12/14
16:25

ANALYTICAL CHEMISTRY REPORTS

This page intentionally left blank

WECK LABORATORIES
ANALYTICAL CHEMISTRY REPORT

This page intentionally left blank

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Attention: Rolf Schottle

Phone: (858) 300-4323

Fax: (858) 300-4301

Work Order(s): 4H12104

Report Date: 08/28/14 11:06

Received Date: 08/12/14 18:55

Turn Around: Normal

Client Project: Port of San Diego Shelter Island Yacht Basin

PO Number: MSSA-11-36M-100812_TO#SD-002

NELAP #04229CA ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Rolf Schottle :

Enclosed are the results of analyses for samples received 08/12/14 18:55 with the Chain of Custody document. The samples were received in good condition, at 2.9 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
SIYB-1	Tyler Huff / Chris S		4H12104-01	Water	08/12/14 14:00
SIYB-1 (Rep)	Tyler Huff / Chris S		4H12104-02	Water	08/12/14 14:43
SIYB-2	Tyler Huff / Chris S		4H12104-03	Water	08/12/14 13:13
SIYB-3	Tyler Huff / Chris S		4H12104-04	Water	08/12/14 12:15
SIYB-4	Tyler Huff / Chris S		4H12104-05	Water	08/12/14 11:07
SIYB-5	Tyler Huff / Chris S		4H12104-06	Water	08/12/14 10:17
SIYB-6	Tyler Huff / Chris S		4H12104-07	Water	08/12/14 09:17
SIYB-REF	Tyler Huff / Chris S		4H12104-08	Water	08/12/14 08:12
SIYB-ER	Tyler Huff / Chris S		4H12104-09	Water	08/12/14 07:30
SIYB-FB	Tyler Huff / Chris S		4H12104-10	Water	08/12/14 14:56

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Metals - Low Level by 1600 Series Methods

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-01 **SIYB-1**

Sampled: 08/12/14 14:00 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.4**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.3**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**12**	0.0038	0.010	ug/l	1	08/23/14 00:27	
Copper, Total	**13**	0.0038	0.010	ug/l	1	08/23/14 03:14	
Zinc, Dissolved	**33**	0.036	0.20	ug/l	1	08/23/14 00:27	
Zinc, Total	**33**	0.036	0.20	ug/l	1	08/23/14 03:14	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-02 **SIYB-1 (Rep)**

Sampled: 08/12/14 14:43 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.5**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.4**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**13**	0.0038	0.010	ug/l	1	08/23/14 00:41	
Copper, Total	**14**	0.0038	0.010	ug/l	1	08/23/14 03:28	
Zinc, Dissolved	**35**	0.036	0.20	ug/l	1	08/23/14 00:41	
Zinc, Total	**33**	0.036	0.20	ug/l	1	08/23/14 03:28	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-03 **SIYB-2**

Sampled: 08/12/14 13:13 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.3**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.2**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.3**	0.0038	0.010	ug/l	1	08/23/14 00:54	
Copper, Total	**9.4**	0.0038	0.010	ug/l	1	08/23/14 03:41	
Zinc, Dissolved	**19**	0.036	0.20	ug/l	1	08/23/14 00:54	
Zinc, Total	**21**	0.036	0.20	ug/l	1	08/23/14 03:41	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-04 **SIYB-3**

Sampled: 08/12/14 12:15 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.3**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.3**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.7**	0.0038	0.010	ug/l	1	08/23/14 01:08	
Copper, Total	**9.5**	0.0038	0.010	ug/l	1	08/23/14 03:55	
Zinc, Dissolved	**20**	0.036	0.20	ug/l	1	08/23/14 01:08	
Zinc, Total	**21**	0.036	0.20	ug/l	1	08/23/14 03:55	

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-05 **SIYB-4**

Sampled: 08/12/14 11:07 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.5**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.3**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.2**	0.0038	0.010	ug/l	1	08/23/14 01:22	
Copper, Total	**8.8**	0.0038	0.010	ug/l	1	08/23/14 04:09	
Zinc, Dissolved	**19**	0.036	0.20	ug/l	1	08/23/14 01:22	
Zinc, Total	**19**	0.036	0.20	ug/l	1	08/23/14 04:09	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-06 **SIYB-5**

Sampled: 08/12/14 10:17 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.3**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.3**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**6.0**	0.0038	0.010	ug/l	1	08/23/14 01:36	
Copper, Total	**7.2**	0.0038	0.010	ug/l	1	08/23/14 04:23	
Zinc, Dissolved	**17**	0.036	0.20	ug/l	1	08/23/14 01:36	
Zinc, Total	**17**	0.036	0.20	ug/l	1	08/23/14 04:23	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-07 **SIYB-6**

Sampled: 08/12/14 09:17 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.3**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.2**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**1.8**	0.0038	0.010	ug/l	1	08/23/14 01:50	
Copper, Total	**2.8**	0.0038	0.010	ug/l	1	08/23/14 04:37	
Zinc, Dissolved	**4.9**	0.036	0.20	ug/l	1	08/23/14 01:50	
Zinc, Total	**5.7**	0.036	0.20	ug/l	1	08/23/14 04:37	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-08 **SIYB-REF**

Sampled: 08/12/14 08:12 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**1.2**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**1.1**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.62**	0.0038	0.010	ug/l	1	08/23/14 03:00	
Copper, Total	**1.3**	0.0038	0.010	ug/l	1	08/23/14 04:51	
Zinc, Dissolved	**1.7**	0.036	0.20	ug/l	1	08/23/14 03:00	
Zinc, Total	**2.4**	0.036	0.20	ug/l	1	08/23/14 04:51	

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-09 **SIYB-ER**

Sampled: 08/12/14 07:30 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**0.20**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**0.26**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.055**	0.0038	0.010	ug/l	1	08/22/14 23:59	
Copper, Total	**0.081**	0.0038	0.010	ug/l	1	08/23/14 00:13	
Zinc, Dissolved	**0.31**	0.036	0.20	ug/l	1	08/22/14 23:59	
Zinc, Total	**0.17**	0.036	0.20	ug/l	1	08/23/14 00:13	J

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 08/12/14 18:55
Date Reported: 08/28/14 11:06

4H12104-10 **SIYB-FB**

Sampled: 08/12/14 14:56 **Sampled By:** Tyler Huff / Chris Stransky **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B Batch: W4H0726 Prepared: 08/14/14 12:43 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Organic Carbon (TOC)	**0.24**	0.016	0.10	mg/l	1	08/14/14 13:00	

Method: SM 5310B Batch: W4H0796 Prepared: 08/15/14 12:07 Analyst: Jose L. Pazzi

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Dissolved Organic Carbon	**0.22**	0.016	0.10	mg/l	1	08/15/14 12:50	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 Batch: W4H1139 Prepared: 08/22/14 08:58 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.031**	0.0038	0.010	ug/l	1	08/22/14 21:26	
Copper, Total	**0.062**	0.0038	0.010	ug/l	1	08/22/14 21:40	
Zinc, Dissolved	**0.12**	0.036	0.20	ug/l	1	08/22/14 21:26	J
Zinc, Total	ND	0.036	0.20	ug/l	1	08/22/14 21:40	

QUALITY CONTROL SECTION

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W4H0726 - SM 5310B

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4H0726-BLK1)					Analyzed: 08/14/14 13:00						
Total Organic Carbon (TOC)	0.0246	0.016	0.10	mg/l							J
LCS (W4H0726-BS1)					Analyzed: 08/14/14 13:00						
Total Organic Carbon (TOC)	1.00	0.016	0.10	mg/l	1.00		100	80-120			
Matrix Spike (W4H0726-MS1)		**Source: 4H12104-01**			Analyzed: 08/14/14 13:00						
Total Organic Carbon (TOC)	6.58	0.016	0.10	mg/l	5.00	1.42	103	80-120			
Matrix Spike Dup (W4H0726-MSD1)		**Source: 4H12104-01**			Analyzed: 08/14/14 13:00						
Total Organic Carbon (TOC)	6.41	0.016	0.10	mg/l	5.00	1.42	100	80-120	3	10	

Batch W4H0796 - SM 5310B

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4H0796-BLK1)					Analyzed: 08/15/14 12:50						
Dissolved Organic Carbon	0.0793	0.016	0.10	mg/l							J
LCS (W4H0796-BS1)					Analyzed: 08/15/14 12:50						
Dissolved Organic Carbon	1.04	0.016	0.10	mg/l	1.00		104	80-120			
Matrix Spike (W4H0796-MS1)		**Source: 4H12104-01**			Analyzed: 08/15/14 12:50						
Dissolved Organic Carbon	5.74	0.016	0.10	mg/l	5.00	1.28	89	80-120			
Matrix Spike Dup (W4H0796-MSD1)		**Source: 4H12104-01**			Analyzed: 08/15/14 12:50						
Dissolved Organic Carbon	6.12	0.016	0.10	mg/l	5.00	1.28	97	80-120	6	20	

Metals - Low Level by 1600 Series Methods - Quality Control

Batch W4H1139 - EPA 1640

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4H1139-BLK1)					Analyzed: 08/22/14 21:12						
Copper, Dissolved	ND	0.0038	0.010	ug/l							
Copper, Total	ND	0.0038	0.010	ug/l							
Zinc, Dissolved	0.108	0.036	0.20	ug/l							J
Zinc, Total	ND	0.036	0.20	ug/l							
LCS (W4H1139-BS1)					Analyzed: 08/22/14 21:54						
Copper, Dissolved	10.6	0.0038	0.010	ug/l	10.0		106	70-130			
Copper, Total	10.6	0.0038	0.010	ug/l	10.0		106	73-122			
Zinc, Dissolved	32.6	0.036	0.20	ug/l	30.0		109	75-127			
Zinc, Total	32.6	0.036	0.20	ug/l	30.0		109	75-127			
Matrix Spike (W4H1139-MS1)		**Source: 4H12104-01**			Analyzed: 08/22/14 22:07						
Copper, Total	22.8	0.0038	0.010	ug/l	10.0	13.4	94	60-138			
Zinc, Total	62.0	0.036	0.20	ug/l	30.0	32.9	97	68-132			
Matrix Spike (W4H1139-MS2)		**Source: 4H12104-03**			Analyzed: 08/22/14 22:35						
Copper, Total	18.8	0.0038	0.010	ug/l	10.0	9.44	93	60-138			
Zinc, Total	50.7	0.036	0.20	ug/l	30.0	21.1	98	68-132			

Metals - Low Level by 1600 Series Methods - Quality Control

Batch W4H1139 - EPA 1640

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike Dup (W4H1139-MSD1)		**Source: 4H12104-01**			Analyzed: 08/22/14 22:21						
Copper, Total	22.8	0.0038	0.010	ug/l	10.0	13.4	95	60-138	0.09	30	
Zinc, Total	63.0	0.036	0.20	ug/l	30.0	32.9	100	68-132	2	30	
Matrix Spike Dup (W4H1139-MSD2)		**Source: 4H12104-03**			Analyzed: 08/22/14 22:49						
Copper, Total	18.6	0.0038	0.010	ug/l	10.0	9.44	91	60-138	1	30	
Zinc, Total	50.1	0.036	0.20	ug/l	30.0	21.1	97	68-132	1	30	

Notes and Definitions

J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

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 Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

4H12104

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 5

CLIENT NAME: AMEC Environment & Infrastructure, Inc.
ADDRESS: 9210 Sky Park Ct., Suite 200
San Diego, CA 92123
PROJECT MANAGER Rolf Schottle

PROJECT: Port of San Diego - Shelter Island Yacht Basin
PHONE: 619-985-2405
FAX: 858-300-4301
EMAIL: rolf.schottle@amec.com
SAMPLER Tyler Huff (TH) / Chris Stransky (CS)

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
SIYB-1	08/12/14	14:00	seawater		14	X	X	X	X	X	X					extra vol. analyze sample MS/MSD
SIYB-1 (REP)	08/12/14	14:43	seawater		8	X	X	X	X	X	X					
SIYB-2	08/12/14	13:13	seawater		8	X	X	X	X	X	X					
SIYB-3	08/12/14	12:15	seawater		8	X	X	X	X	X	X					
SIYB-4	08/12/14	11:07	seawater		8	X	X	X	X	X	X					
SIYB-5	08/12/14	10:17	seawater		8	X	X	X	X	X	X					
SIYB-6	08/12/14	9:17	seawater		8	X	X	X	X	X	X					
SIYB-REF	08/12/14	8:12	seawater		8	X	X	X	X	X	X					
SIYB-ER	08/12/14	7:30	DI		8	X	X	X	X	X	X					
SIYB-FB	08/12/14	14:56	DI		8	x	x	x	x	x	x					

RELINQUISHED BY	DATE / TIME	RECEIVED BY
	8/12/14 15:50	8/12/14 15:50
	8/12/14 18:55	

SAMPLE CONDITION:

Actual Temperature: 2.9
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: FILTER/PRESERVE DISSOLVED Cu/Zn IMMEDIATELY- within same period; not split days 3) 10 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 TOXICITY REPORT

This page intentionally left blank

Toxicity Testing Results for the Shelter Island Yacht Basin Total Maximum Daily Load Monitoring Plan

Monitoring Period: August 2014

Prepared for:
AMEC Environment and Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Prepared by:
Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Report Submitted:
February 18, 2015
Revised March 10, 2015

Data Quality Assurance:

- Nautilus Environmental is a certified laboratory under the State of California Department of Health Services, Environmental Laboratory Accreditation Program (ELAP), Certificate No. 1802.
- 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.
- Any test data discrepancies or protocol deviations have been noted in the report.

Results verified by: Adrienne Cibor

California
4340 Vandever Avenue
San Diego, California 92120
858.587.7333
fax: 858.587.3961

British Columbia
8664 Commerce Court
Burnaby, British Columbia
V5A 4N7
604-420-8773
fax: 604-603-9381

Introduction

Ambient receiving water samples were collected in the Shelter Island Yacht Basin (SIYB), San Diego, California, in August 2014 to fulfill annual monitoring requirements for the SIYB Dissolved Copper Total Maximum Daily Load (TMDL) program. Samples were collected by AMEC Environment and Infrastructure, Inc. (AMEC) and Nautilus Environmental (Nautilus) staff, and were 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 Environment and Infrastructure, Inc.
Sample ID (Sample Collection Date; Time):	1. SIYB-1 (8/12/14; 14:00) 2. SIYB-2 (8/12/14; 13:13) 3. SIYB-3 (8/12/14; 12:15) 4. SIYB-4 (8/12/14; 11:07) 5. SIYB-5 (8/12/14; 10:17) 6. SIYB-6 (8/12/14; 09:17) 7. SIYB-REF (8/12/14; 08:12)
Sample Receipt Date; Time:	8/12/14; 16:45
Sample Material (sample type):	Ambient Water (grab sample)

Bivalve Larvae Chronic Survival and Development Test Specifications

Test Period:	8/13/14; 17:30 – 8/15/14; 17:00
Test Organism:	*Mytilus galloprovincialis* (Mediterranean mussel)
Test Organism Source:	Kamilche Seafarms (Shelton, WA)
Control and Dilution Water:	Natural seawater from Scripps Institution of Oceanography inlet, 20 µm-filtered, 34 ± 2 parts per thousand (ppt). All replicates from each sample were contained 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 (^{o}C)
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.
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:	8/13/14; 12:35 to 12:45 – 8/17/14; 11:05 to 11:20
Test Organism:	*Atherinops affinis* (Pacific topsmelt; 13 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, 50, and 25 percent sample
Number of Organisms/Replicate:	5
Number of Replicates/ Concentration:	6
Test Temperature:	21 ± 1^{o}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)

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. The hinge should be straight; curvature of this part of the shell indicates a retarded or abnormal development effect. Embryos and larvae that exhibit an effect, have developmental patterns differing from those in control replicates, or do not reach the straight hinge D-shape stage at test termination are counted as abnormal.

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 deleterious effects were observed due to the filtration procedure itself. A No Observed Effect Concentration (NOEC), Lowest Observed Effect Concentration (LOEC), median effect concentration (EC50), and percent effect relative to 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 calculator 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 calculated, 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.

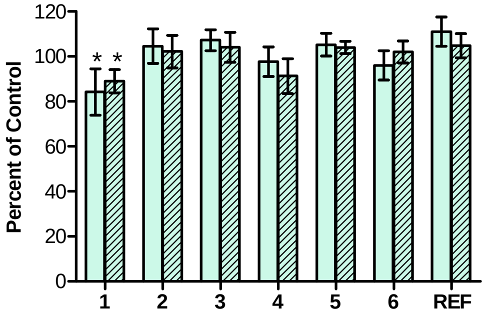
Bivalve Larvae Chronic Survival and Development Test

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 serial diluted per method directions. In addition, an aliquot of each undiluted (i.e., 100 percent only) sample was tested after being filtered through a 0.45-µm nylon filter for comparison purposes as described in the 2014 monitoring plan (AMEC 2014). This step was performed due to interference from native organisms and potentially harmful algae, a confounding factor identified in previous years.

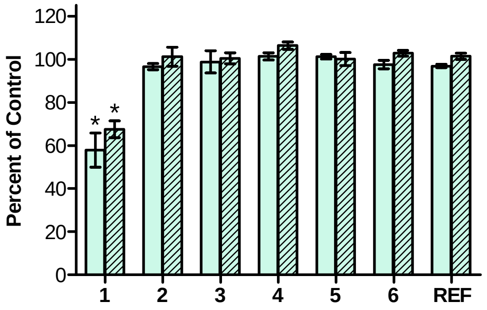
Statistical results for the mussel test are summarized in Table 1, and mean test results are summarized in Table 3.

The only site with a notable response for the combined survival and development endpoint in the undiluted, unfiltered sample was SIYB-1, with a 51 percent effect from the associated lab control (Figure 2). A similar effect was also observed in the 0.45-μm filtered sample (40 percent effect from the filter control). Most of the affected larvae in the SIYB-1 sample were partially developed, but did not possess a straight hinge; this response was not observed in any of the controls or any replicates from other sites. This decrease was statistically significant using both the traditional EPA flow-chart statistical approach and the TST analysis. Additionally, There were no statistically significant effects detected in any of the test concentrations for the SIYB-2, SIYB-3, SIYB-4, SIYB-5, SIYB-6, or SIYB-REF samples with regard to the combined development rate endpoint in the bivalve test.

a) Survival



b) Normal Development



c) Combined Survival and Development

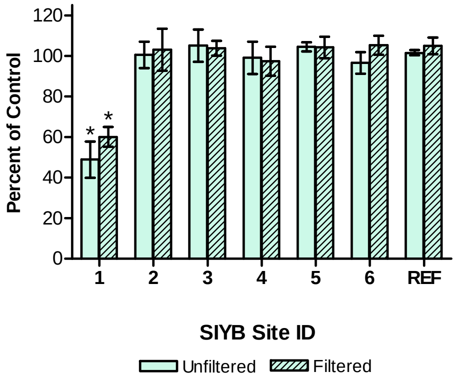
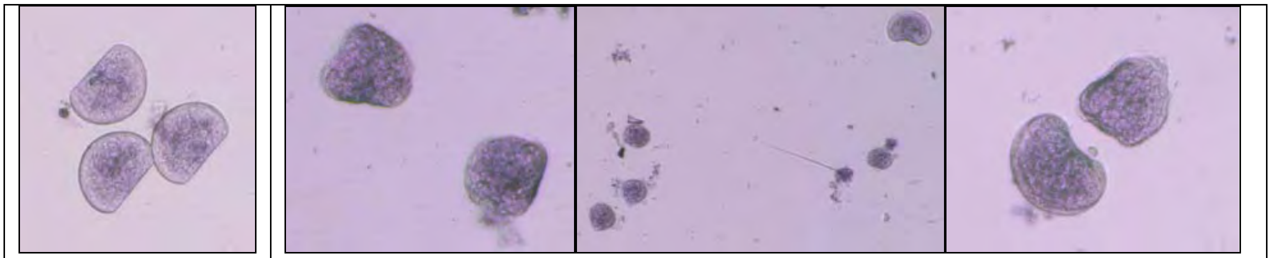


Figure 1. Results of the 48-hour larval bivalve survival and normal development test for each undiluted sample, a) survival, b) normal development, c) combined survival and normal development; presented as the mean result (± standard deviation) normalized to the control. Note: all three endpoints are displayed separately here for additional information, but only the combined endpoint is used for NOEC/LOEC determination and TST pass/fail calculations. An asterisk (*) indicates a statistically significant decrease compared to control using both the traditional EPA flow chart statistical methods and TST analysis.



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.

Pacific Topsmelt Acute Survival Test

There was no toxicity to Pacific topsmelt in any of the undiluted samples tested. Statistical results for the topsmelt tests are summarized in Table 2, and mean test results are summarized in Table 4.

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)
SIYB-1	Unfiltered	50	98.7	2.0	Fail
	Filtered	< 100	> 100	>1.0	Fail
SIYB-2	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass
SIYB-3	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass
SIYB-4	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass
SIYB-5	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass
SIYB-6	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass
SIYB-REF	Unfiltered	100	> 100	1.0	Pass
	Filtered	100	> 100	1.0	Pass

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

Table 2. 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	0.0	Pass
SIYB-2	100	> 100	0.0	Pass
SIYB-3	100	> 100	0.0	Pass
SIYB-4	100	> 100	0.31	Pass
SIYB-5	100	> 100	0.0	Pass
SIYB-6	100	> 100	0.0	Pass
SIYB-REF	100	> 100	0.0	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

TST: Pass = sample is non-toxic according to the TST analysis; Fail = sample is toxic according to the TST analysis

Table 3. 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	84	86	84	86	89	92	91
6.25	77	88	82	82	90	89	90
12.5	83	87	88	80	92	88	86
25	83	89	84	81	92	93	91
50	78	85	84	83	93	92	88
100	**41***	86	89	85	93	89	92
Filter Control	85	85	85	85	85	85	85
100 (filtered)	**51***	87	88	82	88	89	89

Note: Mean combined survival and development in the lab control for Sites 1 through 5 was below 90 percent. However, mean normal development (not taking survival into account) was greater than 90 percent and survival was greater than 50 percent in all lab controls, which meets EPA requirements (see Appendix A for details).

*** A bold asterisk** indicates a statistically significant decrease compared to the lab control using both the traditional EPA flow-chart statistical methods and the TST analysis.

Table 4. 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	100	100	100	97	97	100	100
25	97	100	100	100	83	100	100
50	100	100	100	100	97	100	100
100	100	100	100	97	100	100	100

Quality Assurance

Samples were received in good condition on the same day as collected. The SIYB 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, 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.

Concurrent reference toxicant test results for both species are summarized in Table 5 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. 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 5. 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	14.5	9.6 ± 6.5	33.6
Pacific Topsmelt: 96-hr Survival	157	123 ± 96.2	39.0

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. 2014. Final Shelter Island Yacht Basin Total Maximum Daily Load Monitoring Plan – Revision 1. March 2014

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. 2000-2012. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.8.4.23.

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: 22 Aug-14 09:05 (p 1 of 1)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	03-6714-2905	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	07-0065-6291	**Code:**	14-0668	**Client:**	AMEC
Sample Date:	12 Aug-14 14:00	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	27h (0.2 °C)	**Station:**	SIYB-1		

Sample Note: 101 = 100% filtered sample (0.45 μm)

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-9349-9813	Combined Development Ra	50	100	70.71	12.4%	2	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
01-2326-9719	Combined Development Ra	EC25	70.07	55.86	80.74	1.427	Linear Interpolation (ICPIN)
		EC50	98.73	87.53	N/A	1.013	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-9349-9813	Combined Development Ra	PMSD	0.1238	NL - 0.25	No	Passes Acceptability Criteria

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	0.8453	0.8274	0.8633	0.7783	0.9113	0.02151	0.04809	5.69%	0.0%
0	Lab Control	5	0.8424	0.8181	0.8666	0.7635	0.9113	0.02906	0.06498	7.71%	0.35%
6.25		5	0.7734	0.7351	0.8117	0.6108	0.8571	0.04584	0.1025	13.25%	8.51%
12.5		5	0.8286	0.8082	0.849	0.7586	0.9064	0.02445	0.05468	6.6%	1.98%
25		5	0.8305	0.8107	0.8504	0.7586	0.8916	0.02381	0.05324	6.41%	1.75%
50		5	0.7793	0.7477	0.8109	0.6453	0.8768	0.03788	0.08471	10.87%	7.81%
100		5	0.4118	0.3835	0.4402	0.3202	0.5172	0.03397	0.07596	18.45%	51.28%
NL ~~101~~ 100% filtered		5	0.5074	0.4918	0.5229	0.4335	0.532	0.01863	0.04165	8.21%	39.98%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	0.9113	0.8621	0.7783	0.8374	0.8374
0	Lab Control	0.7833	0.9113	0.8719	0.8818	0.7635
6.25		0.8374	0.8276	0.8571	0.734	0.6108
12.5		0.8473	0.803	0.7586	0.9064	0.8276
25		0.798	0.867	0.8916	0.8374	0.7586
50		0.7685	0.803	0.6453	0.8768	0.803
100		0.4236	0.4384	0.3596	0.3202	0.5172
NL ~~101~~ 100% filtered		0.4335	0.5271	0.532	0.5172	0.5271

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Filter Control	185/203	175/203	158/203	170/203	170/203
0	Lab Control	159/203	185/203	177/203	179/203	155/203
6.25		170/203	168/203	174/203	149/203	124/203
12.5		172/203	163/203	154/203	184/203	168/203
25		162/203	176/203	181/203	170/203	154/203
50		156/203	163/203	131/203	178/203	163/203
100		86/203	89/203	73/203	65/203	105/203
NL ~~101~~ 100% filtered		88/203	107/203	108/203	105/203	107/203

Analyst:______ QA: 9/4/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:04 (p 1 of 2)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 13-9349-9813
Endpoint: Combined Development Rate
CETIS Version: CETISv1.8.4
Analyzed: 22 Aug-14 8:59
Analysis: Parametric-Control vs Treatments
Official Results: Yes

Sample Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	50	100	70.71	2	12.4%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.522	2.362	0.135	8	0.2169	CDF	Non-Significant Effect
		12.5	0.3594	2.362	0.135	8	0.7063	CDF	Non-Significant Effect
		25	0.322	2.362	0.135	8	0.7213	CDF	Non-Significant Effect
		50	1.424	2.362	0.135	8	0.2494	CDF	Non-Significant Effect
		100*	8.27	2.362	0.135	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.8062196	0.1612439	5	19.75	<0.0001	Significant Effect
Error	0.1959377	0.008164071	24			
Total	1.002157		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.489	15.09	0.9144	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9628	0.9031	0.3641	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	0.8424	0.7617	0.923	0.8719	0.7635	0.9113	0.02906	7.71%	0.0%
6.25		5	0.7734	0.6461	0.9007	0.8276	0.6108	0.8571	0.04584	13.25%	8.19%
12.5		5	0.8286	0.7607	0.8965	0.8276	0.7586	0.9064	0.02445	6.6%	1.64%
25		5	0.8305	0.7644	0.8966	0.8374	0.7586	0.8916	0.02381	6.41%	1.4%
50		5	0.7793	0.6741	0.8845	0.803	0.6453	0.8768	0.03788	10.87%	7.49%
100		5	0.4118	0.3175	0.5061	0.4236	0.3202	0.5172	0.03397	18.45%	51.11%

Angular (Corrected) Transformed Summary

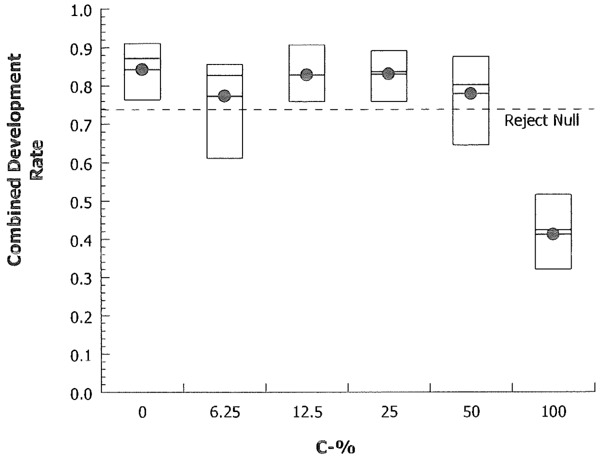
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.169	1.058	1.279	1.205	1.063	1.268	0.03987	7.63%	0.0%
6.25		5	1.082	0.9342	1.229	1.143	0.8972	1.183	0.05308	10.97%	7.44%
12.5		5	1.148	1.055	1.241	1.143	1.057	1.26	0.03363	6.55%	1.76%
25		5	1.15	1.062	1.238	1.156	1.057	1.235	0.03181	6.18%	1.58%
50		5	1.087	0.9615	1.213	1.111	0.9328	1.212	0.04523	9.3%	6.97%
100		5	0.6959	0.5997	0.7922	0.7087	0.6015	0.8026	0.03467	11.14%	40.44%

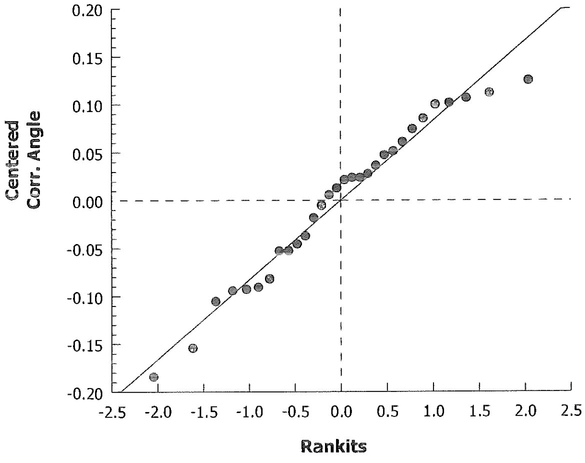
Analyst:______ QA: 9/11/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	13-9349-9813	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 8:59	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: QA: 9/4/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:05 (p 1 of 1)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	01-2326-9719	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:01	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Sample Note: 101 = 100% filtered sample

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1387077	1000	Yes	Two-Point Interpolation

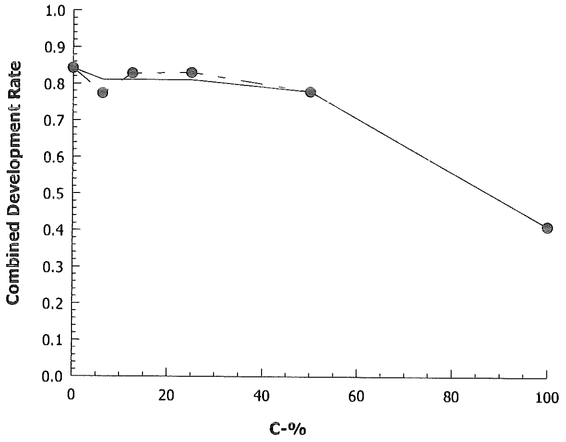
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC25	70.07	55.86	80.74	1.427	1.239	1.79
EC50	98.73	87.53	N/A	1.013	NA	1.142

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	0.8424	0.7635	0.9113	0.02906	0.06498	7.71%	0.0%	855	1015
6.25		5	0.7734	0.6108	0.8571	0.04584	0.1025	13.25%	8.19%	785	1015
12.5		5	0.8286	0.7586	0.9064	0.02445	0.05468	6.6%	1.64%	841	1015
25		5	0.8305	0.7586	0.8916	0.02381	0.05324	6.41%	1.4%	843	1015
50		5	0.7793	0.6453	0.8768	0.03788	0.08471	10.87%	7.49%	791	1015
100		5	0.4118	0.3202	0.5172	0.03397	0.07596	18.45%	51.11%	417	1015

Graphics



Analyst: SD QA: 09/4/14

CETIS Analytical Report

Report Date: 08 Sep-14 12:50 (p 1 of 4)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	17-3861-3630	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:49	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	50	100	70.71	2	6.12%

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	31	16	0	8	0.9676	Asymp	Non-Significant Effect
	12.5	31	16	0	8	0.9676	Asymp	Non-Significant Effect
	25	36	16	0	8	0.9991	Asymp	Non-Significant Effect
	50	25	16	0	8	0.6353	Asymp	Non-Significant Effect
	100*	15	16	0	8	0.0191	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.014171	0.2028342	5	47.03	<0.0001	Significant Effect
Error	0.1035109	0.004312954	24			
Total	1.117682		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.68	15.09	0.0266	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8499	0.9031	0.0006	Non-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	0.9291	0.9045	0.9538	0.9226	0.904	0.9521	0.008883	2.14%	0.0%
6.25		5	0.9156	0.8201	1	0.9392	0.7801	0.9688	0.03439	8.4%	1.45%
12.5		5	0.9386	0.9081	0.969	0.9451	0.8984	0.9588	0.01098	2.62%	-1.01%
25		5	0.9535	0.9405	0.9665	0.9514	0.9448	0.9714	0.004692	1.1%	-2.62%
50		5	0.925	0.9053	0.9447	0.9223	0.9097	0.9455	0.007089	1.71%	0.45%
100		5	0.5384	0.4471	0.6296	0.5659	0.4088	0.5833	0.03286	13.65%	42.06%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.303	1.255	1.352	1.289	1.256	1.35	0.01755	3.01%	0.0%
6.25		5	1.293	1.142	1.445	1.322	1.083	1.393	0.05453	9.43%	0.76%
12.5		5	1.324	1.263	1.384	1.334	1.246	1.366	0.02174	3.67%	-1.56%
25		5	1.355	1.321	1.388	1.348	1.334	1.401	0.01198	1.98%	-3.94%
50		5	1.295	1.257	1.333	1.288	1.266	1.335	0.0137	2.37%	0.68%
100		5	0.8239	0.7322	0.9156	0.8515	0.6937	0.8691	0.03302	8.96%	36.79%

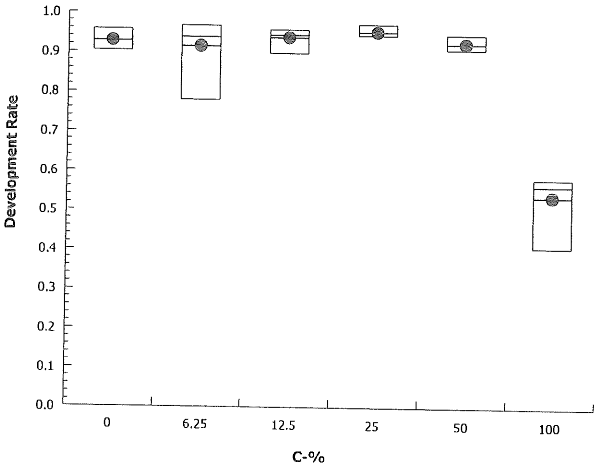
For test acceptability only

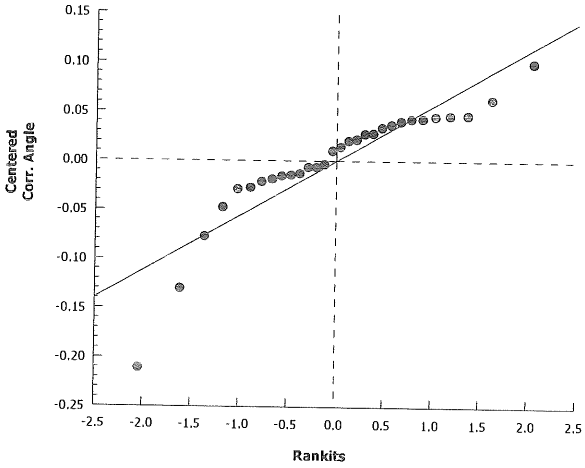
Analyst: KB QA: PTP 9/8/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	17-3861-3630	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:49	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 08 Sep-14 12:50 (p 3 of 4)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	15-2917-4729	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:50	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	50	100	70.71	2	12.5%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.231	2.362	0.191	8	0.3219	CDF	Non-Significant Effect
		12.5	0.6629	2.362	0.191	8	0.5740	CDF	Non-Significant Effect
		25	0.9971	2.362	0.191	8	0.4212	CDF	Non-Significant Effect
		50	1.424	2.362	0.191	8	0.2495	CDF	Non-Significant Effect
		100*	2.703	2.362	0.191	8	0.0246	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1327515	0.0265503	5	1.629	0.1904	Non-Significant Effect
Error	0.3910451	0.01629354	24			
Total	0.5237966		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.966	15.09	0.8538	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9685	0.9031	0.4995	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	0.9074	0.8088	1	0.9212	0.8227	0.9901	0.0355	8.75%	0.0%
6.25		5	0.8493	0.6936	1	0.8916	0.6305	0.9409	0.05605	14.76%	6.41%
12.5		5	0.8837	0.7972	0.9703	0.8966	0.7931	0.9704	0.03118	7.89%	2.61%
25		5	0.8709	0.8047	0.9372	0.8621	0.803	0.936	0.02385	6.12%	4.02%
50		5	0.8424	0.7312	0.9536	0.8571	0.7094	0.9507	0.04005	10.63%	7.17%
100		5	0.7655	0.651	0.88	0.7833	0.6355	0.8867	0.04123	12.04%	15.64%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.29	1.1	1.48	1.286	1.136	1.471	0.06837	11.85%	0.0%
6.25		5	1.191	0.992	1.389	1.235	0.9175	1.325	0.07151	13.43%	7.7%
12.5		5	1.236	1.092	1.381	1.243	1.099	1.398	0.05203	9.41%	4.15%
25		5	1.209	1.108	1.311	1.19	1.111	1.315	0.03668	6.78%	6.24%
50		5	1.175	1.017	1.333	1.183	1.001	1.347	0.05677	10.8%	8.91%
100		5	1.072	0.9332	1.21	1.087	0.9226	1.227	0.04989	10.41%	16.92%

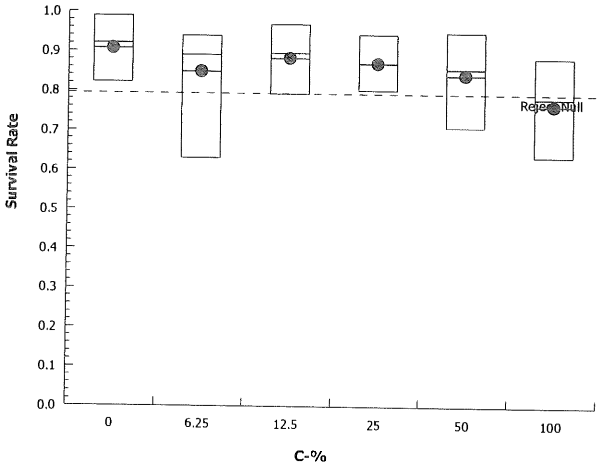
For test acceptability only

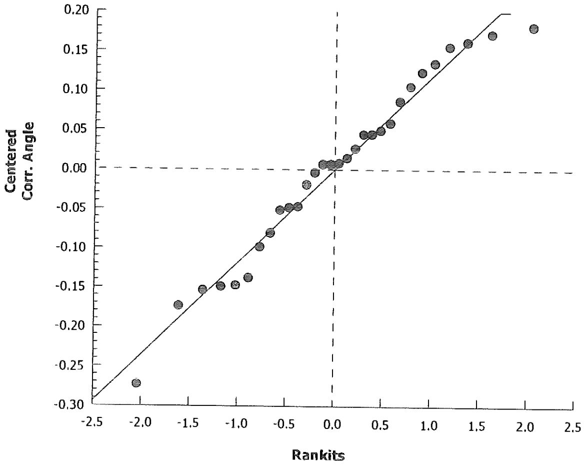
Analyst: KB QA: KPP 9/8/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	15-2917-4729	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:50	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: KB QA: KFP 9/8/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:07 (p 1 of 2)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test LC vs. 100% filt.

Nautilus Environmental (CA)

Analysis ID: 03-1494-9173
Analyzed: 22 Aug-14 8:59
Endpoint: Combined Development Rate
Analysis: Parametric-Two Sample
CETIS Version: CETISv1.8.4
Official Results: Yes

Sample Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample fails combined development rate endpoint	7.01%

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		~~101~~ 100% Filtered	8.535	1.86	0.082	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3529693	0.3529693	1	72.85	<0.0001	Significant Effect
Error	0.03876005	0.004845006	8			
Total	0.3917293		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.56	23.15	0.1708	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9039	0.7411	0.2418	Normal Distribution

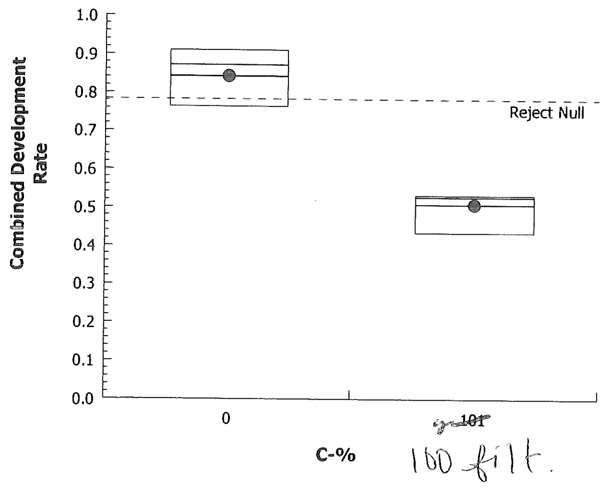
Combined Development Rate Summary

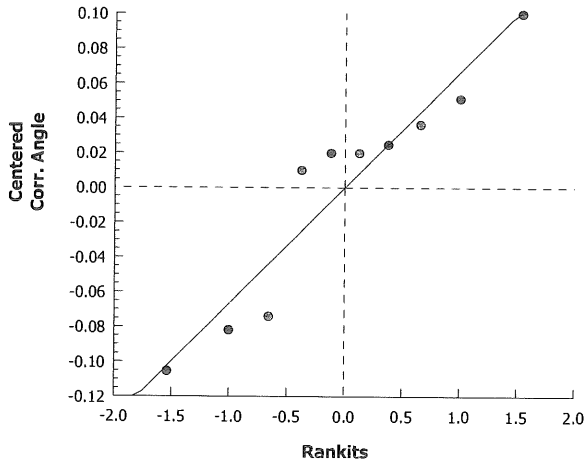
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8424	0.7617	0.923	0.8719	0.7635	0.9113	0.02906	7.71%	0.0%
~~101~~ 100% Filtered		5	0.5074	0.4557	0.5591	0.5271	0.4335	0.532	0.01863	8.21%	39.77%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.169	1.058	1.279	1.205	1.063	1.268	0.03987	7.63%	0.0%
~~101~~ 100% Filtered		5	0.7928	0.7409	0.8446	0.8125	0.7187	0.8174	0.01867	5.27%	32.16%

Graphics





Analyst: SD QA: 09/4/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:13 (p 1 of 2)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test TST

Nautilus Environmental (CA)

Analysis ID:	18-5633-9224	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:01	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	03-6714-2905	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	07-0065-6291	**Code:**	14-0668	**Client:**	AMEC
Sample Date:	12 Aug-14 14:00	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	27h (0.2 °C)	**Station:**	SIYB-1		

Sample Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	<100	100	NA	>1

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		100	-3.942	1.895		7	0.9972	CDF	Significant Effect
		~~101~~ 100% Filtered	-2.372	1.943		6	0.9723	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6231675	0.3115837	2	59.54	<0.0001	Significant Effect
Error	0.0627948	0.0052329	12			
Total	0.6859623		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.956	9.21	0.3761	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9177	0.8328	0.1776	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	0.8424	0.7617	0.923	0.8719	0.7635	0.9113	0.02906	7.71%	0.0%
100		5	0.4118	0.3175	0.5061	0.4236	0.3202	0.5172	0.03397	18.45%	51.11%
~~101~~ 100% Filtered		5	0.5074	0.4557	0.5591	0.5271	0.4335	0.532	0.01863	8.21%	39.77%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.169	1.058	1.279	1.205	1.063	1.268	0.03987	7.63%	0.0%
100		5	0.6959	0.5997	0.7922	0.7087	0.6015	0.8026	0.03467	11.14%	40.44%
~~101~~ 100% Filtered		5	0.7928	0.7409	0.8446	0.8125	0.7187	0.8174	0.01867	5.27%	32.16%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7833	0.9113	0.8719	0.8818	0.7635
100		0.4236	0.4384	0.3596	0.3202	0.5172
~~101~~ 100% Filtered		0.4335	0.5271	0.532	0.5172	0.5271

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.087	1.268	1.205	1.22	1.063
100		0.7087	0.7237	0.6431	0.6015	0.8026
~~101~~ 100% Filtered		0.7187	0.8125	0.8174	0.8026	0.8125

Analyst:

QA: 9/4/14

CETIS Analytical Report

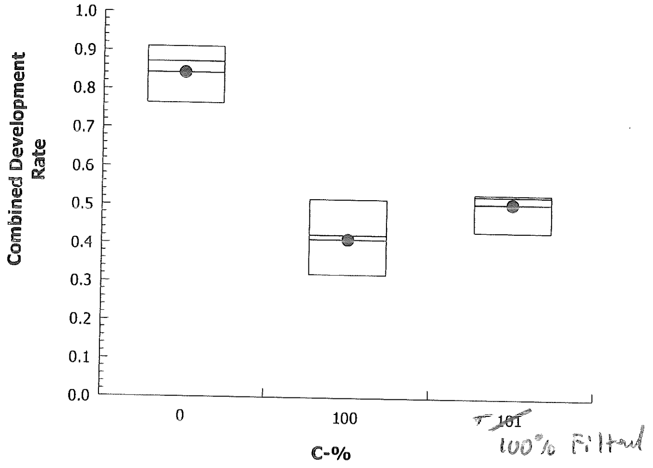
Report Date: 22 Aug-14 09:13 (p 2 of 2)
Test Code: 1408-S090 | 15-8925-3093

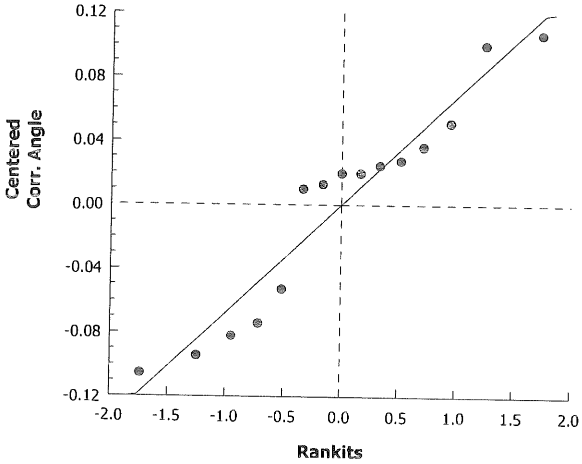
Bivalve Larval Survival and Development Test TST

Nautilus Environmental (CA)

Analysis ID:	18-5633-9224	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:01	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Graphics





Analyst:________ QA:9/4/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:08 (p 2 of 2)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test LC vs. Filt. Cond. **Nautilus Environmental (CA)**

Analysis ID:	05-0446-5401	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:00	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Sample Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	6.13%

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		Filter Control	-0.03332	1.86	0.093	8	0.5129	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.9773E-06	6.9773E-06	1	0.00111	0.9742	Non-Significant Effect
Error	0.05029017	0.006286272	8			
Total	0.05029715		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.718	23.15	0.6129	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9264	0.7411	0.4131	Normal Distribution

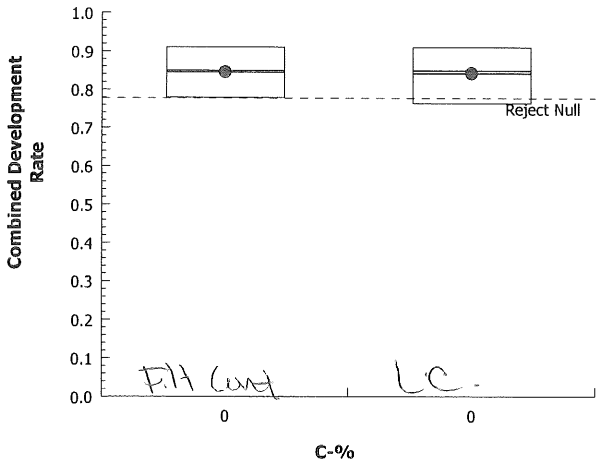
Combined Development Rate Summary

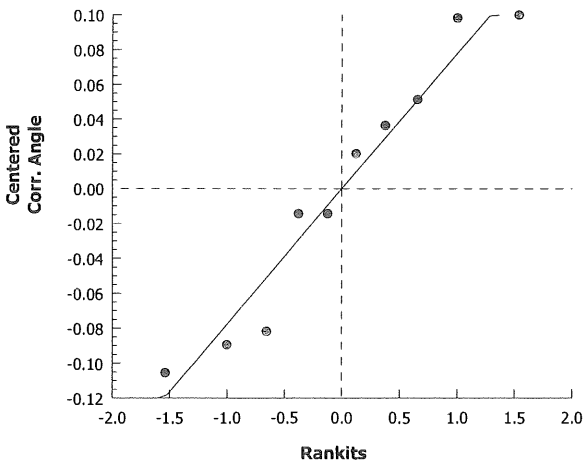
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8424	0.7617	0.923	0.8498	0.7635	0.9113	0.02906	7.71%	0.0%
0	Filter Control	5	0.8453	0.7856	0.905	0.8498	0.7783	0.9113	0.02151	5.69%	-0.35%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.169	1.058	1.279	1.173	1.063	1.268	0.03987	7.63%	0.0%
0	Filter Control	5	1.17	1.086	1.255	1.173	1.081	1.268	0.03042	5.81%	-0.14%

Graphics





Analyst:______ QA: 9/4/14

CETIS Analytical Report

Report Date: 10 Mar-15 14:04 (p 1 of 1)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	19-4208-3823	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Mar-15 14:03	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.64%	Fails survival rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Filter Control		101*	3.141	1.86	0.1	8	0.0069	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.07102261	0.07102261	1	9.868	0.0138	Significant Effect
Error	0.05757972	0.007197465	8			
Total	0.1286023		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.168	23.15	0.2902	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9783	0.7411	0.9555	Normal Distribution

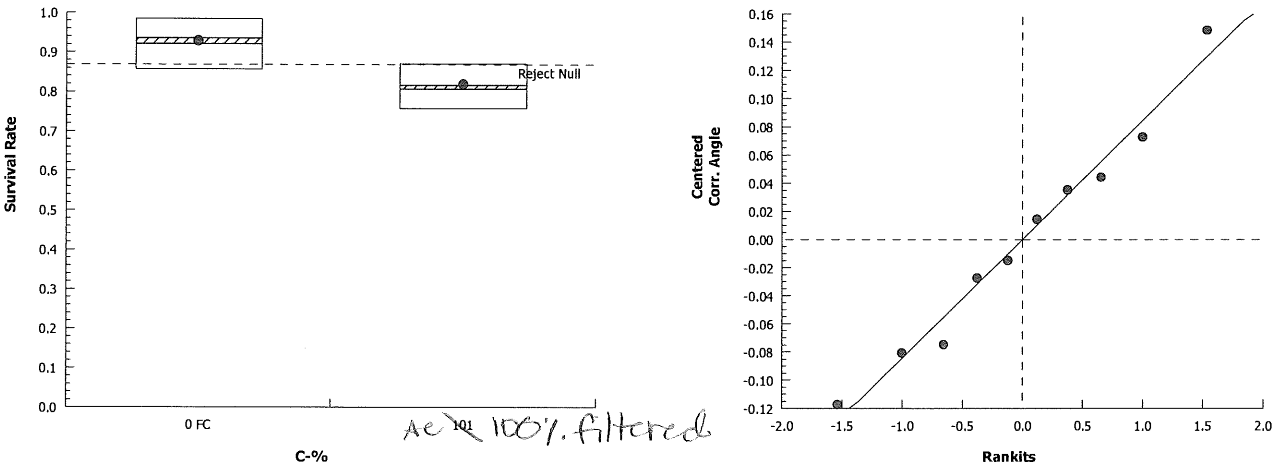
Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	0.9212	0.8573	0.985	0.936	0.8571	0.9852	0.023	5.58%	0.0%
101		5	0.8177	0.7618	0.8736	0.8079	0.7586	0.8719	0.02013	5.51%	11.23%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	1.301	1.171	1.43	1.315	1.183	1.449	0.04678	8.04%	0.0%
101		5	1.132	1.059	1.205	1.117	1.057	1.205	0.02628	5.19%	12.96%

Graphics



AC 101 100% filtered

Analyst: AC QA: TFP 3/10/15

CETIS Analytical Report

Report Date: 10 Mar-15 14:04 (p 1 of 1)
Test Code: 1408-S090 | 15-8925-3093

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	01-9072-6557	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Mar-15 14:03	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% filtered sample

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.9%	Fails development rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Filter Control		101*	14.63	1.86	0.048	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3521372	0.3521372	1	214.1	<0.0001	Significant Effect
Error	0.01315567	0.001644458	8			
Total	0.3652929		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.384	23.15	0.7607	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9686	0.7411	0.8779	Normal Distribution

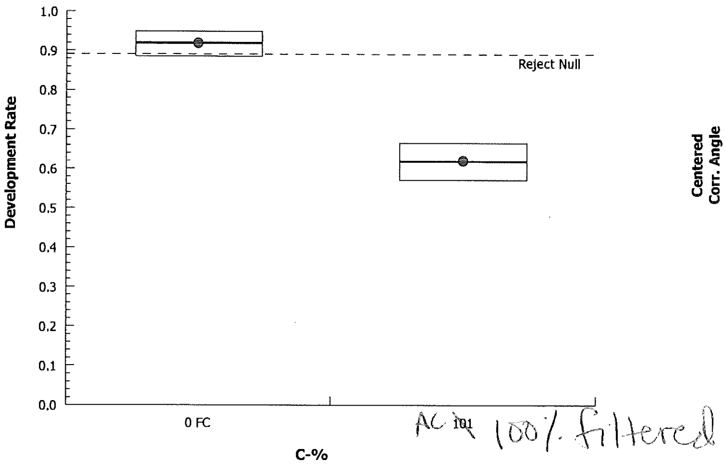
Development Rate Summary

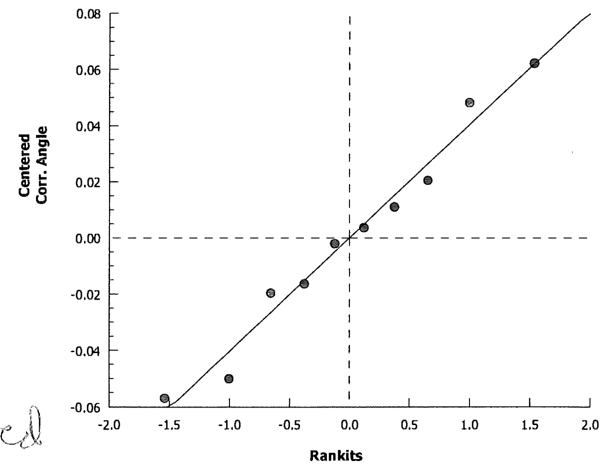
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	0.9178	0.8886	0.9471	0.9211	0.8854	0.9497	0.01055	2.57%	0.0%
101		5	0.6203	0.5756	0.665	0.6185	0.5714	0.6667	0.01611	5.81%	32.42%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Filter Control	5	1.282	1.228	1.337	1.286	1.225	1.345	0.01954	3.41%	0.0%
101		5	0.9071	0.861	0.9533	0.905	0.8571	0.9553	0.01661	4.1%	29.27%

Graphics





Analyst: AC QA: 3/10/15

Embryo Larval Bioassay

48-hour Development

Client: AMEC/POSD

Project ID: SIYB TMDL Monitoring

Test Species: *M. galloprovincialis*

Start Date/Time: 8/13/2014 1730

End Date/Time: 8/15/2014 1700

Sample	Rep	Number Counted	Number Normal	Technician Initials
Filter Control	A	200	185	SGZ
	B	190	175	↓
	C	174	158	
	D	192	170	
	E	179	170	
	A			
	B			
	C			
	D			
	E			
	A			
	B			
	C			
	D			
	E			
	A			
	B			
	C			
	D			
	E			
	A			
	B			
	C			
	D			
	E			
	A			
	B			
	C			
	D			
	E			
	A			
	B			
	C			
	D			
	E			

QC Check: SD 8/22/14

Final Review: 9/~~14~~4/14

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: Filtration Method Control
Sample Log No.: N/A
Test No.: 1408-S090 to S096

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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 (0.45µ)	33.1	32.8	32.8	16.0	15.7	15.5	7.1	7 ~~9.8~~ SG	7.9	8.05	7.93	7.97
	SG ~~32.8~~			SG ~~15.7~~			SG ~~9.8~~			SG ~~7.93~~		

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SD 8/22/14

Final Review: 9/4/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:40 (p 1 of 1)
Test Code: 1408-S090 15-8925-3093/1408-S090

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730
End Date: 15 Aug-14 1700
Sample Date: 12 Aug-14 1400
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 14- 0668
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-1

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			177	107	08/18/14
			2			181	170	
			3			179	163	
			4			161	89	
			5			190	181	
			6			168	155	
			7			159	65	
			8			197	184	
			9			163	154	
			10			182	172	
			11			167	159	
			12			186	174	
			13			180	105	
			14			193	178	
			15			128	124	
			16			148	86	
			17			170	163	
			18			165	156	
			19			161	154	
			20			144	131	
			21			173	107	
			22			171	162	
			23			174	163	
			24			129	73	
			25			176	168	
			26			164	105	08/19/14
			27			175	170	
			28			198	179	
			29			201	185	
			30			191	149	
			31			162	108	
			32			185	176	
			33			187	177	
			34			187	168	
			35			154	88	

Analyst: SGZ QA: SO 8/22/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:40 (p 1 of 1)
Test Code: 1408-S090 15-8925-3093/1408-S090

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0608
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1400 **Material:** Ambient Water **Sample Station:** SIYB-1

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	11					
0	LC	2	29					
0	LC	3	33					
0	LC	4	28					
0	LC	5	6					
6.25		1	2					
6.25		2	25					
6.25		3	12					
6.25		4	30					
6.25		5	15					
12.5		1	10					
12.5		2	17					
12.5		3	19					
12.5		4	8					
12.5		5	34					
25		1	22					
25		2	32					
25		3	5					
25		4	27					
25		5	9					
50		1	18					
50		2	3					
50		3	20					
50		4	14					
50		5	23					
100		1	16					
100		2	4			169	76	
100		3	24					
100		4	7					
100		5	13					
~~101~~		1	35					
100% ~~101~~ AC		2	1					
filtered ~~101~~		3	31					
~~101~~		4	26					
~~101~~		5	21					

QC: AG

CETIS™ v1.8.4.23 Analyst: AC QA: SO 8/22/14

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-1
Sample Log No.: 14-0668
Test No.: 1408-S090

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.4	33.2	32.9	16.0	15.3	15.9	7.9	7.9 ~~8~~ SG	7.4	8.08	8.01	7.98
6.25	33.5	33.4	33.4	16.0	15.4	15.5	7.8	7.9	7.8	8.06	8.00	7.97
12.5	33.4	33.4	33.5	16.0	15.6	15.5	7.8	7.9	7.8	8.07	7.98	7.96
25	33.4	33.4	33.4	16.0	15.8	15.4	7.7	7.9	7.9	8.06	7.98	7.97
50	33.4	33.4	33.4	16.0	15.6	15.5	7.3	7.9	7.9	8.08	7.98	7.97
100	33.6	33.5	33.6	16.0	15.7	15.7	7.8	7.9	7.9	8.08	7.99	7.97
100 filtered	33.4	33.5	33.5	15.6	15.8	15.5	6.8	7.7	7.9	8.09	7.99	7.98

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SD 8/22/14

Final Review: 9/4/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-2

CETIS Summary Report

Report Date: 22 Aug-14 09:24 (p 1 of 1)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	20-8043-6614	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	~~Taylor Shellfish~~ KP Kamilche Sea Farms	**Age:**	

Sample ID:	17-4612-8349	**Code:**	14-0669	**Client:**	AMEC
Sample Date:	12 Aug-14 13:13	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	28h (12.1 °C)	**Station:**	SIYB-2		

Sample Note: 101 = 100% sample, filtered (0.45µm)

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
16-0392-7387	Combined Development Ra	100	>100	NA	10.4%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
16-0392-7387	Combined Development Ra	PMSD	0.1035	NL - 0.25	No	Passes Acceptability Criteria

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	0.8571	0.835	0.8793	0.7685	0.9163	0.02648	0.05922	6.91%	0.0%
6.25		5	0.8772	0.8608	0.8935	0.8276	0.9375	0.01963	0.04389	5.0%	-2.34%
12.5		5	0.8698	0.852	0.8876	0.7931	0.9204	0.02135	0.04774	5.49%	-1.48%
25		5	0.8895	0.8653	0.9137	0.7882	0.9548	0.029	0.06486	7.29%	-3.78%
50		5	0.8493	0.8284	0.8701	0.7586	0.9113	0.02495	0.0558	6.57%	0.92%
100		5	0.8609	0.84	0.8819	0.7783	0.9069	0.02506	0.05604	6.51%	-0.44%
KP ~~101~~ 100% filtered		5	0.8712	0.8385	0.9039	0.7537	0.9557	0.03915	0.08754	10.05%	-1.64%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7685	0.9015	0.9163	0.8325	0.867
6.25		0.8276	0.8424	0.9375	0.8818	0.8966
12.5		0.8818	0.8621	0.8916	0.9204	0.7931
25		0.867	0.9126	0.7882	0.925	0.9548
50		0.7586	0.8571	0.867	0.8522	0.9113
100		0.7783	0.8905	0.8276	0.9015	0.9069
KP ~~101~~ 100% filtered		0.7537	0.9557	0.8079	0.8966	0.9423

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	156/203	183/203	186/203	169/203	176/203
6.25		168/203	171/203	195/208	179/203	182/203
12.5		179/203	175/203	181/203	208/226	161/203
25		176/203	188/206	160/203	222/240	211/221
50		154/203	174/203	176/203	173/203	185/203
100		158/203	187/210	168/203	183/203	185/204
KP ~~101~~ 100% filtered		153/203	194/203	164/203	182/203	196/208

Analyst: SD QA: 9/4/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:24 (p 1 of 2)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	16-0392-7387	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:23	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	10.4%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.5593	2.362	0.120	8	0.9479	CDF	Non-Significant Effect
		12.5	-0.3324	2.362	0.120	8	0.9130	CDF	Non-Significant Effect
		25	-1.048	2.362	0.120	8	0.9854	CDF	Non-Significant Effect
		50	0.2424	2.362	0.120	8	0.7519	CDF	Non-Significant Effect
		100	-0.09703	2.362	0.120	8	0.8604	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01361056	0.002722112	5	0.4211	0.8293	Non-Significant Effect
Error	0.1551254	0.006463557	24			
Total	0.1687359		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.7733	15.09	0.9787	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9522	0.9031	0.1939	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	0.8571	0.7836	0.9307	0.867	0.7685	0.9163	0.02648	6.91%	0.0%
6.25		5	0.8772	0.8227	0.9317	0.8818	0.8276	0.9375	0.01963	5.0%	-2.34%
12.5		5	0.8698	0.8105	0.9291	0.8818	0.7931	0.9204	0.02135	5.49%	-1.48%
25		5	0.8895	0.809	0.97	0.9126	0.7882	0.9548	0.029	7.29%	-3.78%
50		5	0.8493	0.78	0.9185	0.8571	0.7586	0.9113	0.02495	6.57%	0.92%
100		5	0.8609	0.7914	0.9305	0.8905	0.7783	0.9069	0.02506	6.51%	-0.44%

Angular (Corrected) Transformed Summary

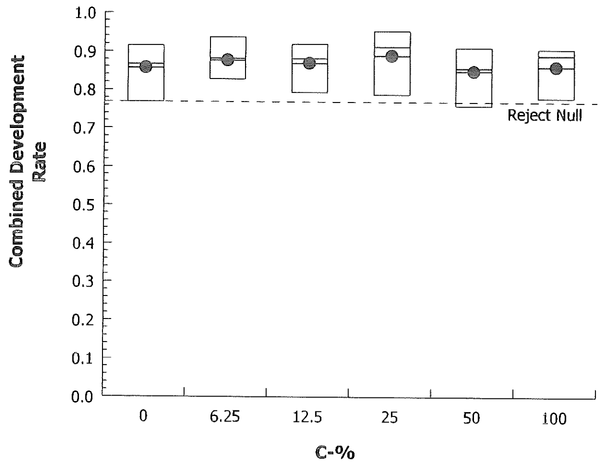
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.189	1.085	1.292	1.197	1.069	1.277	0.03728	7.01%	0.0%
6.25		5	1.217	1.131	1.304	1.22	1.143	1.318	0.03117	5.73%	-2.39%
12.5		5	1.206	1.12	1.291	1.22	1.099	1.285	0.03085	5.72%	-1.42%
25		5	1.242	1.117	1.368	1.271	1.093	1.356	0.04521	8.14%	-4.48%
50		5	1.177	1.082	1.271	1.183	1.057	1.268	0.03403	6.47%	1.04%
100		5	1.194	1.096	1.292	1.233	1.081	1.261	0.03523	6.6%	-0.42%

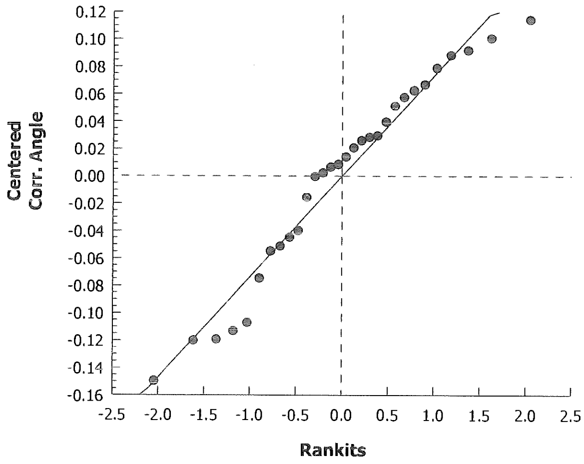
Analyst:______ QA: 9/4/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 16-0392-7387 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 22 Aug-14 9:23 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst:________ QA: 9/4/14

CETIS Analytical Report

Report Date: 08 Sep-14 12:52 (p 1 of 4)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 17-8948-2836 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 08 Sep-14 12:51 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	3.47%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.4001	2.362	0.063	8	0.6895	CDF	Non-Significant Effect
		12.5	1.339	2.362	0.063	8	0.2801	CDF	Non-Significant Effect
		25	-0.5934	2.362	0.063	8	0.9519	CDF	Non-Significant Effect
		50	-0.6223	2.362	0.063	8	0.9552	CDF	Non-Significant Effect
		100	2.273	2.362	0.063	8	0.0596	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02307197	0.004614393	5	2.622	0.0499	Significant Effect
Error	0.04223474	0.001759781	24			
Total	0.06530671		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.094	15.09	0.5359	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9508	0.9031	0.1778	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	0.9392	0.922	0.9563	0.9455	0.9196	0.9514	0.006166	1.47%	0.0%
6.25		5	0.9336	0.9111	0.9561	0.9323	0.9096	0.96	0.008113	1.94%	0.59%
12.5		5	0.9207	0.8965	0.9449	0.9204	0.9005	0.9521	0.008715	2.12%	1.96%
25		5	0.9445	0.9124	0.9766	0.9524	0.9126	0.9778	0.01156	2.74%	-0.57%
50		5	0.9453	0.9199	0.9707	0.9362	0.9301	0.9809	0.009163	2.17%	-0.65%
100		5	0.9075	0.8903	0.9247	0.9069	0.8905	0.9289	0.006198	1.53%	3.37%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.323	1.288	1.358	1.335	1.283	1.348	0.01266	2.14%	0.0%
6.25		5	1.312	1.265	1.359	1.308	1.265	1.369	0.01684	2.87%	0.8%
12.5		5	1.287	1.24	1.335	1.285	1.25	1.35	0.0171	2.97%	2.69%
25		5	1.339	1.265	1.412	1.351	1.271	1.421	0.0264	4.41%	-1.19%
50		5	1.339	1.274	1.405	1.315	1.303	1.432	0.02365	3.95%	-1.25%
100		5	1.262	1.232	1.293	1.261	1.233	1.301	0.01093	1.94%	4.56%

For test acceptability only

Analyst: KB QA: 9/8/14

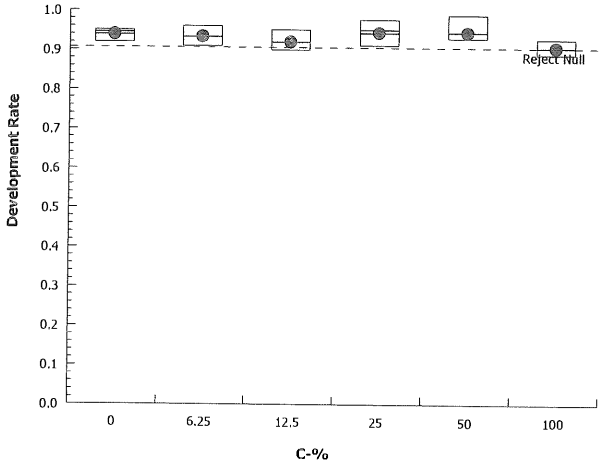
CETIS Analytical Report

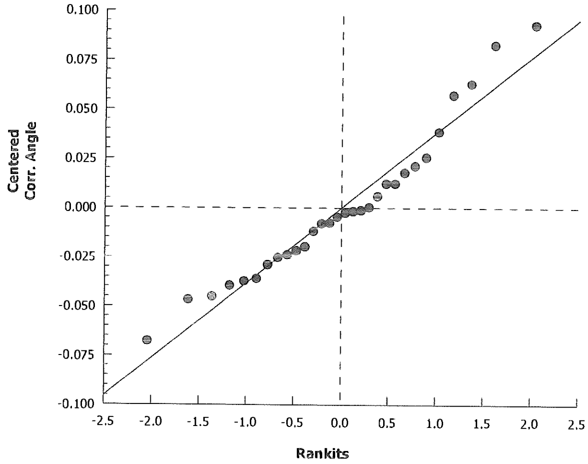
Report Date: 08 Sep-14 12:52 (p 2 of 4)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 17-8948-2836 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 08 Sep-14 12:51 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	19-4537-8695	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:51	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	15.1%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.5567	2.362	0.219	8	0.9475	CDF	Non-Significant Effect
		12.5	-0.7311	2.362	0.219	8	0.9658	CDF	Non-Significant Effect
		25	-1.065	2.362	0.219	8	0.9861	CDF	Non-Significant Effect
		50	0.3754	2.362	0.219	8	0.6997	CDF	Non-Significant Effect
		100	-0.9626	2.362	0.219	8	0.9815	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06919839	0.01383968	5	0.6421	0.6699	Non-Significant Effect
Error	0.5173058	0.02155441	24			
Total	0.5865042		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.339	15.09	0.9308	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9242	0.9031	0.0345	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	0.9133	0.8231	1	0.9113	0.8128	0.9852	0.03247	7.95%	0.0%
6.25		5	0.9399	0.8761	1	0.9458	0.8621	1	0.02297	5.46%	-2.91%
12.5		5	0.9448	0.8802	1	0.936	0.8719	1	0.02328	5.51%	-3.45%
25		5	0.9429	0.8423	1	1	0.8276	1	0.03622	8.59%	-3.24%
50		5	0.8995	0.8084	0.9906	0.9163	0.7734	0.9655	0.03281	8.16%	1.51%
100		5	0.9488	0.8723	1	0.9704	0.8571	1	0.02754	6.49%	-3.88%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.297	1.122	1.471	1.268	1.123	1.449	0.06281	10.83%	0.0%
6.25		5	1.348	1.191	1.506	1.336	1.19	1.536	0.0567	9.4%	-3.99%
12.5		5	1.364	1.196	1.533	1.315	1.205	1.536	0.0606	9.93%	-5.24%
25		5	1.395	1.154	1.637	1.536	1.143	1.536	0.08693	13.93%	-7.62%
50		5	1.262	1.121	1.403	1.277	1.075	1.384	0.05078	9.0%	2.69%
100		5	1.386	1.192	1.58	1.398	1.183	1.536	0.06997	11.29%	-6.89%

For test acceptability only.

Analyst: KB QA: KFP 9/8/14

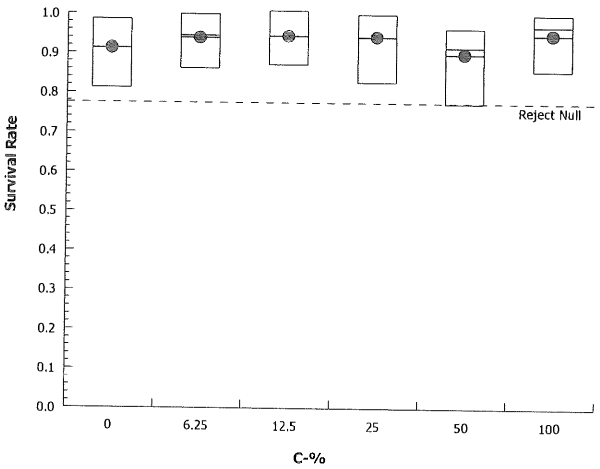
CETIS Analytical Report

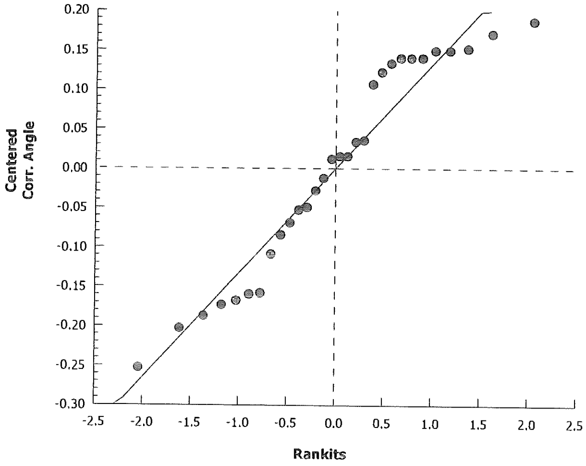
Report Date: 08 Sep-14 12:52 (p 4 of 4)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test
Nautilus Environmental (CA)

Analysis ID:	19-4537-8695	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:51	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: KB QA: PP 9/8/14

CETIS Analytical Report

Report Date: 22 Aug-14 09:25 (p 1 of 1)
Test Code: 1408-S091 | 01-7024-1289

Bivalve Larval Survival and Development Test LC VS 100 filt
Nautilus Environmental (CA)

Analysis ID:	10-7668-1645	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	22 Aug-14 9:23	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	11.4%

Equal Variance t Two-Sample Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control	~~101~~ 100 Filtered	-0.4411	1.86	0.130	8	0.6646	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002389863	0.002389863	1	0.1945	0.6708	Non-Significant Effect
Error	0.09827262	0.01228408	8			
Total	0.1006625		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.536	23.15	0.3895	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9499	0.7411	0.6668	Normal Distribution

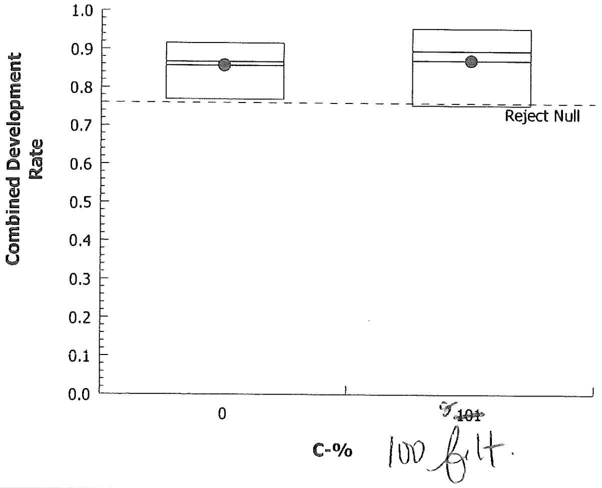
Combined Development Rate Summary

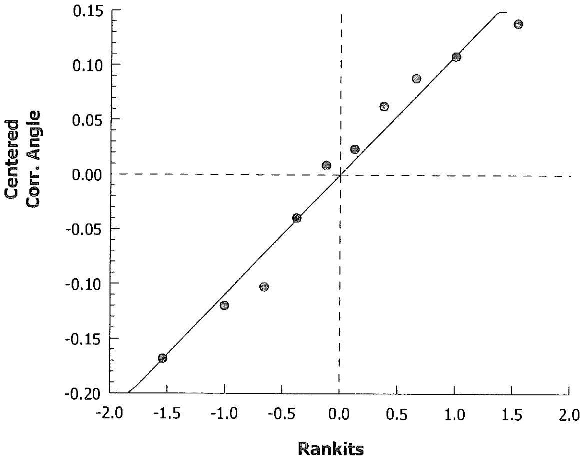
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8571	0.7836	0.9307	0.867	0.7685	0.9163	0.02648	6.91%	0.0%
~~101~~ 100 Filtered		5	0.8712	0.7625	0.9799	0.8966	0.7537	0.9557	0.03915	10.05%	-1.64%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.189	1.085	1.292	1.197	1.069	1.277	0.03728	7.01%	0.0%
~~101~~ 100 Filtered		5	1.22	1.055	1.385	1.243	1.051	1.359	0.05936	10.88%	-2.6%

Graphics





Analyst: SD QA: 9/4/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:43 (p 1 of 1)
Test Code: MUS-S091 01-7024-1289/1408-S091

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0669
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1313 **Material:** Ambient Water **Sample Station:** SIYB-2

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			36			204	185	08/20/14
			37			200	186	
			38			185	164	
			39			196	185	
			40			157	154	
			41			226	208	
			42			201	181	
			43			210	187	
			44			240	222	
			45			186	173	
			46			SG ~~156~~ 165	156	
			47			208	195	
			48			190	175	
			49			185	176	
			50			188	176	08/21/14
			51			199	183	
			52			174	158	
			53			221	211	
			54			208	196	
			55			188	179	
			56			178	169	
			57			175	168	
			58			188	171	
			59			192	182	
			60			206	188	
			61			180	176	
			62			186	168	
			63			177	161	
			64			197	183	
			65			196	188	
			66			198	194	
			67			168	160	
			68			172	153	
			69			186	174	
			70			192	179	

Analyst: SGZ QA: SD 8/22/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:43 (p 1 of 1)
Test Code: 1408-S091 01-7024-1289/1408-S091

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0669
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1313 **Material:** Ambient Water **Sample Station:** SIYB-2

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	46					
0	LC	2	51					
0	LC	3	37					
0	LC	4	56					
0	LC	5	49					
6.25		1	57					
6.25		2	58					
6.25		3	47					
6.25		4	70					
6.25		5	65					
12.5		1	55					
12.5		2	48					
12.5		3	42					
12.5		4	41					
12.5		5	63					
25		1	61					
25		2	60					
25		3	67					
25		4	44					
25		5	53					
50		1	40					
50		2	69					
50		3	50					
50		4	45					
50		5	39					
100		1	52					
100		2	43					
100		3	62			202	187	
100		4	64					
100		5	36					
~~101~~		1	68					
100% ~~101~~ AC		2	66					
filtered ~~101~~		3	38					
~~101~~		4	59					
~~101~~		5	54					

QC: AG

CETIS™ v1.8.4.23 Analyst: AC QA: JO 8/22/14

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-2
Sample Log No.: 14-0669
Test No.: 1408-S091

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.3	33.2	33.1	16.0	15.9	15.8	7.9	7.8	7.8	8.09	8.03	7.98
6.25	33.4	33.3	33.3	16.0	15.7	15.9	7.9	7.9	7.9	8.09	8.01	7.98
12.5	33.4	33.4	33.3	16.0	16.0	15.9	7.9	7.9	7.9	8.08	8.01	7.97
25	33.5	33.4	33.3	15.9	15.9	15.9	8.0	7.9	7.9	8.08	8.00	7.97
50	33.4	33.3	33.3	16.0	15.9	15.8	8.0	7.9	7.9	8.08	8.00	8.03
100	33.5	33.5	33.5	15.8	15.7	15.8	8.2	7.9	7.9	8.07	7.99	8.02
100 filtered	33.5	33.5	33.4	15.8	16.0	15.8	7.5	7.8	7.8	8.07	8.00	8.01

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: 8/22/14

Final Review: 9/4/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-3

CETIS Summary Report

Report Date: 02 Sep-14 16:25 (p 1 of 1)
Test Code: 1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	11-2117-2128	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	~~Taylor Shellfish~~ AC Kamilche	**Age:**	

Sample ID:	14-3288-9134	**Code:**	14-0670	**Client:**	AMEC
Sample Date:	12 Aug-14 12:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	29h (12.6 °C)	**Station:**	SIYB-3		

Batch Note: 101 = 100% sample, filtered (0.45um)

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-2795-1857	Combined Development Ra	100	>100	NA	12.5%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-2795-1857	Combined Development Ra	PMSD	0.1248	NL - 0.25	No	Passes Acceptability Criteria

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	0.8433	0.8256	0.8611	0.7833	0.8966	0.02121	0.04743	5.62%	0.0%
6.25		5	0.8217	0.8036	0.8398	0.7586	0.8719	0.02166	0.04844	5.9%	2.57%
12.5		5	0.8811	0.8666	0.8956	0.8374	0.9227	0.01735	0.03879	4.4%	-4.48%
25		5	0.8434	0.8171	0.8697	0.7685	0.9214	0.03155	0.07054	8.36%	-0.01%
50		5	0.8407	0.8136	0.8678	0.734	0.9375	0.03248	0.07262	8.64%	0.31%
100		5	0.8859	0.861	0.9108	0.8325	0.9811	0.02979	0.06661	7.52%	-5.04%
~~101~~ 100 Filtered		5	0.8774	0.8658	0.8891	0.8325	0.9113	0.01398	0.03126	3.56%	-4.04%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7833	0.8227	0.8966	0.8276	0.8867
6.25		0.7931	0.867	0.8719	0.7586	0.8177
12.5		0.8424	0.8966	0.8374	0.9227	0.9064
25		0.9214	0.9064	0.7685	0.7783	0.8424
50		0.8424	0.8325	0.8571	0.9375	0.734
100		0.8424	0.931	0.9811	0.8325	0.8424
~~101~~ 100 Filtered		0.8995	0.8325	0.9113	0.8818	0.8621

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	159/203	167/203	182/203	168/203	180/203
6.25		161/203	176/203	177/203	154/203	166/203
12.5		171/203	182/203	170/203	203/220	184/203
25		211/229	184/203	156/203	158/203	171/203
50		171/203	169/203	174/203	195/208	149/203
100		171/203	189/203	208/212	169/203	171/203
~~101~~ 100 Filtered		188/209	169/203	185/203	179/203	175/203

Analyst: AC QA: G 9/4/14

CETIS Analytical Report

Report Date: 02 Sep-14 16:21 (p 1 of 2)
Test Code: 1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test Nautilus Environmental (CA)

Analysis ID: 05-2795-1857 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 Sep-14 16:20 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	12.5%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.5241	2.362	0.134	8	0.6364	CDF	Non-Significant Effect
		12.5	-0.9703	2.362	0.134	8	0.9819	CDF	Non-Significant Effect
		25	-0.07885	2.362	0.134	8	0.8556	CDF	Non-Significant Effect
		50	-0.02053	2.362	0.134	8	0.8393	CDF	Non-Significant Effect
		100	-1.329	2.362	0.134	8	0.9936	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03849937	0.007699873	5	0.9618	0.4605	Non-Significant Effect
Error	0.1921463	0.008006097	24			
Total	0.2306457		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.402	15.09	0.6383	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9642	0.9031	0.3936	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	0.8433	0.7845	0.9022	0.8276	0.7833	0.8966	0.02121	5.62%	0.0%
6.25		5	0.8217	0.7615	0.8818	0.8177	0.7586	0.8719	0.02166	5.9%	2.57%
12.5		5	0.8811	0.8329	0.9293	0.8966	0.8374	0.9227	0.01735	4.4%	-4.48%
25		5	0.8434	0.7558	0.931	0.8424	0.7685	0.9214	0.03155	8.36%	-0.01%
50		5	0.8407	0.7505	0.9309	0.8424	0.734	0.9375	0.03248	8.64%	0.31%
100		5	0.8859	0.8032	0.9686	0.8424	0.8325	0.9811	0.02979	7.52%	-5.04%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.167	1.085	1.249	1.143	1.087	1.243	0.02959	5.67%	0.0%
6.25		5	1.138	1.059	1.216	1.13	1.057	1.205	0.02842	5.59%	2.54%
12.5		5	1.222	1.148	1.296	1.243	1.156	1.289	0.02675	4.9%	-4.7%
25		5	1.172	1.048	1.296	1.163	1.069	1.287	0.0447	8.53%	-0.38%
50		5	1.168	1.04	1.296	1.163	1.029	1.318	0.0461	8.82%	-0.1%
100		5	1.242	1.088	1.397	1.163	1.149	1.433	0.05555	10.0%	-6.45%

Analyst: AC QA: 9/4/14

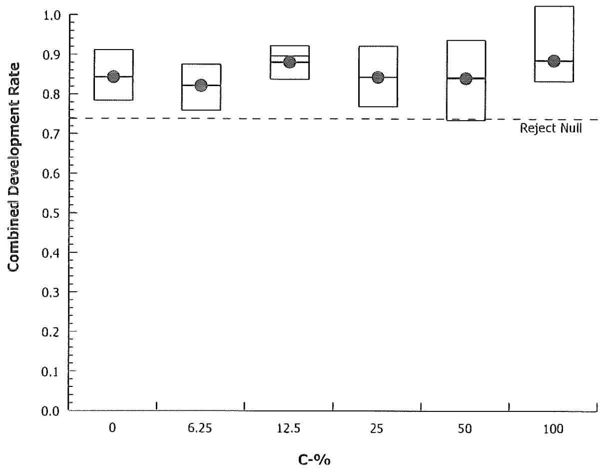
CETIS Analytical Report

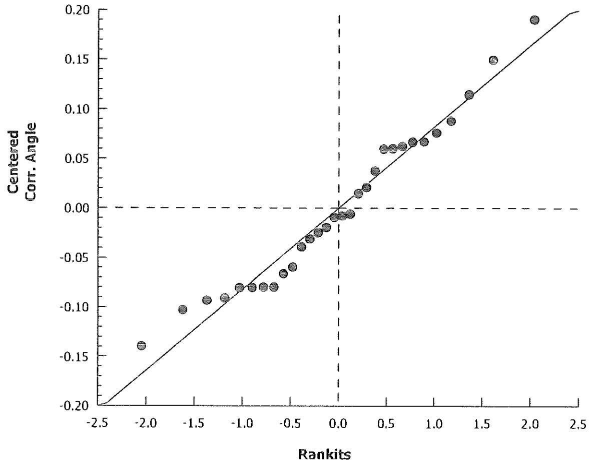
Report Date: 02 Sep-14 16:21 (p 2 of 2)
Test Code: 1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	05-2795-1857	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 Sep-14 16:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 02 Sep-14 16:27 (p 1 of 2)
Test Code: 1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	05-5366-5399	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 Sep-14 16:26	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	4.7%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.06196	2.362	0.077	8	0.8144	CDF	Non-Significant Effect
		12.5	-0.1766	2.362	0.077	8	0.8802	CDF	Non-Significant Effect
		25	0.2536	2.362	0.077	8	0.7477	CDF	Non-Significant Effect
		50	-0.3397	2.362	0.077	8	0.9143	CDF	Non-Significant Effect
		100	0.3258	2.362	0.077	8	0.7198	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001699148	0.0003398296	5	0.1273	0.9848	Non-Significant Effect
Error	0.06405853	0.002669105	24			
Total	0.06575768		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.12	15.09	0.0491	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9606	0.9031	0.3204	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	0.9303	0.9146	0.9459	0.9278	0.9176	0.9438	0.005648	1.36%	0.0%
6.25		5	0.9283	0.9013	0.9554	0.9222	0.9026	0.9583	0.009749	2.35%	0.21%
12.5		5	0.9326	0.909	0.9563	0.9392	0.9048	0.9529	0.00851	2.04%	-0.26%
25		5	0.9251	0.8969	0.9532	0.9214	0.9017	0.9553	0.01014	2.45%	0.56%
50		5	0.9359	0.9212	0.9505	0.9375	0.9158	0.9448	0.005266	1.26%	-0.6%
100		5	0.9186	0.8598	0.9774	0.9048	0.8756	0.9811	0.02118	5.16%	1.25%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.304	1.273	1.335	1.299	1.28	1.331	0.0112	1.92%	0.0%
6.25		5	1.302	1.248	1.357	1.288	1.253	1.365	0.01962	3.37%	0.16%
12.5		5	1.31	1.264	1.357	1.322	1.257	1.352	0.0167	2.85%	-0.44%
25		5	1.296	1.241	1.351	1.287	1.252	1.358	0.01994	3.44%	0.64%
50		5	1.315	1.287	1.344	1.318	1.276	1.334	0.01035	1.76%	-0.85%
100		5	1.294	1.172	1.415	1.257	1.21	1.433	0.04369	7.55%	0.82%

* For Test Acceptability Only

Analyst: AC QA: KFP 9/8/14

CETIS Analytical Report

Report Date:	02 Sep-14 16:28 (p 1 of 2)
Test Code:	1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	12-3126-7066	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 Sep-14 16:27	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	15.0%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.378	2.362	0.196	8	0.6987	CDF	Non-Significant Effect
		12.5	-1.047	2.362	0.196	8	0.9854	CDF	Non-Significant Effect
		25	-0.6566	2.362	0.196	8	0.9588	CDF	Non-Significant Effect
		50	-0.1322	2.362	0.196	8	0.8694	CDF	Non-Significant Effect
		100	-1.528	2.362	0.196	8	0.9966	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08747331	0.01749466	5	1.015	0.4306	Non-Significant Effect
Error	0.4136094	0.01723373	24			
Total	0.5010827		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.793	15.09	0.4416	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9508	0.9031	0.1773	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	0.9064	0.8498	0.963	0.8966	0.8522	0.9557	0.02037	5.03%	0.0%
6.25		5	0.8857	0.8106	0.9608	0.8916	0.8227	0.9606	0.02704	6.83%	2.28%
12.5		5	0.9448	0.8954	0.9942	0.9409	0.8916	1	0.01779	4.21%	-4.24%
25		5	0.9123	0.8101	1	0.8818	0.8276	1	0.03681	9.02%	-0.65%
50		5	0.8985	0.7997	0.9973	0.8916	0.7833	1	0.03558	8.85%	0.87%
100		5	0.9635	0.9313	0.9958	0.9606	0.931	1	0.01162	2.7%	-6.3%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.267	1.166	1.369	1.243	1.176	1.359	0.03647	6.43%	0.0%
6.25		5	1.236	1.111	1.361	1.235	1.136	1.371	0.04497	8.14%	2.48%
12.5		5	1.354	1.215	1.494	1.325	1.235	1.536	0.0503	8.3%	-6.86%
25		5	1.322	1.077	1.567	1.22	1.143	1.536	0.0881	14.9%	-4.3%
50		5	1.278	1.073	1.484	1.235	1.087	1.536	0.07404	12.95%	-0.87%
100		5	1.394	1.285	1.504	1.371	1.305	1.536	0.03943	6.32%	-10.01%

* For test Acceptability Only

Analyst: AC QA: KPP 9/8/14

CETIS Analytical Report

~~TST~~ KFP

Report Date: 08 Sep-14 12:53 (p 1 of 1)
Test Code: 1408-S092 | 10-2253-7170

Bivalve Larval Survival and Development Test LC vs 100 filtered **Nautilus Environmental (CA)**

Analysis ID:	14-7092-4614	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:52	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	5.86%

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	-1.319	1.86	0.068	8	0.8882	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00575263	0.00575263	1	1.741	0.2236	Non-Significant Effect
Error	0.02644081	0.003305102	8			
Total	0.03219344		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.961	23.15	0.5302	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9428	0.7411	0.5841	Normal Distribution

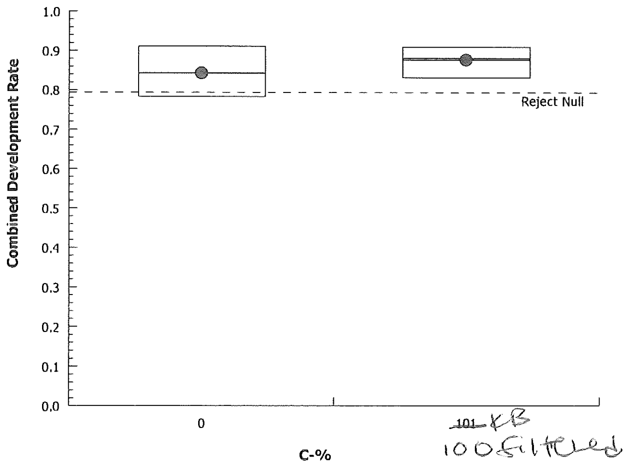
Combined Development Rate Summary

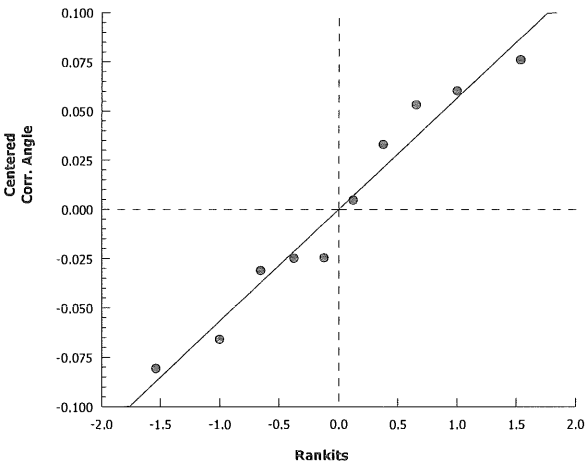
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8433	0.7845	0.9022	0.8276	0.7833	0.8966	0.02121	5.62%	0.0%
~~101~~ KB 100 filtered		5	0.8774	0.8386	0.9163	0.8818	0.8325	0.9113	0.01398	3.56%	-4.04%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.167	1.085	1.249	1.143	1.087	1.243	0.02959	5.67%	0.0%
~~101~~ KB 100 filtered		5	1.215	1.157	1.274	1.22	1.149	1.268	0.02113	3.89%	-4.11%

Graphics





Analyst: KB QA: KFP 9/8/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:45 (p 1 of 1)
Test Code: 10-2253-7170/1408-S092

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0670
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1215 **Material:** Ambient Water **Sample Station:** SIYB-3

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			71			167	154	09/02/14
			72			188	177	
			73			192	175	
			74			181	166	
			75			179	169	
			76			220	203	
			77			189	171	
			78			~~212~~ 195	~~208~~ 184	
			79			195	176	
			80			189	171	
			81			212	208	
			82			198	189	
			83			194	180	
			84			168	158	
			85			190	174	
			86			182	167	
			87			191	182	
			88			209	188	
			89			203	184	
			90			229	211	
			91			193	169	
			92			181	171	
			93			179	171	
			94			202	185	
			95			208	195	
			96			173	156	
			97			195	171	
			98			176	169	
			99			178	168	
			100			193	182	
			101			194	179	
			102			173	159	
			103			168	161	
			104			159	149	
			105			181	170	

Analyst: SGZ QA: AC 9/2/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:45 (p 1 of 1)
Test Code: 1408-S092 10-2253-7170/1408-S092

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1130
End Date: 15 Aug-14 1700
Sample Date: 12 Aug-14 1215
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 14- 0670
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-3

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	102					
0	LC	2	86					
0	LC	3	100					
0	LC	4	99					
0	LC	5	83					
6.25		1	103					
6.25		2	79					
6.25		3	72					
6.25		4	71					
6.25		5	74					
12.5		1	80					
12.5		2	87					
12.5		3	105					
12.5		4	76					
12.5		5	78					
25		1	90					
25		2	89					
25		3	96					
25		4	84					
25		5	93					
50		1	92					
50		2	75					
50		3	85					
50		4	95					
50		5	104					
100		1	97					
100		2	82					
100		3	81			212	204	
100		4	91					
100		5	77					
100% 101		1	88					
filtered AC 101		2	98					
101		3	94					
101		4	101					
101		5	73					

QC: AG

Analyst: AC QA: 8/22/14

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-3
Sample Log No.: 14-0670
Test No.: 1408-S092

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.4	33.1	33.1	15.3	15.0	15.5	8.0	7.7	7.9	8.11	8.01	7.96
6.25	33.4	33.3	33.3	15.2	14.7	15.2	8.1	7.8	8.0	8.09	8.02	7.98
12.5	33.4	33.4	33.4	15.1	14.7	15.2	8.0	7.9	8.1	8.14	7.99	7.98
25	33.4	33.5	33.3	14.9	14.8	15.1	8.1	7.9	8.1	8.11	8.00	7.98
50	33.4	33.5	33.4	15.0	14.8	15.2	8.1	~~7~~ SG 8.0	8.1	8.09	8.00	7.98
100	33.5	33.6	33.6	14.9	14.8	15.2	8.3	8.0	8.1	8.08	7.98	7.97
100 filtered	33.5	33.4	33.4	14.8	14.9	15.1	~~8~~ AC 7.0	7.8	8.0	8.09	8.00	7.98

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SO 8/22/14

Final Review: AC 9/2/14

Site: SIYB-4

CETIS Summary Report

Report Date: 03 Sep-14 15:24 (p 1 of 1)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	04-2913-2821	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (3.1 °C)	**Station:**	SIYB-4		

Batch Note: 101 = 100% sample, filtered (0.45um)

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-6618-4019	Combined Development Ra	100	>100	NA	11.6%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-6618-4019	Combined Development Ra	PMSD	0.1164	NL - 0.25	No	Passes Acceptability Criteria

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	0.8552	0.8223	0.888	0.7537	0.9606	0.03937	0.08802	10.29%	0.0%
6.25		5	0.8227	0.7946	0.8508	0.7438	0.936	0.03366	0.07527	9.15%	3.8%
12.5		5	0.7961	0.775	0.8171	0.7389	0.8867	0.0252	0.05634	7.08%	6.91%
25		5	0.8138	0.803	0.8246	0.7882	0.8473	0.01298	0.02902	3.57%	4.84%
50		5	0.8305	0.8091	0.8519	0.7635	0.8867	0.02563	0.0573	6.9%	2.88%
100		5	0.8473	0.8219	0.8727	0.7783	0.9557	0.03041	0.06799	8.03%	0.92%
AC ~~101~~ 100% ~~un~~ filtered		5	0.8227	0.8	0.8453	0.7586	0.8916	0.02712	0.06063	7.37%	3.8%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7882	0.7537	0.9606	0.8473	0.9261
6.25		0.936	0.8571	0.7438	0.7833	0.7931
12.5		0.7783	0.7685	0.7389	0.8079	0.8867
25		0.8424	0.803	0.7882	0.8473	0.7882
50		0.8424	0.7635	0.8818	0.7783	0.8867
100		0.8621	0.7783	0.9557	0.8079	0.8325
AC ~~101~~ 100% filtered		0.803	0.7586	0.8916	0.8818	0.7783

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	160/203	153/203	195/203	172/203	188/203
6.25		190/203	174/203	151/203	159/203	161/203
12.5		158/203	156/203	150/203	164/203	180/203
25		171/203	163/203	160/203	172/203	160/203
50		171/203	155/203	179/203	158/203	180/203
100		175/203	158/203	194/203	164/203	169/203
AC ~~101~~ 100% filtered.		163/203	154/203	181/203	179/203	158/203

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:23 (p 1 of 2)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	19-6618-4019	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 15:21	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	04-2913-2821	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (3.1 °C)	**Station:**	SIYB-4		

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	11.6%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.8514	2.362	0.142	8	0.4873	CDF	Non-Significant Effect
		12.5	1.499	2.362	0.142	8	0.2244	CDF	Non-Significant Effect
		25	1.169	2.362	0.142	8	0.3471	CDF	Non-Significant Effect
		50	0.7518	2.362	0.142	8	0.5332	CDF	Non-Significant Effect
		100	0.279	2.362	0.142	8	0.7381	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0277571	0.00555142	5	0.6121	0.6916	Non-Significant Effect
Error	0.2176732	0.009069715	24			
Total	0.2454303		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.768	15.09	0.3294	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9427	0.9031	0.1079	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	0.8552	0.7459	0.9645	0.8473	0.7537	0.9606	0.03937	10.29%	0.0%
6.25		5	0.8227	0.7292	0.9161	0.7931	0.7438	0.936	0.03366	9.15%	3.8%
12.5		5	0.7961	0.7261	0.866	0.7783	0.7389	0.8867	0.0252	7.08%	6.91%
25		5	0.8138	0.7778	0.8498	0.803	0.7882	0.8473	0.01298	3.57%	4.84%
50		5	0.8305	0.7594	0.9017	0.8424	0.7635	0.8867	0.02563	6.9%	2.88%
100		5	0.8473	0.7629	0.9317	0.8325	0.7783	0.9557	0.03041	8.03%	0.92%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.196	1.028	1.363	1.169	1.051	1.371	0.06034	11.28%	0.0%
6.25		5	1.145	1.01	1.279	1.099	1.04	1.315	0.04843	9.46%	4.29%
12.5		5	1.106	1.014	1.198	1.081	1.034	1.227	0.03319	6.71%	7.55%
25		5	1.126	1.079	1.172	1.111	1.093	1.169	0.01685	3.35%	5.89%
50		5	1.151	1.056	1.246	1.163	1.063	1.227	0.03422	6.65%	3.79%
100		5	1.179	1.045	1.313	1.149	1.081	1.359	0.04838	9.18%	1.41%

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:23 (p 2 of 2)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID: 19-6618-4019
Analyzed: 03 Sep-14 15:21
Endpoint: Combined Development Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7882	0.7537	0.9606	0.8473	0.9261
6.25		0.936	0.8571	0.7438	0.7833	0.7931
12.5		0.7783	0.7685	0.7389	0.8079	0.8867
25		0.8424	0.803	0.7882	0.8473	0.7882
50		0.8424	0.7635	0.8818	0.7783	0.8867
100		0.8621	0.7783	0.9557	0.8079	0.8325

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.093	1.051	1.371	1.169	1.296
6.25		1.315	1.183	1.04	1.087	1.099
12.5		1.081	1.069	1.034	1.117	1.227
25		1.163	1.111	1.093	1.169	1.093
50		1.163	1.063	1.22	1.081	1.227
100		1.19	1.081	1.359	1.117	1.149

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:25 (p 1 of 1)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	05-6571-5854	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 15:22	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	04-2913-2821	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	
Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (3.1 °C)	**Station:**	SIYB-4		

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	10.5%

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		~~101~~ 100% filtered	0.7826	1.86	0.131	8	0.2282	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007618063	0.007618063	1	0.6125	0.4564	Non-Significant Effect
Error	0.09950331	0.01243791	8			
Total	0.1071214		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.728	23.15	0.3545	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9378	0.7411	0.5284	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	0.8552	0.7459	0.9645	0.8473	0.7537	0.9606	0.03937	10.29%	0.0%
AC ~~101~~ 100% filtered		5	0.8227	0.7474	0.8979	0.803	0.7586	0.8916	0.02712	7.37%	3.8%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.196	1.028	1.363	1.169	1.051	1.371	0.06034	11.28%	0.0%
AC ~~101~~ 100% filtered		5	1.141	1.039	1.242	1.111	1.057	1.235	0.03653	7.16%	4.62%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7882	0.7537	0.9606	0.8473	0.9261
AC ~~101~~ 100% filtered		0.803	0.7586	0.8916	0.8818	0.7783

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.093	1.051	1.371	1.169	1.296
AC ~~101~~ 100% filtered		1.111	1.057	1.235	1.22	1.081

Analyst: AC QA: b9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:31 (p 1 of 2)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	19-3302-7745	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 15:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	04-2913-2821	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (3.1 °C)	**Station:**	SIYB-4		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	101	>101	NA	0.9901	3.34%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.2065	2.407	0.089	8	0.7938	CDF	Non-Significant Effect
		12.5	-0.3383	2.407	0.089	8	0.9295	CDF	Non-Significant Effect
		25	0.1756	2.407	0.089	8	0.8042	CDF	Non-Significant Effect
		50	-1.521	2.407	0.089	8	0.9977	CDF	Non-Significant Effect
		100	-0.8359	2.407	0.089	8	0.9802	CDF	Non-Significant Effect
		101	-0.9893	2.407	0.089	8	0.9873	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01789513	0.002982522	6	0.8736	0.5265	Non-Significant Effect
Error	0.09558901	0.003413893	28			
Total	0.1134841		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.716	16.81	0.5808	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9787	0.9146	0.7150	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	0.9638	0.9207	1	0.9792	0.9053	0.9938	0.01553	3.6%	0.0%
6.25		5	0.9661	0.9521	0.9801	0.9695	0.9508	0.9805	0.005048	1.17%	-0.23%
12.5		5	0.972	0.9529	0.9911	0.9804	0.9535	0.9873	0.006885	1.58%	-0.85%
25		5	0.9638	0.9305	0.9971	0.9663	0.9194	0.9879	0.012	2.78%	0.0%
50		5	0.9845	0.9729	0.9961	0.981	0.9753	0.9945	0.004178	0.95%	-2.14%
100		5	0.9767	0.9561	0.9974	0.9777	0.9518	0.9949	0.00744	1.7%	-1.34%
~~101~~ 100% Filtered		5	0.9785	0.962	0.995	0.976	0.9676	1	0.005939	1.36%	-1.52%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.395	1.286	1.504	1.426	1.258	1.492	0.03923	6.29%	0.0%
6.25		5	1.388	1.348	1.427	1.395	1.347	1.431	0.01415	2.28%	0.55%
12.5		5	1.408	1.35	1.466	1.43	1.353	1.458	0.02082	3.31%	-0.9%
25		5	1.389	1.304	1.473	1.386	1.283	1.46	0.03047	4.91%	0.47%
50		5	1.451	1.4	1.503	1.433	1.413	1.496	0.01858	2.86%	-4.03%
100		5	1.426	1.355	1.497	1.421	1.349	1.499	0.02559	4.01%	-2.21%
~~101~~ 100% Filtered		5	1.432	1.359	1.504	1.415	1.39	1.531	0.02605	4.07%	-2.62%

For test acceptability only

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:31 (p 2 of 2)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID:	14-3867-6036	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 15:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	04-2913-2821	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	
Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	30h (3.1 °C)	**Station:**	SIYB-4		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	101	>101	NA	0.9901	11.8%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.7906	2.407	0.161	8	0.5496	CDF	Non-Significant Effect
		12.5	1.607	2.407	0.161	8	0.2100	CDF	Non-Significant Effect
		25	1.135	2.407	0.161	8	0.3912	CDF	Non-Significant Effect
		50	1.18	2.407	0.161	8	0.3717	CDF	Non-Significant Effect
		100	0.5975	2.407	0.161	8	0.6379	CDF	Non-Significant Effect
		~~101~~ 100 Filtrd	1.157	2.407	0.161	8	0.3816	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0360591	0.00600985	6	0.5364	0.7760	Non-Significant Effect
Error	0.3137324	0.01120473	28			
Total	0.3497915		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.146	16.81	0.7903	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9342	0.9146	0.0373	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	0.8867	0.7906	0.9828	0.8818	0.7931	0.9803	0.03462	8.73%	0.0%
6.25		5	0.8522	0.7456	0.9589	0.8177	0.7586	0.9754	0.03841	10.08%	3.89%
12.5		5	0.8197	0.7344	0.905	0.7931	0.7537	0.9261	0.03071	8.38%	7.56%
25		5	0.8453	0.7844	0.9063	0.8177	0.803	0.9163	0.02195	5.81%	4.67%
50		5	0.8433	0.7787	0.908	0.8621	0.7783	0.8916	0.02328	6.17%	4.89%
100		5	0.867	0.7937	0.9403	0.8571	0.8177	0.9606	0.02639	6.81%	2.22%
~~101~~ 100 Filtrd		5	0.8414	0.7531	0.9296	0.8227	0.7734	0.9212	0.03179	8.45%	5.11%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.247	1.078	1.415	1.22	1.099	1.43	0.06071	10.89%	0.0%
6.25		5	1.194	1.018	1.369	1.13	1.057	1.413	0.06329	11.86%	4.25%
12.5		5	1.139	1.018	1.26	1.099	1.051	1.296	0.04366	8.57%	8.63%
25		5	1.171	1.082	1.26	1.13	1.111	1.277	0.03207	6.13%	6.1%
50		5	1.168	1.079	1.256	1.19	1.081	1.235	0.0318	6.09%	6.34%
100		5	1.207	1.083	1.33	1.183	1.13	1.371	0.04447	8.24%	3.21%
~~101~~ 100 Filtrd		5	1.169	1.043	1.296	1.136	1.075	1.286	0.04551	8.7%	6.21%

For test acceptability only.

Analyst: AC QA: 9/4/14

CETIS Analytical Report

TST

Report Date:	08 Sep-14 12:54 (p 1 of 1)
Test Code:	1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	06-4059-6521	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:54	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

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		100*	4.26	1.895		7	0.0019	CDF	Non-Significant Effect
		101*	4.192	1.895		7	0.0020	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.008006563	0.004003282	2	0.3283	0.7264	Non-Significant Effect
Error	0.1463177	0.01219315	12			
Total	0.1543243		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.8754	9.21	0.6455	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9221	0.8328	0.2077	Normal Distribution

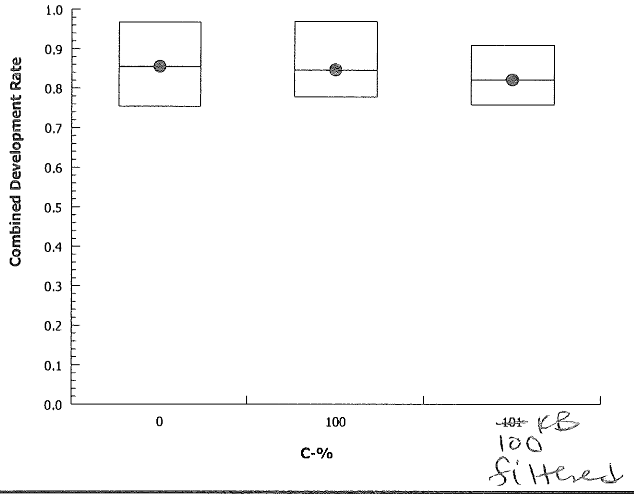
Combined Development Rate Summary

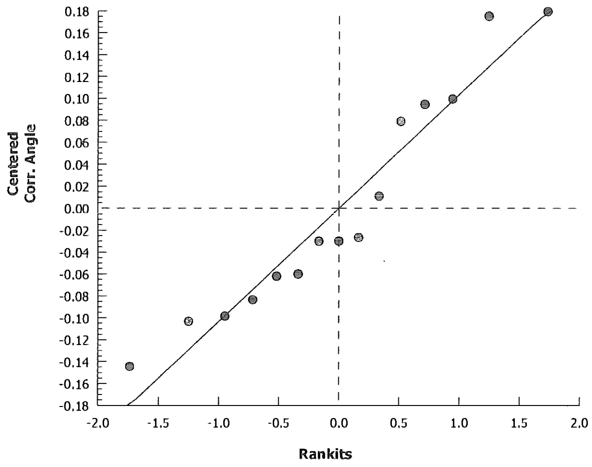
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8552	0.7459	0.9645	0.8473	0.7537	0.9606	0.03937	10.29%	0.0%
100		5	0.8473	0.7629	0.9317	0.8325	0.7783	0.9557	0.03041	8.03%	0.92%
~~101~~ KB 100 filtered		5	0.8227	0.7474	0.8979	0.803	0.7586	0.8916	0.02712	7.37%	3.8%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.196	1.028	1.363	1.169	1.051	1.371	0.06034	11.28%	0.0%
100		5	1.179	1.045	1.313	1.149	1.081	1.359	0.04838	9.18%	1.41%
~~101~~ KB 100 filtered		5	1.141	1.039	1.242	1.111	1.057	1.235	0.03653	7.16%	4.62%

Graphics





Analyst: KB QA: KFP 9/8/14

CETIS Analytical Report

Report Date: 10 Mar-15 14:13 (p 1 of 1)
Test Code: 1408-S093 | 00-2940-1047

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 05-4231-4199 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 10 Mar-15 14:13 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.92%	Passes survival 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	1.021	1.86	0.141	8	0.1686	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01500292	0.01500292	1	1.042	0.3371	Non-Significant Effect
Error	0.1151384	0.0143923	8			
Total	0.1301413		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.779	23.15	0.5905	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9135	0.7411	0.3057	Normal Distribution

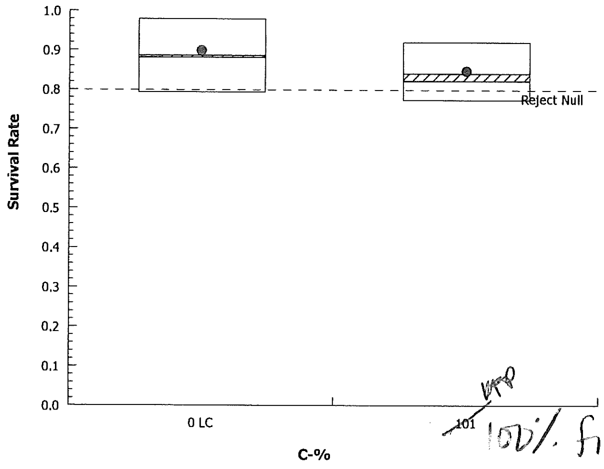
Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8867	0.7906	0.9828	0.8818	0.7931	0.9803	0.03462	8.73%	0.0%
101		5	0.8414	0.7531	0.9296	0.8227	0.7734	0.9212	0.03179	8.45%	5.11%

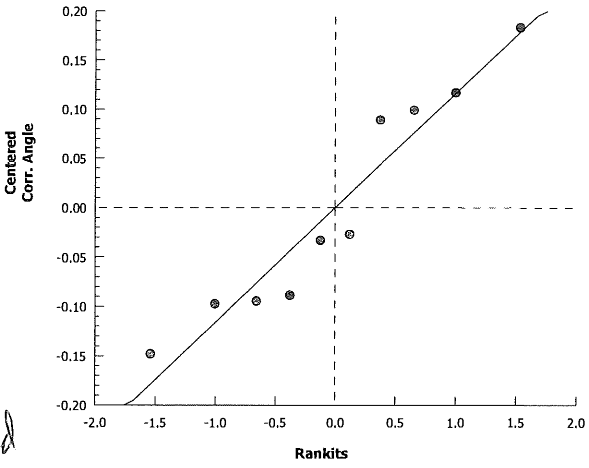
Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.247	1.078	1.415	1.22	1.099	1.43	0.06071	10.89%	0.0%
101		5	1.169	1.043	1.296	1.136	1.075	1.286	0.04551	8.7%	6.21%

Graphics



~~101~~ vrp 100% filtered



Analyst: AC QA: KTP 3/10/15

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:48 (p 1 of 1)
Test Code: 1408-S093 00-2940-1047/1408-S093

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14-~~0678~~ 0671 SD
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1107 **Material:** Ambient Water **Sample Station:** SIYB-4

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	140					
0	LC	2	121					
0	LC	3	126					
0	LC	4	114					
0	LC	5	123					
6.25		1	108					
6.25		2	132					
6.25		3	111					
6.25		4	109					
6.25		5	116					
12.5		1	113					
12.5		2	133					
12.5		3	134					
12.5		4	131					
12.5		5	124					
25		1	117					
25		2	125					
25		3	118					
25		4	110					
25		5	139					
50		1	120					
50		2	130					
50		3	122					
50		4	112					
50		5	135					
100		1	106					
100		2	119					
100		3	129			202	198	
100		4	115					
100		5	136					
101		1	128					
101		2	138					
101		3	127					
101		4	107					
101		5	137					

100% filtered AC

QC:AG

Analyst: AC QA: SD 8/22/14

CETIS Test Data Worksheet

Report Date: 03 Sep-14 15:34 (p 1 of 1)
Test Code: 00-2940-1047/1408-S093

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date:	13 Aug-14 17:30	**Species:**	Mytilus galloprovincialis	**Sample Code:**	14-0671
End Date:	15 Aug-14 17:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Shelter Island Yacht Basin
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Sample Station:**	SIYB-4

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			106			179	175	
			107			185	179	
			108			198	190	
			109			164	159	
			110			178	172	
			111			154	151	
			112			162	158	
			113			161	158	
			114			179	172	
			115			166	164	
			116			166	161	
			117			186	171	
			118			166	160	
			119			166	158	
			120			175	171	
			121			169	153	
			122			180	179	
			123			192	188	
			124			188	180	
			125			165	163	
			126			199	195	
			127			187	181	
			128			167	163	
			129			195	194	
			130			158	155	
			131			172	164	
			132			183	174	
			133			158	156	
			134			153	150	
			135			181	180	
			136			174	169	
			137			158	158	
			138			157	154	
			139			163	160	
			140			161	160	

Analyst: NH QA: 9/8/14

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-4
Sample Log No.: 14-0671
Test No.: 1408-S093

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.2	33.2	33.2	16.0	14.8	15.5	8.1	8.6	8.1	7.97	8.02	7.95
6.25	33.6	33.4	33.4	15.8	14.7	15.4	7.8	8.1	8.1	8.05	7.98	7.94
12.5	33.6	33.5	33.4	15.2	14.9	15.4	7.9	8.1	8.2	~~8.05~~ 8.05	8.00	7.94
25	33.4	33.5	33.5	15.4	15.0	15.5	8.1	8.0	8.1	8.07	7.99	7.95
50	33.4	33.4	33.4	15.8	15.0	15.5	8.1	8.1	8.2	8.07	7.99	7.95
100	33.5	33.6	33.4	15.6	15.0	15.4	8.2	8.1	8.2	8.07	7.98	7.95
100 filtered	33.4	33.5	33.4	15.3	15.2	15.5	7.3	7.9	8.0	8.07	8.01	7.97

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AP
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SO 8/22/14

Final Review: AC 9/3/14

Site: SIYB-5

CETIS Summary Report

Report Date: 03 Sep-14 15:55 (p 1 of 1)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	17-3590-3597	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	06-7425-7939	**Code:**	14-0672	**Client:**	AMEC
Sample Date:	12 Aug-14 10:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	31h (0.9 °C)	**Station:**	SIYB-5		

Batch Note: 101 = 100% sample, filtered (0.45µm)

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
08-1927-4250	Combined Development Ra	100	>100	NA	5.65%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
08-1927-4250	Combined Development Ra	PMSD	0.05654	NL - 0.25	No	Passes Acceptability Criteria

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	0.8867	0.8765	0.8969	0.8424	0.9113	0.01217	0.02721	3.07%	0.0%
6.25		5	0.9041	0.8931	0.9151	0.8719	0.9393	0.01314	0.02939	3.25%	-1.96%
12.5		5	0.9199	0.9099	0.9298	0.8818	0.9569	0.01196	0.02673	2.91%	-3.74%
25		5	0.9178	0.9053	0.9303	0.8818	0.9585	0.01495	0.03342	3.64%	-3.51%
50		5	0.9252	0.9151	0.9353	0.8966	0.9519	0.01208	0.02701	2.92%	-4.34%
100		5	0.9263	0.919	0.9337	0.8966	0.9469	0.008774	0.01962	2.12%	-4.47%
~~101~~ 100% filtered		5	0.8808	0.864	0.8976	0.8079	0.9261	0.02015	0.04507	5.12%	0.67%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.8424	0.8867	0.8867	0.9064	0.9113
6.25		0.9393	0.8867	0.8719	0.8916	0.931
12.5		0.9231	0.9569	0.8818	0.9156	0.922
25		0.8818	0.8916	0.9458	0.9113	0.9585
50		0.8966	0.9474	0.8966	0.9336	0.9519
100		0.9406	0.8966	0.9469	0.9212	0.9265
~~101~~ 100% filtered		0.8719	0.8966	0.9261	0.8079	0.9015

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	171/203	180/203	180/203	184/203	185/203
6.25		201/214	180/203	177/203	181/203	189/203
12.5		192/208	200/209	179/203	206/225	189/205
25		179/203	181/203	192/203	185/203	208/217
50		182/203	198/209	182/203	197/211	198/208
100		206/219	182/203	196/207	187/203	189/204
~~101~~ 100% filtered		177/203	182/203	188/203	164/203	183/203

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 15:54 (p 1 of 2)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	08-1927-4250	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 15:53	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	17-3590-3597	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	06-7425-7939	**Code:**	14-0672	**Client:**	AMEC
Sample Date:	12 Aug-14 10:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	31h (0.9 °C)	**Station:**	SIYB-5		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	5.65%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.9419	2.362	0.075	8	0.9804	CDF	Non-Significant Effect
		12.5	-1.832	2.362	0.075	8	0.9987	CDF	Non-Significant Effect
		25	-1.77	2.362	0.075	8	0.9984	CDF	Non-Significant Effect
		50	-2.156	2.362	0.075	8	0.9996	CDF	Non-Significant Effect
		100	-2.172	2.362	0.075	8	0.9996	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01805023	0.003610045	5	1.449	0.2430	Non-Significant Effect
Error	0.05977639	0.002490683	24			
Total	0.07782662		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.267	15.09	0.9383	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9432	0.9031	0.1108	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	0.8867	0.8529	0.9205	0.8867	0.8424	0.9113	0.01217	3.07%	0.0%
6.25		5	0.9041	0.8676	0.9406	0.8916	0.8719	0.9393	0.01314	3.25%	-1.96%
12.5		5	0.9199	0.8867	0.9531	0.922	0.8818	0.9569	0.01196	2.91%	-3.74%
25		5	0.9178	0.8763	0.9593	0.9113	0.8818	0.9585	0.01495	3.64%	-3.51%
50		5	0.9252	0.8917	0.9587	0.9336	0.8966	0.9519	0.01208	2.92%	-4.34%
100		5	0.9263	0.902	0.9507	0.9265	0.8966	0.9469	0.008774	2.12%	-4.47%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.229	1.177	1.281	1.227	1.163	1.268	0.01862	3.39%	0.0%
6.25		5	1.259	1.195	1.323	1.235	1.205	1.322	0.02297	4.08%	-2.42%
12.5		5	1.287	1.224	1.35	1.288	1.22	1.362	0.02262	3.93%	-4.7%
25		5	1.285	1.206	1.364	1.268	1.22	1.366	0.02837	4.94%	-4.55%
50		5	1.297	1.234	1.361	1.31	1.243	1.35	0.02292	3.95%	-5.54%
100		5	1.298	1.252	1.344	1.296	1.243	1.338	0.01652	2.85%	-5.58%

Analyst: AC QA: 9/4/14

CETIS Analytical Report

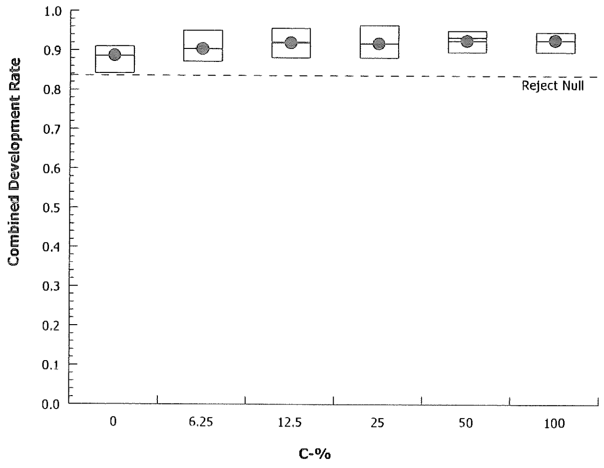
Report Date: 03 Sep-14 15:54 (p 2 of 2)
Test Code: 1408-S094 | 12-8289-6864

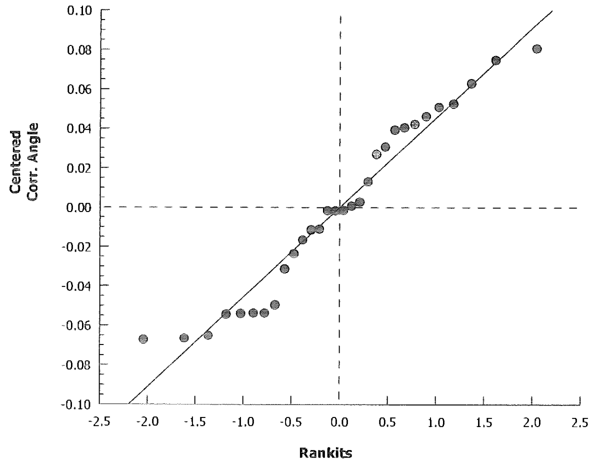
Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID: 08-1927-4250
Analyzed: 03 Sep-14 15:53
Endpoint: Combined Development Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Graphics





Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 16:55 (p 1 of 4)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	06-0619-1655	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 16:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	17-3590-3597	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	06-7425-7939	**Code:**	14-0672	**Client:**	AMEC
Sample Date:	12 Aug-14 10:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	31h (0.9 °C)	**Station:**	SIYB-5		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	101	>101	NA	0.9901	3.06%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.8187	2.407	0.053	8	0.9792	CDF	Non-Significant Effect
		12.5	-0.03971	2.407	0.053	8	0.8676	CDF	Non-Significant Effect
		25	-1.538	2.407	0.053	8	0.9978	CDF	Non-Significant Effect
		50	-0.6923	2.407	0.053	8	0.9707	CDF	Non-Significant Effect
		100	-1.02	2.407	0.053	8	0.9884	CDF	Non-Significant Effect
		~~101~~ 100% Filtered	0.4039	2.407	0.053	8	0.7202	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006688879	0.001114813	6	0.92	0.4955	Non-Significant Effect
Error	0.03392735	0.001211691	28			
Total	0.04061623		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.759	16.81	0.4507	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9678	0.9146	0.3854	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	0.926	0.8942	0.9578	0.9375	0.886	0.9487	0.01146	2.77%	0.0%
6.25		5	0.9363	0.924	0.9485	0.9378	0.9231	0.9497	0.004411	1.05%	-1.11%
12.5		5	0.9271	0.906	0.9481	0.922	0.9156	0.9569	0.007583	1.83%	-0.12%
25		5	0.9437	0.9299	0.9574	0.9439	0.9275	0.9585	0.004944	1.17%	-1.91%
50		5	0.9343	0.9118	0.9569	0.9336	0.9055	0.9519	0.008105	1.94%	-0.9%
100		5	0.9384	0.9264	0.9505	0.9406	0.9265	0.9479	0.004326	1.03%	-1.34%
~~101~~ 100% Filtered		5	0.9213	0.8866	0.956	0.9307	0.8723	0.9433	0.01251	3.04%	0.51%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.298	1.24	1.357	1.318	1.226	1.342	0.02112	3.64%	0.0%
6.25		5	1.316	1.291	1.341	1.319	1.29	1.345	0.009084	1.54%	-1.39%
12.5		5	1.299	1.255	1.343	1.288	1.276	1.362	0.01587	2.73%	-0.07%
25		5	1.332	1.302	1.362	1.332	1.298	1.366	0.01074	1.8%	-2.61%
50		5	1.313	1.269	1.358	1.31	1.258	1.35	0.0159	2.71%	-1.17%
100		5	1.321	1.296	1.346	1.325	1.296	1.341	0.008957	1.52%	-1.73%
~~101~~ 100% Filtered		5	1.289	1.229	1.349	1.304	1.205	1.33	0.02162	3.75%	0.69%

For test acceptability

Analyst: AC QA: 9/4/14

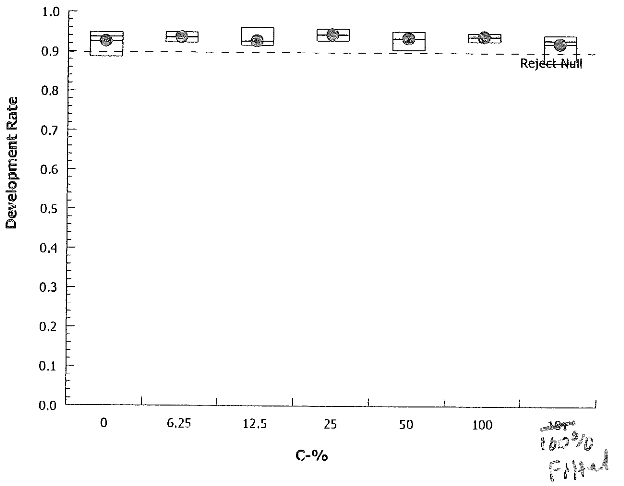
CETIS Analytical Report

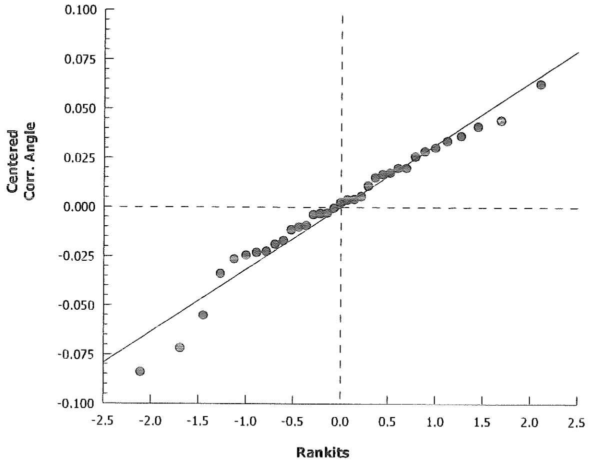
Report Date: 03 Sep-14 16:55 (p 2 of 4)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test | **Nautilus Environmental (CA)**

Analysis ID:	06-0619-1655	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 16:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 9/9/14

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	05-4381-5998	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 16:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	17-3590-3597	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	06-7425-7939	**Code:**	14-0672	**Client:**	AMEC
Sample Date:	12 Aug-14 10:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	31h (0.9 °C)	**Station:**	SIYB-5		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	101	>101	NA	0.9901	6.15%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.5797	2.407	0.123	8	0.9607	CDF	Non-Significant Effect
		12.5	-2.595	2.407	0.123	8	0.9999	CDF	Non-Significant Effect
		25	-1.126	2.407	0.123	8	0.9916	CDF	Non-Significant Effect
		50	-2.344	2.407	0.123	8	0.9999	CDF	Non-Significant Effect
		100	-2.206	2.407	0.123	8	0.9999	CDF	Non-Significant Effect
		~~101~~ 100% Filtered	-0.01292	2.407	0.123	8	0.8606	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0976866	0.0162811	6	2.492	0.0465	Significant Effect
Error	0.1829202	0.006532863	28			
Total	0.2806067		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.205	16.81	0.9766	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.976	0.9146	0.6266	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	0.9576	0.9333	0.9819	0.9507	0.9409	0.9901	0.008757	2.05%	0.0%
6.25		5	0.9655	0.9343	0.9967	0.9606	0.936	1	0.01123	2.6%	-0.82%
12.5		5	0.9921	0.9702	1	1	0.9606	1	0.007882	1.78%	-3.6%
25		5	0.9724	0.9399	1	0.9655	0.9458	1	0.01172	2.7%	-1.54%
50		5	0.9901	0.969	1	1	0.9606	1	0.007632	1.72%	-3.4%
100		5	0.9872	0.958	1	1	0.9458	1	0.01052	2.38%	-3.09%
~~101~~ 100% Filtered		5	0.9557	0.9222	0.9892	0.9557	0.9261	0.9951	0.01207	2.82%	0.21%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.37	1.297	1.443	1.347	1.325	1.471	0.02644	4.32%	0.0%
6.25		5	1.4	1.292	1.508	1.371	1.315	1.536	0.03886	6.21%	-2.16%
12.5		5	1.503	1.411	1.594	1.536	1.371	1.536	0.03295	4.9%	-9.68%
25		5	1.428	1.303	1.552	1.384	1.336	1.536	0.04482	7.02%	-4.2%
50		5	1.49	1.4	1.579	1.536	1.371	1.536	0.03224	4.84%	-8.75%
100		5	1.483	1.375	1.591	1.536	1.336	1.536	0.0388	5.85%	-8.23%
~~101~~ 100% Filtered		5	1.371	1.271	1.471	1.359	1.296	1.501	0.03602	5.88%	-0.05%

For test acceptability

Analyst: AC QA: 9/4/14

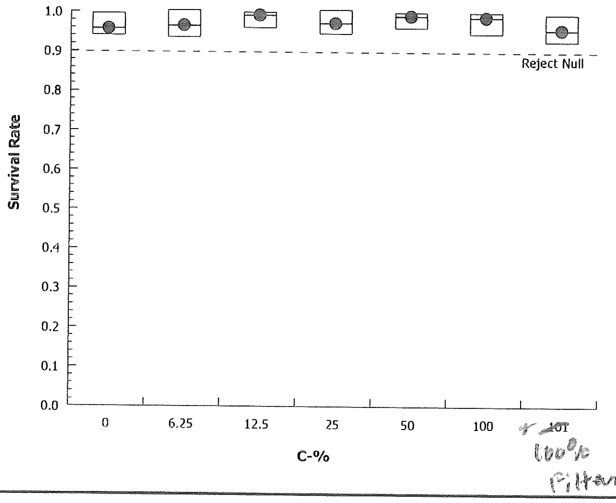
CETIS Analytical Report

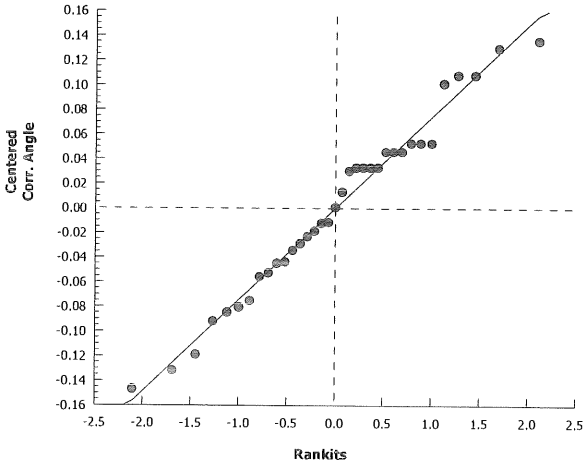
Report Date: 03 Sep-14 16:55 (p 4 of 4)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	05-4381-5998	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 16:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 08 Sep-14 12:56 (p 2 of 2)
Test Code: 1408-S094 | 12-8289-6864

TST

Bivalve Larval Survival and Development Test LC vs 100 filtered **Nautilus Environmental (CA)**

Analysis ID:	10-4654-7657	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:55	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	Sample passes combined development rate endpoint

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	9.076	2.015		5	0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001127109	0.0001127109	1	0.03612	0.8540	Non-Significant Effect
Error	0.0249666	0.003120825	8			
Total	0.02507931		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.601	23.15	0.3770	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9285	0.7411	0.4335	Normal Distribution

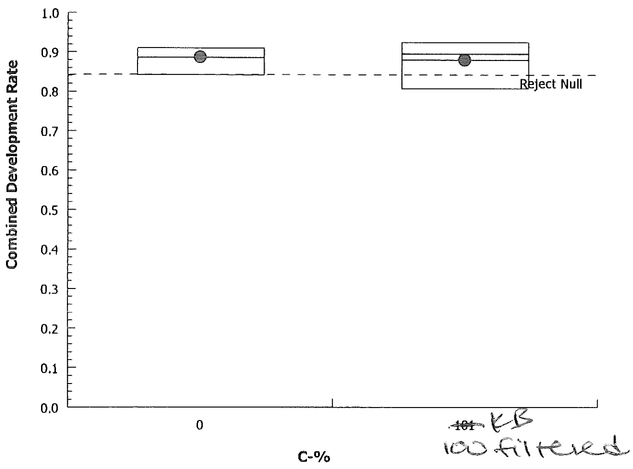
Combined Development Rate Summary

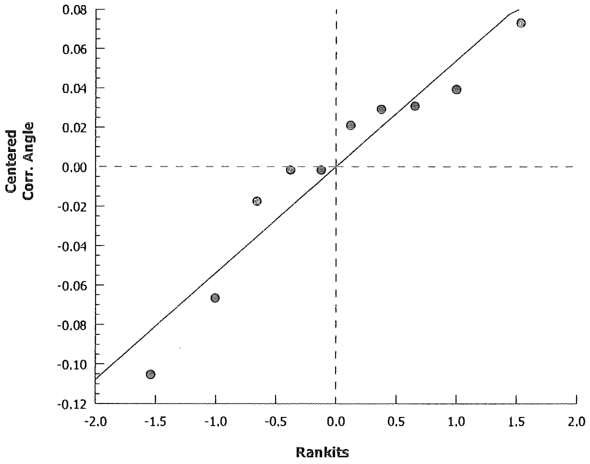
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8867	0.8529	0.9205	0.8867	0.8424	0.9113	0.01217	3.07%	0.0%
~~101~~ KB 100 filtered		5	0.8808	0.8248	0.9367	0.8966	0.8079	0.9261	0.02015	5.12%	0.67%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.229	1.177	1.281	1.227	1.163	1.268	0.01862	3.39%	0.0%
~~101~~ KB 100 filtered		5	1.222	1.139	1.306	1.243	1.117	1.296	0.03003	5.49%	0.55%

Graphics





Analyst: KB QA: PP 9/8/14

CETIS Analytical Report

Report Date: 08 Sep-14 12:56 (p 1 of 2)
Test Code: 1408-S094 | 12-8289-6864

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	21-1204-2425	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:55	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	4.22%

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	0.19	1.86	0.066	8	0.4270	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001127109	0.0001127109	1	0.03612	0.8540	Non-Significant Effect
Error	0.0249666	0.003120825	8			
Total	0.02507931		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.601	23.15	0.3770	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9285	0.7411	0.4335	Normal Distribution

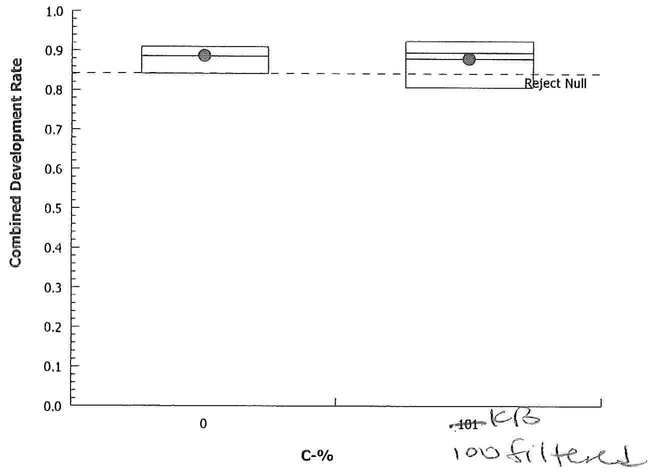
Combined Development Rate Summary

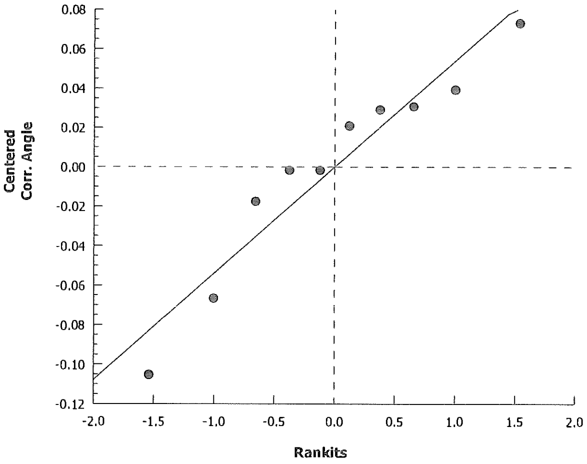
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8867	0.8529	0.9205	0.8867	0.8424	0.9113	0.01217	3.07%	0.0%
~~101~~ KB 100 filtered		5	0.8808	0.8248	0.9367	0.8966	0.8079	0.9261	0.02015	5.12%	0.67%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.229	1.177	1.281	1.227	1.163	1.268	0.01862	3.39%	0.0%
~~101~~ 100 filtered KB		5	1.222	1.139	1.306	1.243	1.117	1.296	0.03003	5.49%	0.55%

Graphics





Analyst: KB QA: KP 9/8/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:51 (p 1 of 1)
Test Code: 12-8289-6864/1408-S094

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730
End Date: 15 Aug-14 1700
Sample Date: 12 Aug-14 1017
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 14- 0672
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-5

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			141			203	192	
			142			193	171	
			143			205	189	
			144			194	183	
			145			214	201	
			146			190	AC 177	
			147			201	182	
			148			217	208	
			149			211	197	
			150			202	188	
			151			209	200	
			152			195	185	
			153			209	198	
			154			219	206	
			155			195	179	
			156			190	177	
			157			201	184	
			158			192	187	
			159			208	198	
			160			207	196	
			161			225	206	
			162			192	180	
			163			188	164	
			164			195	180	
			165			195	182	
			166			193	181	
			167			192	182	
			168			199	189	
			169			204	189	
			170			193	179	
			171			196	185	
			172			AC 7 208	192	
			173			201	187	
			174			196	180	
			175			196	182	

000-089-170-2

CETIS™ v1.8.4.23

Analyst: AC

QA: 9/4/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:51 (p 1 of 1)
Test Code: 1408-S094 12-8289-6864/1408-S094

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0072
End Date: 15 Aug-14 1700 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 1017 **Material:** Ambient Water **Sample Station:** SIYB-5

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	142					
0	LC	2	162					
0	LC	3	174					
0	LC	4	157					
0	LC	5	152					
6.25		1	145					
6.25		2	164					
6.25		3	146					
6.25		4	166					
6.25		5	168					
12.5		1	172					
12.5		2	151					
12.5		3	155					
12.5		4	161					
12.5		5	143					
25		1	170					
25		2	158					
25		3	141					
25		4	171					
25		5	148					
50		1	147					
50		2	153					
50		3	165					
50		4	149					
50		5	159					
100		1	154					
100		2	167			178	170	
100		3	160					
100		4	173					
100		5	169					
101		1	156					
101		2	175					
101		3	150					
101		4	163					
101		5	144					

100% filtered AC

QC: AC

Analyst: AC QA: 8/22/14

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-5
Sample Log No.: 14-0672
Test No.: 1408-S094

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.3	33.1	33.0	15.1	14.8	15.0	8.3	7.7	8.1	8.08	8.02	8.00
6.25	33.5	33.3	33.3	15.6	14.5	15.0	8.0	7.8	8.2	8.08	8.01	7.98
12.5	33.5	33.2	33.4	15.8	14.5	15.0	8.0	7.9	8.2	8.07	7.99	7.97
25	33.5	33.4	33.4	15.9	14.7	15.2	8.0	7.9	8.2	8.07	7.99	7.98
50	33.5	33.5	33.6	15.0	14.6	15.2	8.2	8.0	8.3	8.06	7.98	7.96
100	33.8	33.6	33.6	14.9	14.7	15.3	8.2	8.0	8.3	8.04	7.97	7.96
100 filtered	33.6	33.6	33.6	15.0	14.8	15.4	7.6	8.0	8.1	8.06	7.99	7.96

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AO
Dilutions made by:	AG	▨	▨

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SD 8/22/14

Final Review: AC 9/3/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-6

CETIS Summary Report

Report Date: 08 Sep-14 13:29 (p 1 of 1)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Batch ID:	19-7914-2070	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-7446-1515	**Code:**	14-0673	**Client:**	AMEC
Sample Date:	12 Aug-14 09:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	32h (1.1 °C)	**Station:**	SIYB-6		

Batch Note: 101 = 100% sample, filtered

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-1838-4756	Combined Development Ra	100	>100	NA	7.64%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
04-1838-4756	Combined Development Ra	PMSD	0.07636	NL - 0.25	No	Passes Acceptability Criteria

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	0.9199	0.9031	0.9367	0.8424	0.9534	0.02009	0.04491	4.88%	0.0%
6.25		5	0.8858	0.8636	0.908	0.8424	0.9543	0.0266	0.05947	6.71%	3.71%
12.5		5	0.8798	0.8564	0.9032	0.7734	0.936	0.02807	0.06276	7.13%	4.36%
25		5	0.932	0.9204	0.9436	0.8818	0.9671	0.01389	0.03105	3.33%	-1.32%
50		5	0.9182	0.9058	0.9307	0.8719	0.9548	0.01491	0.03333	3.63%	0.18%
100		5	0.8884	0.8701	0.9066	0.8128	0.9476	0.02185	0.04887	5.5%	3.42%
KFP ~~101~~ 100% filtered		5	0.8897	0.8749	0.9044	0.8325	0.936	0.01767	0.0395	4.44%	3.29%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.9444	0.9212	0.8424	0.9534	0.9381
6.25		0.8424	0.8424	0.8424	0.9474	0.9543
12.5		0.9113	0.8818	0.936	0.7734	0.8966
25		0.9671	0.9409	0.9342	0.936	0.8818
50		0.9548	0.8719	0.9346	0.9333	0.8966
100		0.8818	0.9476	0.8966	0.9032	0.8128
KFP ~~101~~ 100% filtered		0.8966	0.8719	0.8325	0.936	0.9113

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	204/216	187/203	171/203	225/236	197/210
6.25		171/203	171/203	171/203	198/209	209/219
12.5		185/203	179/203	190/203	157/203	182/203
25		206/213	191/203	213/228	190/203	179/203
50		211/221	177/203	200/214	196/210	182/203
100		179/203	199/210	182/203	196/217	165/203
KFP ~~101~~ 100% filtered		182/203	177/203	169/203	190/203	185/203

Analyst: KB QA: KFP 9/8/14

CETIS Analytical Report

Report Date: 06 Sep-14 13:36 (p 1 of 4)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	04-1838-4756	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 Sep-14 13:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	19-7914-2070	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-7446-1515	**Code:**	14-0673	**Client:**	AMEC
Sample Date:	12 Aug-14 09:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	32h (1.1 °C)	**Station:**	SIYB-6		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	7.64%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.086	2.362	0.118	8	0.3821	CDF	Non-Significant Effect
		12.5	1.33	2.362	0.118	8	0.2833	CDF	Non-Significant Effect
		25	-0.4224	2.362	0.118	8	0.9285	CDF	Non-Significant Effect
		50	0.1109	2.362	0.118	8	0.7985	CDF	Non-Significant Effect
		100	1.092	2.362	0.118	8	0.3796	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03293686	0.006587371	5	1.052	0.4110	Non-Significant Effect
Error	0.1503263	0.006263597	24			
Total	0.1832632		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.599	15.09	0.9014	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.962	0.9031	0.3484	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	0.9199	0.8641	0.9757	0.9381	0.8424	0.9534	0.02009	4.88%	0.0%
6.25		5	0.8858	0.8119	0.9596	0.8424	0.8424	0.9543	0.0266	6.71%	3.71%
12.5		5	0.8798	0.8019	0.9577	0.8966	0.7734	0.936	0.02807	7.13%	4.36%
25		5	0.932	0.8934	0.9705	0.936	0.8818	0.9671	0.01389	3.33%	-1.32%
50		5	0.9182	0.8768	0.9596	0.9333	0.8719	0.9548	0.01491	3.63%	0.18%
100		5	0.8884	0.8277	0.9491	0.8966	0.8128	0.9476	0.02185	5.5%	3.42%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.291	1.197	1.385	1.319	1.163	1.353	0.03388	5.87%	0.0%
6.25		5	1.236	1.111	1.362	1.163	1.163	1.355	0.04536	8.2%	4.21%
12.5		5	1.224	1.112	1.337	1.243	1.075	1.315	0.04058	7.41%	5.16%
25		5	1.312	1.237	1.387	1.315	1.22	1.389	0.02696	4.6%	-1.64%
50		5	1.285	1.21	1.36	1.31	1.205	1.356	0.02703	4.7%	0.43%
100		5	1.236	1.14	1.333	1.243	1.123	1.34	0.03474	6.28%	4.23%

Analyst: AC QA: KFP 9/8/14

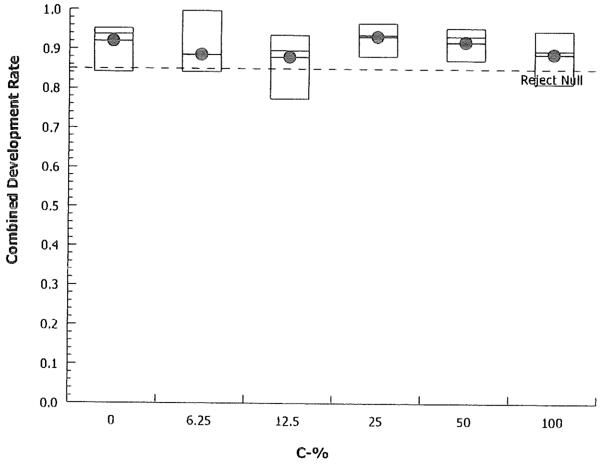
CETIS Analytical Report

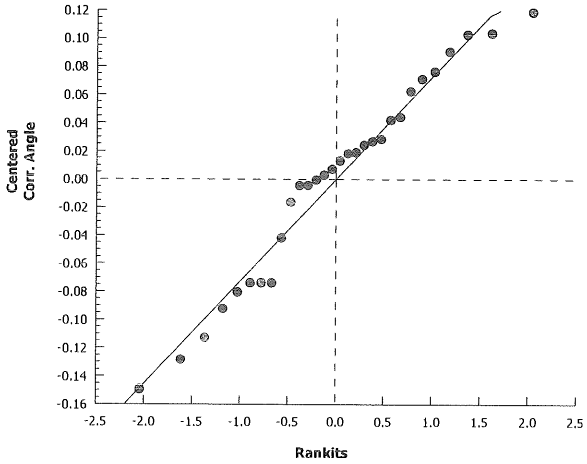
Report Date: 06 Sep-14 13:36 (p 2 of 4)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	04-1838-4756	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 Sep-14 13:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: KP 9/8/14

CETIS Analytical Report

Report Date: 17 Feb-15 11:38 (p 1 of 2)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	14-2170-9781	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:37	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.58%	101	>101	NA	0.9901

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.2271	2.407	0.049	8	0.9098	CDF	Non-Significant Effect
		12.5	-0.4876	2.407	0.049	8	0.9505	CDF	Non-Significant Effect
		25	-0.5844	2.407	0.049	8	0.9611	CDF	Non-Significant Effect
		50	0.3764	2.407	0.049	8	0.7311	CDF	Non-Significant Effect
		100	2.305	2.407	0.049	8	0.0615	CDF	Non-Significant Effect
		AC ~~101~~ 100% filtered	-0.3521	2.407	0.049	8	0.9317	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01238727	0.002064544	6	2.019	0.0965	Non-Significant Effect
Error	0.02863154	0.001022555	28			
Total	0.04101881		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.571	16.81	0.5998	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9724	0.9146	0.5119	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	0.9429	0.9311	0.9547	0.9444	0.9293	0.9534	0.004239	1.01%	0.0%
6.25		5	0.9451	0.9362	0.954	0.9448	0.9344	0.9543	0.003199	0.76%	-0.24%
12.5		5	0.9464	0.9229	0.9699	0.9453	0.9179	0.9686	0.008466	2.0%	-0.37%
25		5	0.9477	0.9296	0.9659	0.95	0.9323	0.9671	0.006541	1.54%	-0.51%
50		5	0.9386	0.9156	0.9615	0.9346	0.9124	0.9579	0.008261	1.97%	0.46%
100		5	0.9189	0.8967	0.9411	0.9133	0.9032	0.9476	0.007995	1.95%	2.54%
AC ~~101~~ 100% filtered		5	0.9457	0.9294	0.9621	0.9406	0.9333	0.9672	0.005905	1.4%	-0.3%

Angular (Corrected) Transformed Summary

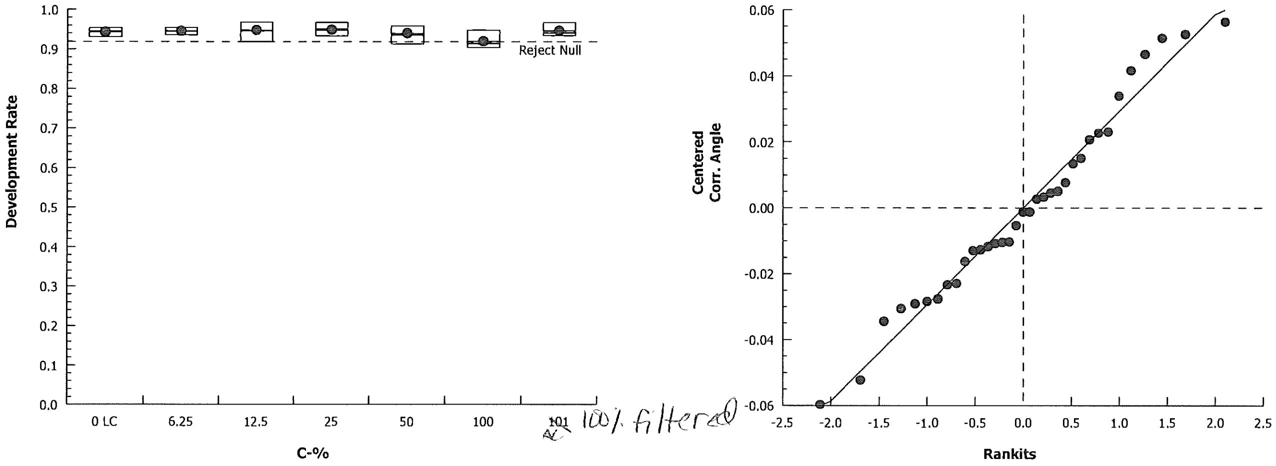
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.33	1.305	1.355	1.333	1.302	1.353	0.009056	1.52%	0.0%
6.25		5	1.335	1.315	1.354	1.334	1.312	1.355	0.00699	1.17%	-0.35%
12.5		5	1.34	1.288	1.392	1.335	1.28	1.393	0.01869	3.12%	-0.74%
25		5	1.342	1.3	1.384	1.345	1.308	1.389	0.01504	2.51%	-0.89%
50		5	1.323	1.275	1.37	1.312	1.27	1.364	0.01715	2.9%	0.57%
100		5	1.284	1.241	1.326	1.272	1.254	1.34	0.01543	2.69%	3.5%
AC ~~101~~ 100% filtered		5	1.337	1.299	1.376	1.325	1.31	1.389	0.0139	2.32%	-0.54%

Analyst: AC QA: PPP 2/18/15

Bivalve Larval Survival and Development Test	**Nautilus Environmental (CA)**

Analysis ID:	14-2170-9781	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:37	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics



Analyst: AC QA: KAP 2/18/15

CETIS Analytical Report

Report Date: 17 Feb-15 11:38 (p 1 of 2)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 10-7010-1980 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 17 Feb-15 11:37 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.63%	101	>101	NA	0.9901

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	1.223	2.407	0.186	8	0.3533	CDF	Non-Significant Effect
		12.5	1.643	2.407	0.186	8	0.1988	CDF	Non-Significant Effect
		25	-0.1041	2.407	0.186	8	0.8835	CDF	Non-Significant Effect
		50	-0.04076	2.407	0.186	8	0.8679	CDF	Non-Significant Effect
		100	0.4364	2.407	0.186	8	0.7070	CDF	Non-Significant Effect
		AC ~~101~~ 100% filtered	1.41	2.407	0.186	8	0.2783	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1012217	0.01687028	6	1.135	0.3680	Non-Significant Effect
Error	0.4160395	0.01485855	28			
Total	0.5172611		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.769	16.81	0.9397	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9511	0.9146	0.1223	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	0.9754	0.9249	1	1	0.9064	1	0.01817	4.17%	0.0%
6.25		5	0.9369	0.8653	1	0.9015	0.8916	1	0.0258	6.16%	3.94%
12.5		5	0.93	0.8422	1	0.9507	0.8079	0.9901	0.03163	7.61%	4.65%
25		5	0.9833	0.9557	1	0.9852	0.9458	1	0.009926	2.26%	-0.81%
50		5	0.9783	0.9405	1	1	0.936	1	0.01363	3.12%	-0.3%
100		5	0.9665	0.914	1	0.9704	0.8966	1	0.01891	4.38%	0.91%
AC ~~101~~ 100% filtered		5	0.9409	0.8847	0.9971	0.9606	0.8867	0.9951	0.02025	4.81%	3.54%

Angular (Corrected) Transformed Summary

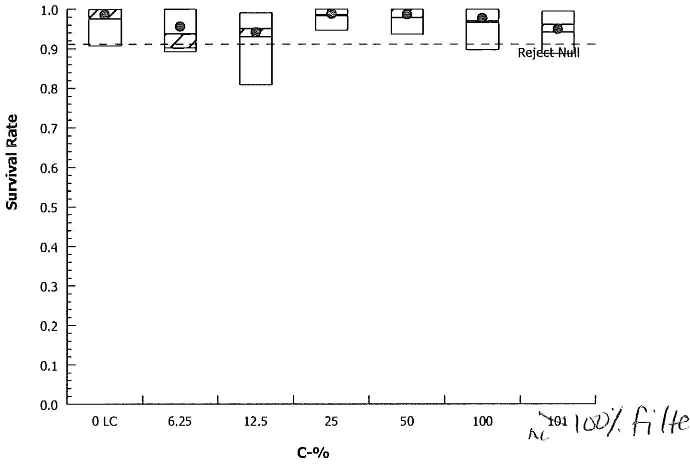
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.453	1.3	1.606	1.536	1.26	1.536	0.05515	8.49%	0.0%
6.25		5	1.359	1.158	1.559	1.252	1.235	1.536	0.07231	11.9%	6.49%
12.5		5	1.326	1.165	1.487	1.347	1.117	1.471	0.05798	9.78%	8.72%
25		5	1.461	1.359	1.563	1.449	1.336	1.536	0.03682	5.64%	-0.55%
50		5	1.456	1.32	1.593	1.536	1.315	1.536	0.04921	7.56%	-0.22%
100		5	1.419	1.268	1.571	1.398	1.243	1.536	0.05466	8.61%	2.32%
AC ~~101~~ 100% filtered		5	1.344	1.208	1.48	1.371	1.227	1.501	0.04903	8.16%	7.48%

Analyst: AC QA: KP 2/18/15

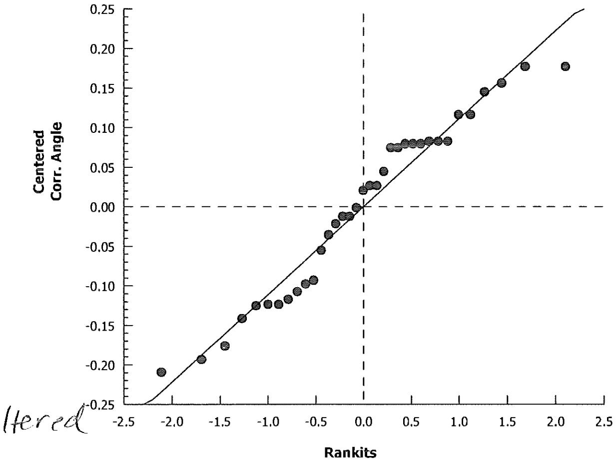
Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 10-7010-1980 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 17 Feb-15 11:37 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics



AL 100% filtered



CETIS Analytical Report

Report Date: 06 Sep-14 13:36 (p 3 of 4)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	18-9085-4258	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 Sep-14 13:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	19-7914-2070	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-7446-1515	**Code:**	14-0673	**Client:**	AMEC
Sample Date:	12 Aug-14 09:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	32h (1.1 °C)	**Station:**	SIYB-6		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	4.92%

Equal Variance t Two-Sample Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control	KPP ~~101~~ 100% filtered	1.241	1.86	0.082	8	0.1248	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007477005	0.007477005	1	1.541	0.2496	Non-Significant Effect
Error	0.03880831	0.004851039	8			
Total	0.04628532		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.448	23.15	0.7286	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9212	0.7411	0.3667	Normal Distribution

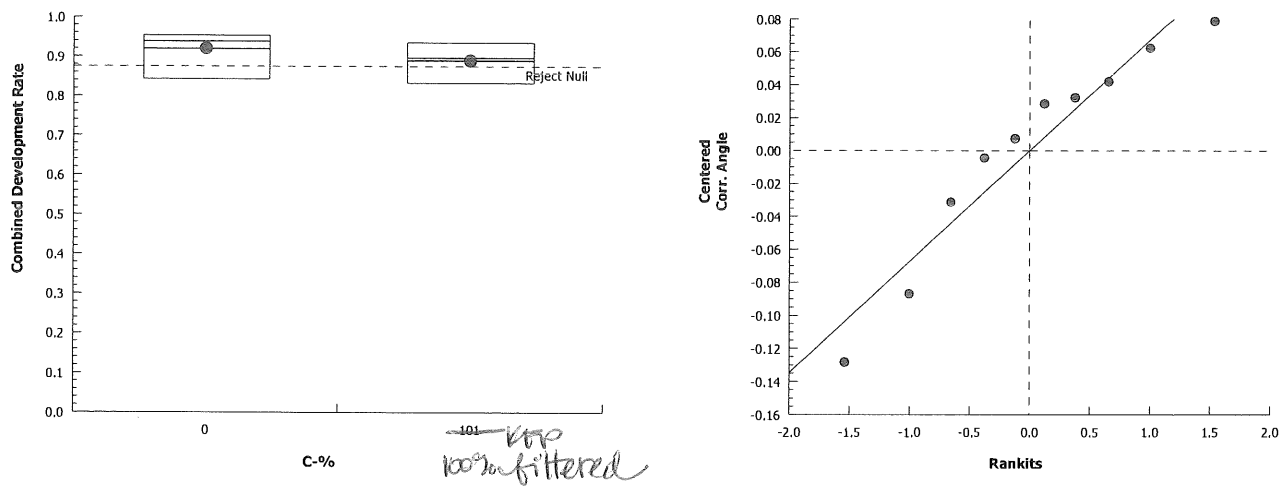
Combined Development Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9199	0.8641	0.9757	0.9381	0.8424	0.9534	0.02009	4.88%	0.0%
KPP ~~101~~ 100% filtered		5	0.8897	0.8406	0.9387	0.8966	0.8325	0.936	0.01767	4.44%	3.29%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.291	1.197	1.385	1.319	1.163	1.353	0.03388	5.87%	0.0%
KPP ~~101~~ 100% filtered		5	1.236	1.158	1.314	1.243	1.149	1.315	0.02816	5.09%	4.24%

Graphics



Analyst: AC QA: KPP 9/8/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	02-8038-7132	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 Sep-14 13:35	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	19-7914-2070	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-7446-1515	**Code:**	14-0673	**Client:**	AMEC
Sample Date:	12 Aug-14 09:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	32h (1.1 °C)	**Station:**	SIYB-6		

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	Sample passes combined development rate endpoint

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		100*	6.228	1.895		7	0.0002	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007469195	0.007469195	1	1.269	0.2926	Non-Significant Effect
Error	0.04709085	0.005886357	8			
Total	0.05456005		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.052	23.15	0.9623	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9167	0.7411	0.3306	Normal Distribution

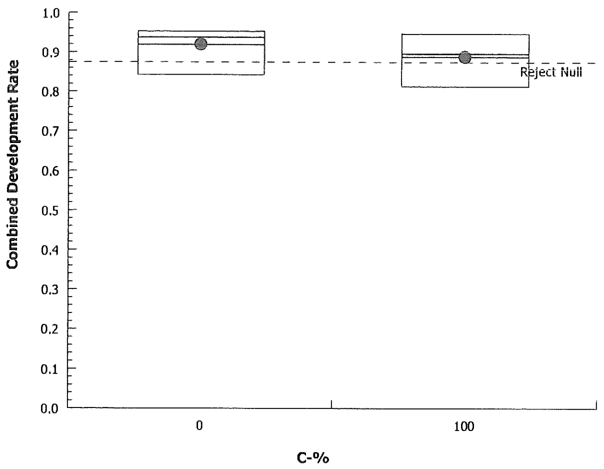
Combined Development Rate Summary

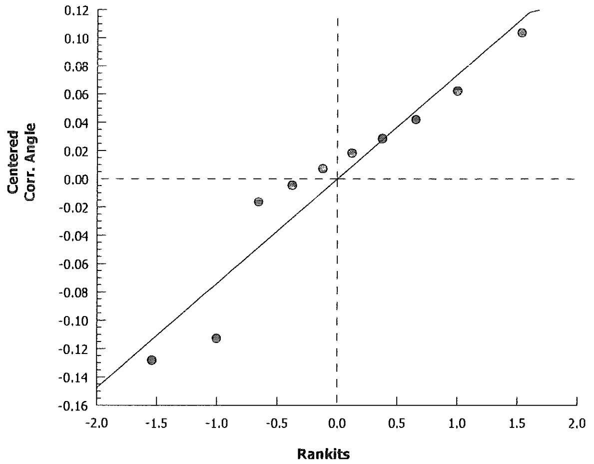
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9199	0.8641	0.9757	0.9381	0.8424	0.9534	0.02009	4.88%	0.0%
100		5	0.8884	0.8277	0.9491	0.8966	0.8128	0.9476	0.02185	5.5%	3.42%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.291	1.197	1.385	1.319	1.163	1.353	0.03388	5.87%	0.0%
100		5	1.236	1.14	1.333	1.243	1.123	1.34	0.03474	6.28%	4.23%

Graphics





Analyst: AC QA: MP 9/8/14

CETIS Analytical Report

TST

Report Date: 08 Sep-14 12:59 (p 1 of 1)
Test Code: 1408-S095 | 09-9050-4775

Bivalve Larval Survival and Development Test LC vs 100-filtered **Nautilus Environmental (CA)**

Analysis ID: 10-8596-6181 **Endpoint:** Combined Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 08 Sep-14 12:57 **Analysis:** Parametric Bioequivalence-Two Sample **Official Results:** Yes

Batch Note: 101 = 100% sample, filtered

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	Sample passes combined development rate endpoint

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	7.067	1.895		7	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007477005	0.007477005	1	1.541	0.2496	Non-Significant Effect
Error	0.03880831	0.004851039	8			
Total	0.04628532		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.448	23.15	0.7286	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9212	0.7411	0.3667	Normal Distribution

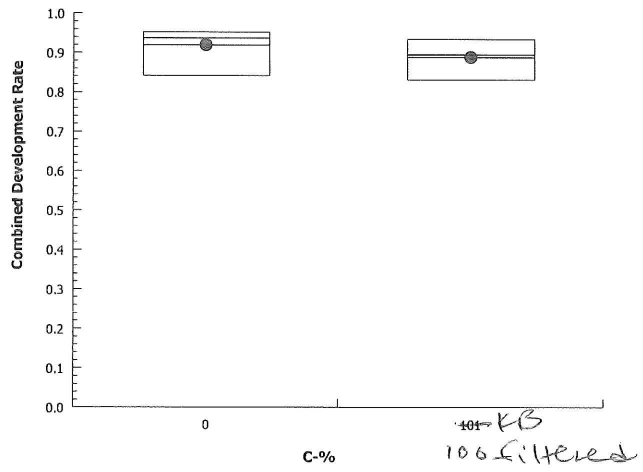
Combined Development Rate Summary

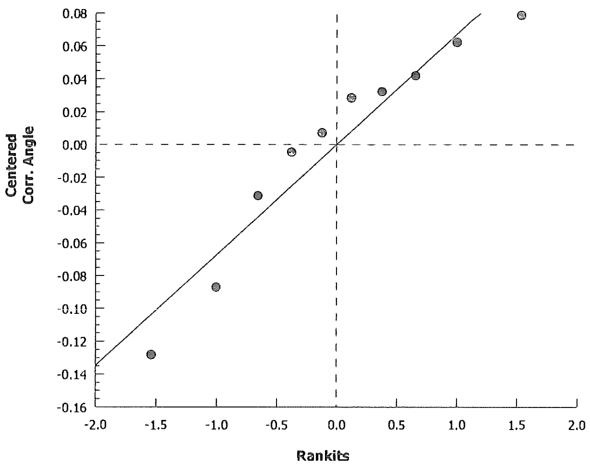
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9199	0.8641	0.9757	0.9381	0.8424	0.9534	0.02009	4.88%	0.0%
~~101~~ KB	100 filtered	5	0.8897	0.8406	0.9387	0.8966	0.8325	0.936	0.01767	4.44%	3.29%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.291	1.197	1.385	1.319	1.163	1.353	0.03388	5.87%	0.0%
~~101~~ KB	100 filtered	5	1.236	1.158	1.314	1.243	1.149	1.315	0.02816	5.09%	4.24%

Graphics





Analyst: KB QA: KP 9/8/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:53 (p 1 of 1)
Test Code: 09-9050-4775/1408-S095

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 **Species:** Mytilus galloprovincialis **Sample Code:** 14- 0672
End Date: 15 Aug-14 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Shelter Island Yacht Basin
Sample Date: 12 Aug-14 **Material:** Ambient Water **Sample Station:** SIYB-6

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			176			221 ~~230~~ BK	211 ~~219~~ BK	BK 09/04/14
			177			181	171	BK
			178			190	182	BK
			179			184	171	BK
			180			180	169	BK
			181			210	196	SG2 09/05/14
			182			210	197	
			183			200	190	
			184			182	165	
			185			217	196	
			186			191	185	
			187			194	177	
			188			SG2 ~~228~~ 164	~~213~~ 157	
			189			228	213	
			190			210	199	
			191			202	190	
			192			195	188	
			193			196	179	
			194			201	190	
			195			216	204	
			196			193	182	
			197			195	185	
			198			195	179	
			199			183	177	
			200			197	182	
			201			SG ~~183~~ 200	~~171~~ 191	
			202			SG ~~200~~ 183	~~191~~ 171	
			203			209	198	
			204			219	209	
			205			197	187	
			206			181	171	
			207			192	179	
			208			213	206	
			209			214	200	
			210			236	225	

Analyst: BK SG2 QA: AC 9/16/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:53 (p 1 of 1)
Test Code: 1408-S095 09-9050-4775/1408-S095

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14
End Date: 15 Aug-14
Sample Date: 12 Aug-14
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 14- 0472
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-6

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	195					
0	LC	2	205					
0	LC	3	179					
0	LC	4	210					
0	LC	5	182					
6.25		1	177					
6.25		2	206					
6.25		3	202					
6.25		4	203					
6.25		5	204					
12.5		1	186					
12.5		2	198					
12.5		3	194					
12.5		4	188					
12.5		5	196					
25		1	208					
25		2	201					
25		3	189					
25		4	183					
25		5	207					
50		1	176					
50		2	187					
50		3	209					
50		4	181					
50		5	178					
100		1	193					
100		2	190					
100		3	200			202	186	
100		4	185					
100		5	184					
101		1	192					
101		2	199					
101		3	180					
101		4	191					
101		5	197					

100% filtered AC

QC: AG

CETIS™ v1.8.4.23

Analyst: AC

QA: JD 8/22/14

Marine Chronic Bioassay **Water Quality Measurements**

Client: AMEC/POSD
Sample ID: SIYB-6
Sample Log No.: 14-0072
Test No.: 1408-S095

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.3	33.0	33.0	15.0	14.6	15.3	8.3	7.9	8.3	8.09	8.05	7.97
6.25	33.4	33.3	33.3	15.0	14.4	15.3	8.2	8.0	8.3	8.09	8.04	7.97
12.5	33.4 ~~33.4~~ A	33.5	33.4	15.1	14.4	15.3	8.2	8.0	8.3	8.09	8.02	7.95
25	33.5	33.5	33.4	15.2	14.5	15.4	8.2	8.0	8.3	8.09	8.01	7.95
50	33.5	33.5	33.4	15.0	14.4	15.4	8.2	8.1	8.3	8.09	8.02	7.96
100	33.7	33.6	33.5	15.1	14.5	15.4	8.0	8.1	8.3	8.09	8.02	7.96
100 filtered	33.5	33.6	33.3	15.0	14.5	15.3	~~8.~~ 7.2	7.9	8.2	8.08	8.01	7.95

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SD 8/22/14

Final Review: AC 9/6/14

Site: SIYB-REF

CETIS Summary Report

Report Date: 03 Sep-14 17:16 (p 1 of 1)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Batch ID:	16-3462-7861	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-6916-3164	**Code:**	14-0674	**Client:**	AMEC
Sample Date:	12 Aug-14 08:12	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	33h (2.4 °C)	**Station:**	SIYB-REF		

Batch Note: 101 = 100% sample, filtered 0.45 um

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-7854-9043	Combined Development Ra	100	>100	NA	6.97%	1	Dunnett Multiple Comparison Test

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
20-7854-9043	Combined Development Ra	PMSD	0.06975	NL - 0.25	No	Passes Acceptability Criteria

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	0.9084	0.9018	0.915	0.8916	0.931	0.007882	0.01762	1.94%	0.0%
6.25		5	0.9049	0.8961	0.9137	0.867	0.931	0.01049	0.02346	2.59%	0.38%
12.5		5	0.8611	0.8366	0.8857	0.7833	0.9394	0.02939	0.06572	7.63%	5.2%
25		5	0.9121	0.8918	0.9324	0.8227	0.9624	0.02432	0.05438	5.96%	-0.41%
50		5	0.8799	0.8634	0.8964	0.8227	0.9375	0.01979	0.04424	5.03%	3.13%
100		5	0.9225	0.918	0.927	0.9064	0.9361	0.005395	0.01206	1.31%	-1.55%
AC ~~101~~ 100% filtered		5	0.8873	0.8745	0.9001	0.8522	0.9439	0.01534	0.0343	3.87%	2.32%

Combined Development Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.8916	0.9212	0.8916	0.931	0.9064
6.25		0.9136	0.931	0.9064	0.867	0.9064
12.5		0.867	0.8079	0.7833	0.9394	0.9082
25		0.9113	0.9479	0.9163	0.9624	0.8227
50		0.9375	0.8522	0.8867	0.8227	0.9005
100		0.9361	0.9163	0.9212	0.9064	0.9324
AC ~~101~~ 100% filtered		0.9439	0.8818	0.8719	0.8867	0.8522

Combined Development Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	181/203	187/203	181/203	189/203	184/203
6.25		201/220	189/203	184/203	176/203	184/203
12.5		176/203	164/203	159/203	217/231	188/207
25		185/203	200/211	186/203	205/213	167/203
50		195/208	173/203	180/203	167/203	190/211
100		205/219	208/227	187/203	184/203	207/222
AC ~~101~~ 100% filtered		202/214	179/203	177/203	180/203	173/203

Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 03 Sep-14 17:16 (p 1 of 2)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID:	20-7854-9043	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 17:15	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	16-3462-7861	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-6916-3164	**Code:**	14-0674	**Client:**	AMEC
Sample Date:	12 Aug-14 08:12	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	33h (2.4 °C)	**Station:**	SIYB-REF		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1	6.97%

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	0.13	2.362	0.098	8	0.7921	CDF	Non-Significant Effect
		12.5	1.615	2.362	0.098	8	0.1887	CDF	Non-Significant Effect
		25	-0.3662	2.362	0.098	8	0.9191	CDF	Non-Significant Effect
		50	1.03	2.362	0.098	8	0.4068	CDF	Non-Significant Effect
		100	-0.5992	2.362	0.098	8	0.9526	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03139819	0.006279639	5	1.453	0.2419	Non-Significant Effect
Error	0.10373	0.004322082	24			
Total	0.1351282		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.29	15.09	0.0459	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9778	0.9031	0.7637	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	0.9084	0.8865	0.9303	0.9064	0.8916	0.931	0.007882	1.94%	0.0%
6.25		5	0.9049	0.8758	0.934	0.9064	0.867	0.931	0.01049	2.59%	0.38%
12.5		5	0.8611	0.7795	0.9427	0.867	0.7833	0.9394	0.02939	7.63%	5.2%
25		5	0.9121	0.8446	0.9796	0.9163	0.8227	0.9624	0.02432	5.96%	-0.41%
50		5	0.8799	0.825	0.9348	0.8867	0.8227	0.9375	0.01979	5.03%	3.13%
100		5	0.9225	0.9075	0.9375	0.9212	0.9064	0.9361	0.005395	1.31%	-1.55%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.264	1.226	1.303	1.26	1.235	1.305	0.01386	2.45%	0.0%
6.25		5	1.259	1.211	1.307	1.26	1.197	1.305	0.01745	3.1%	0.43%
12.5		5	1.197	1.075	1.319	1.197	1.087	1.322	0.04392	8.2%	5.31%
25		5	1.28	1.166	1.394	1.277	1.136	1.376	0.04103	7.17%	-1.2%
50		5	1.222	1.135	1.308	1.227	1.136	1.318	0.03124	5.72%	3.39%
100		5	1.289	1.261	1.317	1.286	1.26	1.315	0.01008	1.75%	-1.97%

Analyst: AC QA: G 9/4/14

CETIS Analytical Report

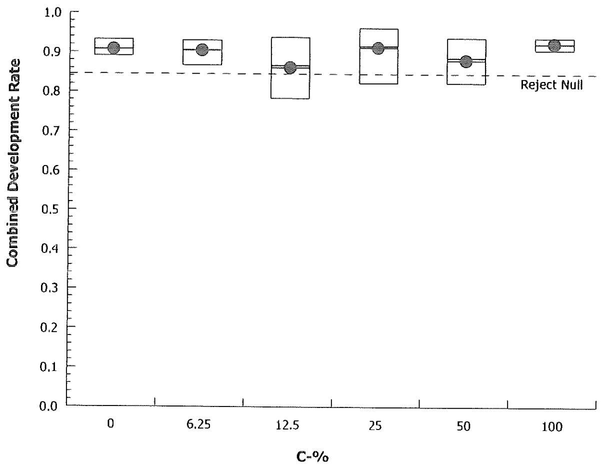
Report Date: 03 Sep-14 17:16 (p 2 of 2)
Test Code: 1408-S096 | 01-5597-4077

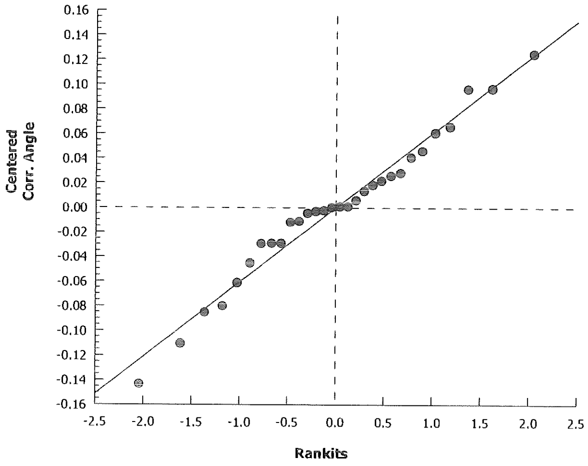
Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID: 20-7854-9043
Analyzed: 03 Sep-14 17:15
Endpoint: Combined Development Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Graphics





Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 17 Feb-15 11:52 (p 1 of 2)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	01-3833-0628	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered 0.45 um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	10.7%	101	>101	NA	0.9901

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	-0.8953	2.407	0.178	8	0.9833	CDF	Non-Significant Effect
		12.5	0.08716	2.407	0.178	8	0.8322	CDF	Non-Significant Effect
		25	-1.035	2.407	0.178	8	0.9889	CDF	Non-Significant Effect
		50	-0.4082	2.407	0.178	8	0.9401	CDF	Non-Significant Effect
		100	-2.165	2.407	0.178	8	0.9998	CDF	Non-Significant Effect
		AC ~~101~~ 100% filtered	-0.3275	2.407	0.178	8	0.9278	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09956593	0.01659432	6	1.209	0.3308	Non-Significant Effect
Error	0.3842331	0.01372261	28			
Total	0.483799		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	9.921	16.81	0.1280	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9658	0.9146	0.3381	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	0.9488	0.9192	0.9783	0.9507	0.9113	0.9754	0.01063	2.51%	0.0%
6.25		5	0.9695	0.9358	1	0.9655	0.931	1	0.01211	2.79%	-2.18%
12.5		5	0.9241	0.8308	1	0.9212	0.8473	1	0.03361	8.13%	2.6%
25		5	0.9665	0.9076	1	0.9852	0.8867	1	0.02121	4.91%	-1.87%
50		5	0.9468	0.8793	1	0.936	0.8719	1	0.0243	5.74%	0.21%
100		5	0.9951	0.9845	1	1	0.9803	1	0.003816	0.86%	-4.88%
AC ~~101~~ 100% filtered		5	0.9537	0.9158	0.9915	0.9458	0.9212	1	0.01363	3.2%	-0.52%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.347	1.281	1.413	1.347	1.268	1.413	0.02372	3.94%	0.0%
6.25		5	1.413	1.301	1.526	1.384	1.305	1.536	0.04045	6.4%	-4.92%
12.5		5	1.341	1.112	1.569	1.286	1.169	1.536	0.08229	13.73%	0.48%
25		5	1.424	1.263	1.584	1.449	1.227	1.536	0.05788	9.09%	-5.69%
50		5	1.377	1.191	1.564	1.315	1.205	1.536	0.06727	10.92%	-2.25%
100		5	1.508	1.45	1.565	1.536	1.43	1.536	0.02055	3.05%	-11.91%
AC ~~101~~ 100% filtered		5	1.371	1.249	1.494	1.336	1.286	1.536	0.04408	7.19%	-1.8%

Analyst: AC QA: KPP 2/18/15

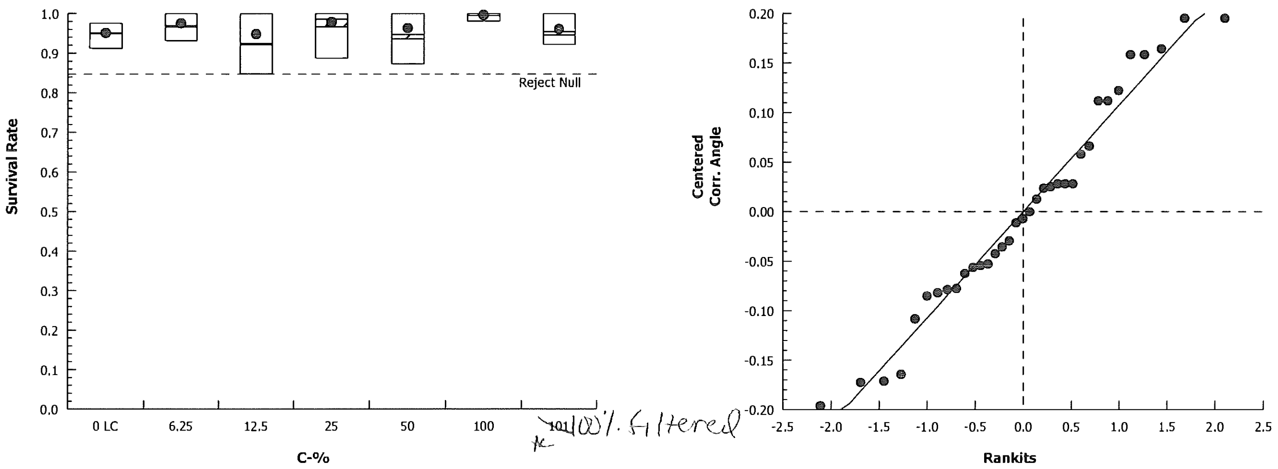
CETIS Analytical Report

Report Date: 17 Feb-15 11:52 (p 2 of 2)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID: 01-3833-0628 **Endpoint:** Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 17 Feb-15 11:39 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics



Analyst: AC QA: KPP 2/18/15

CETIS Analytical Report

Report Date:	17 Feb-15 11:42 (p 1 of 2)
Test Code:	1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	03-0206-2515	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered 0.45 um

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.59%	25	50	35.36	4

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		6.25	2.213	2.407	0.061	8	0.0737	CDF	Non-Significant Effect
		12.5	2.39	2.407	0.061	8	0.0518	CDF	Non-Significant Effect
		25	1.468	2.407	0.061	8	0.2570	CDF	Non-Significant Effect
		50*	2.532	2.407	0.061	8	0.0386	CDF	Significant Effect
		100*	2.858	2.407	0.061	8	0.0188	CDF	Significant Effect
		~~101*~~ 100% filtered KFP	2.588	2.407	0.061	8	0.0342	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01848406	0.003080676	6	1.948	0.1076	Non-Significant Effect
Error	0.04427232	0.001581154	28			
Total	0.06275638		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.359	16.81	0.2889	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9817	0.9146	0.8115	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	0.9577	0.9304	0.9851	0.9583	0.9282	0.9793	0.009847	2.3%	0.0%
6.25		5	0.9337	0.9057	0.9616	0.9312	0.9136	0.9692	0.01008	2.41%	2.51%
12.5		5	0.9323	0.9096	0.9549	0.9394	0.9082	0.9535	0.008164	1.96%	2.66%
25		5	0.9434	0.923	0.9637	0.9479	0.925	0.9624	0.007329	1.74%	1.5%
50		5	0.9299	0.9005	0.9593	0.9375	0.9005	0.9574	0.01059	2.55%	2.91%
100		5	0.927	0.9175	0.9365	0.9257	0.9163	0.9361	0.003417	0.82%	3.21%
~~101~~ AC 100% filtered		5	0.9303	0.9155	0.945	0.9251	0.9184	0.9439	0.005316	1.28%	2.87%

Angular (Corrected) Transformed Summary

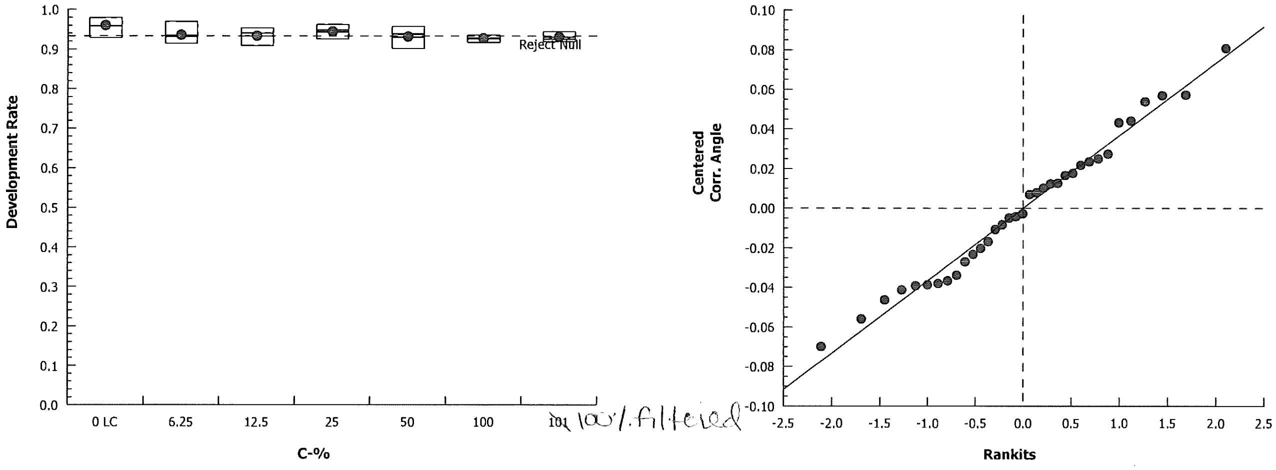
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.369	1.3	1.438	1.365	1.3	1.426	0.02487	4.06%	0.0%
6.25		5	1.314	1.252	1.375	1.305	1.273	1.394	0.02212	3.76%	4.06%
12.5		5	1.309	1.264	1.354	1.322	1.263	1.353	0.01621	2.77%	4.39%
25		5	1.333	1.288	1.377	1.34	1.293	1.376	0.01594	2.67%	2.7%
50		5	1.306	1.248	1.364	1.318	1.25	1.363	0.02084	3.57%	4.65%
100		5	1.298	1.279	1.316	1.295	1.277	1.315	0.006552	1.13%	5.25%
~~101~~ AC 100% filtered		5	1.304	1.275	1.334	1.294	1.281	1.332	0.01058	1.81%	4.75%

Analyst: AC QA: KFP 2/18/15

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	03-0206-2515	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:39	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics



Analyst: AC QA: KFP 2/18/15

CETIS Analytical Report

Report Date: 17 Feb-15 11:49 (p 1 of 1)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test TST **Nautilus Environmental (CA)**

Analysis ID:	17-3850-8510	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:49	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered 0.45 um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	1.66%	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		100*	13.68	2.132	0.042	4	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01291508	0.01291508	1	7.81	0.0234	Significant Effect
Error	0.01323002	0.001653753	8			
Total	0.0261451		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	14.41	23.15	0.0242	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9569	0.7411	0.7496	Normal Distribution

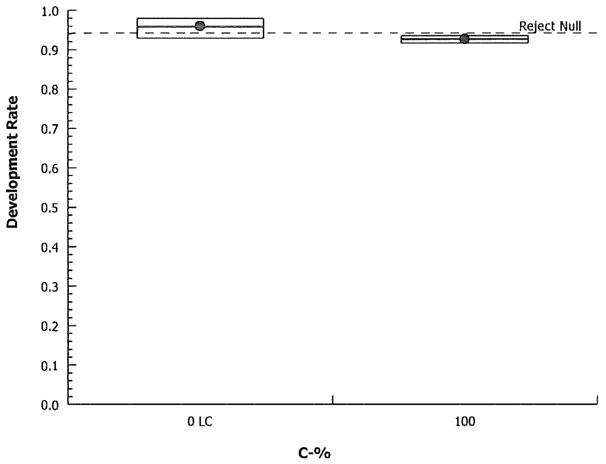
Development Rate Summary

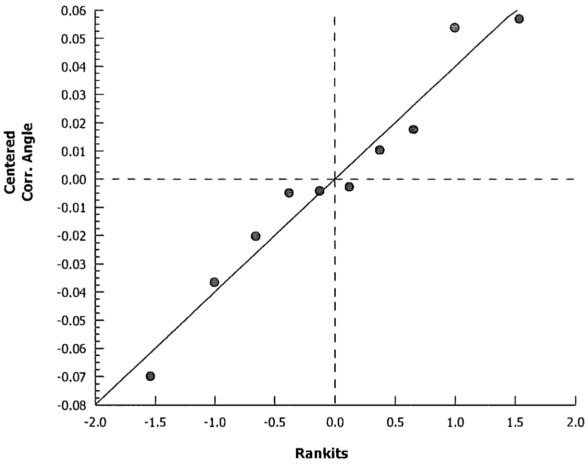
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9577	0.9304	0.9851	0.9583	0.9282	0.9793	0.009847	2.3%	0.0%
100		5	0.927	0.9175	0.9365	0.9257	0.9163	0.9361	0.003417	0.82%	3.21%

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	1.3	1.438	1.365	1.3	1.426	0.02487	4.06%	0.0%
100		5	1.298	1.279	1.316	1.295	1.277	1.315	0.006552	1.13%	5.25%

Graphics





Analyst: AC QA: KFP 2/18/15

CETIS Analytical Report

Report Date: 17 Feb-15 11:43 (p 1 of 1)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	09-6941-9676	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	17 Feb-15 11:40	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered 0.45 um

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	373256	1000	Yes	Two-Point Interpolation

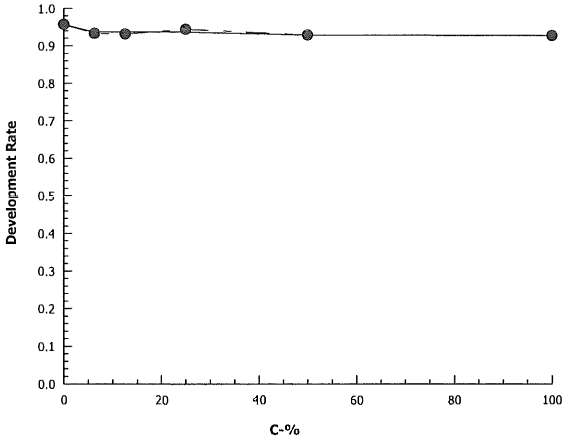
Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>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	0.9577	0.9282	0.9793	0.009847	0.02202	2.3%	0.0%	922	963
6.25		5	0.9337	0.9136	0.9692	0.01008	0.02253	2.41%	2.51%	934	1001
12.5		5	0.9323	0.9082	0.9535	0.008164	0.01826	1.96%	2.66%	904	970
25		5	0.9434	0.925	0.9624	0.007329	0.01639	1.74%	1.5%	943	999
50		5	0.9299	0.9005	0.9574	0.01059	0.02368	2.55%	2.91%	905	974
100		5	0.927	0.9163	0.9361	0.003417	0.007641	0.82%	3.21%	991	1069

Graphics



Analyst: AC QA: KPP 2/18/15

CETIS Analytical Report

Report Date: 03 Sep-14 17:18 (p 1 of 1)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	13-1447-9289	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	03 Sep-14 17:15	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	16-3462-7861	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	20-6916-3164	**Code:**	14-0674	**Client:**	AMEC
Sample Date:	12 Aug-14 08:12	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	33h (2.4 °C)	**Station:**	SIYB-REF		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample passes combined development rate endpoint	3.71%

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101	1.085	1.86	0.055	8	0.1548	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002618814	0.002618814	1	1.177	0.3097	Non-Significant Effect
Error	0.01780663	0.002225828	8			
Total	0.02042544		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.637	23.15	0.2389	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8939	0.7411	0.1876	Normal Distribution

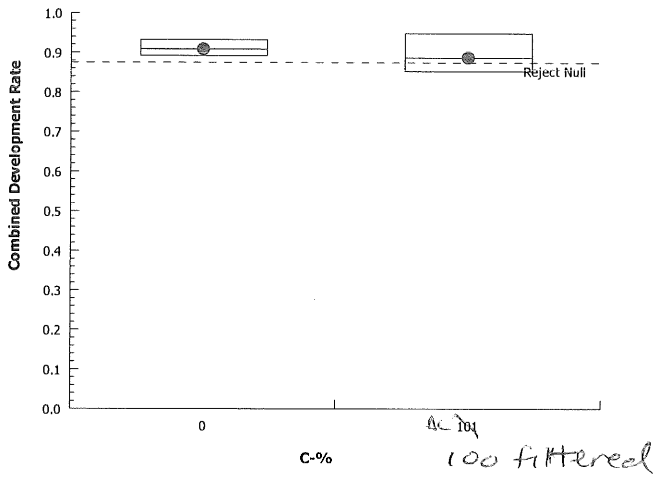
Combined Development Rate Summary

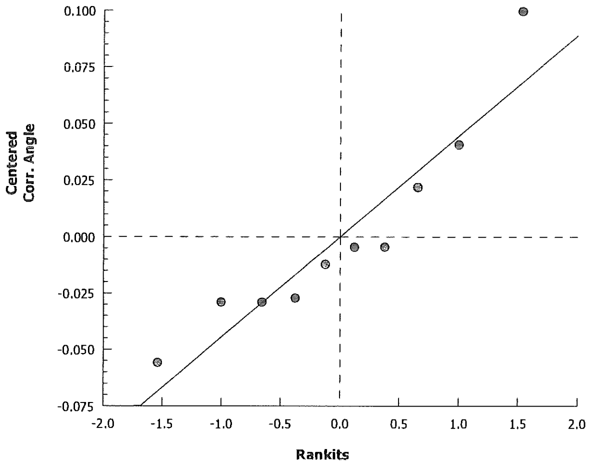
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9084	0.8865	0.9303	0.9064	0.8916	0.931	0.007882	1.94%	0.0%
~~101~~ 100 Filtered		5	0.8873	0.8447	0.9299	0.8818	0.8522	0.9439	0.01534	3.87%	2.32%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.264	1.226	1.303	1.26	1.235	1.305	0.01386	2.45%	0.0%
~~101~~ 100 Filtered		5	1.232	1.159	1.305	1.22	1.176	1.332	0.02643	4.8%	2.56%

Graphics





Analyst: AC QA: 9/4/14

CETIS Analytical Report

Report Date: 08 Sep-14 12:15 (p 1 of 1)
Test Code: 1408-S096 | 01-5597-4077

Bivalve Larval Survival and Development Test TST **Nautilus Environmental (CA)**

Analysis ID:	19-1569-3629	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 12:15	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch Note: 101 = 100% sample, filtered 0.45 um

Data Transform	Zeta	Alt Hyp	Trials	Seed	TST b	Test Result
Angular (Corrected)	NA	C*b < T	NA	NA	0.75	Sample passes combined development rate endpoint

TST-Welch's t Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		101*	9.992	2.015		5	<0.0001	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002618814	0.002618814	1	1.177	0.3097	Non-Significant Effect
Error	0.01780663	0.002225828	8			
Total	0.02042544		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.637	23.15	0.2389	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8939	0.7411	0.1876	Normal Distribution

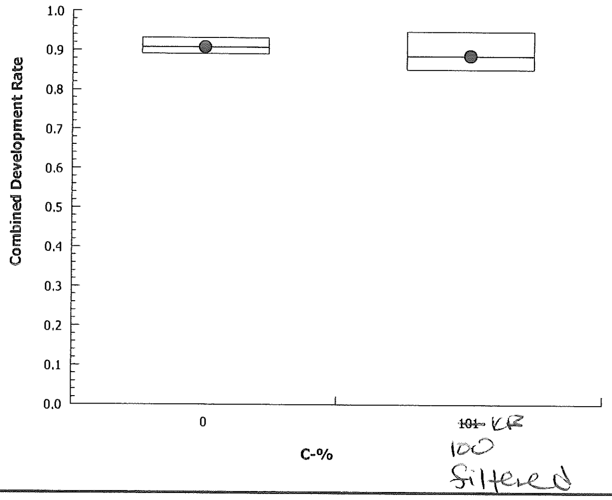
Combined Development Rate Summary

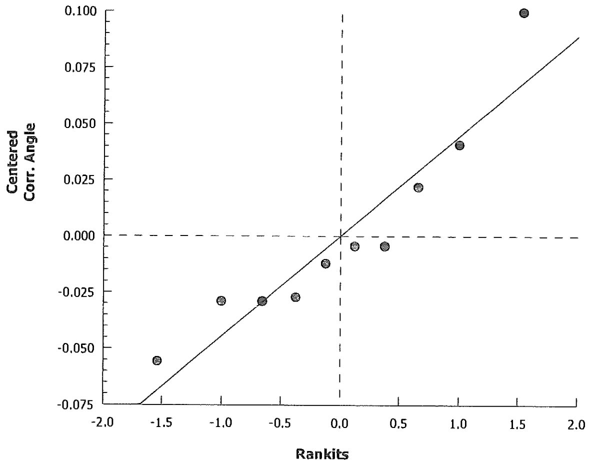
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9084	0.8865	0.9303	0.9064	0.8916	0.931	0.007882	1.94%	0.0%
~~101~~ KB 100Filt.		5	0.8873	0.8447	0.9299	0.8818	0.8522	0.9439	0.01534	3.87%	2.32%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.264	1.226	1.303	1.26	1.235	1.305	0.01386	2.45%	0.0%
~~101~~ KB 100Filt.		5	1.232	1.159	1.305	1.22	1.176	1.332	0.02643	4.8%	2.56%

Graphics





Analyst: KB QA: KFP 9/8/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:55 (p 1 of 1)
Test Code: 01-5597-4077/1408-S096

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Start Date: 13 Aug-14 1730
End Date: 15 Aug-14 1700
Sample Date: 12 Aug-14 0812

Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water

Sample Code: 14-0674
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-REF

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			211			196	184	
			212			227	208	
			213			200	185	
			214			207	188	
			215			202	187	
			216			211	200	
			217			222	207	
			218			190	179	
			219			173	159	
			220			172	164	
			221			180	167	
			222			231	217	
			223			188	180	
			224			193	189	
			225			192	184	
			226			196	180	
			227			208	195	
			228			220	201	
			229			189	176	
			230			195	186	
			231			219	205	
			232			199	184	
			233			198	187	
			234			187	173	
			235			213	205	
			236			211	190	
			237			187	176	
			238			195	181	
			239			195	189	
			240			214	202	
			241			185	181	
			242			201	184	
			243			177	167	
			244			190	173	
			245			192	177	

Analyst: SRZ QA: AC 9/3/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 13:55 (p 1 of 1)
Test Code: 1408-S096 01-5597-4077/1408-S096

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 1730
End Date: 15 Aug-14 1700
Sample Date: 12 Aug-14 0812
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Ambient Water
Sample Code: 14-0674
Sample Source: Shelter Island Yacht Basin
Sample Station: SIYB-REF

C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	238					
0	LC	2	233					
0	LC	3	241					
0	LC	4	224					
0	LC	5	225					
6.25		1	228					
6.25		2	239					
6.25		3	242					
6.25		4	229					
6.25		5	211					
12.5		1	237					
12.5		2	220					
12.5		3	219					
12.5		4	222					
12.5		5	214					
25		1	213					
25		2	216					
25		3	230					
25		4	235					
25		5	221					
50		1	227					
50		2	244					
50		3	223					
50		4	243					
50		5	236					
100		1	231					
100		2	212					
100		3	215					
100		4	232					
100		5	217			201	193	
101		1	240					
101		2	218					
101		3	245					
101		4	226					
101		5	234					

100% filtered AC

QC: AG

Analyst: AC

QA: [illegible]/22/14

Marine Chronic Bioassay

Water Quality Measurements

Client: AMEC/POSD
Sample ID: SIYB-REF
Sample Log No.: 14-0674
Test No.: 1408-S096

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	33.3	33.3	33.0	14.8	14.5	15.4	8.1	8.1	8.3	8.07	8.04	7.95
6.25	33.3	33.3	33.2	14.7	14.6	15.0	8.2	8.1	8.3	8.09	8.02	7.95
12.5	33.4	33.4	33.2	14.8	14.7	15.2	8.2	8.1	8.3	8.09	8.01	7.95
25	33.4	33.4	33.3	15.0	14.7	15.3	8.2	8.1	8.3	8.09	8.01	7.95
50	33.4	33.4	33.3	14.8	14.7	15.2	8.3	8.1	8.4	8.10	8.01	7.96
100	33.5	33.5	33.4	14.9	14.7	15.1	8.3	8.1	8.4	8.10	8.01	7.96
100 filtered	33.5	33.5	33.4	14.7	14.9	15.2	7.3	7.9	8.2	8.10	8.03	7.97

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: JD 8/22/14

Final Review: AC 9/3/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: AMEC | POSD 1408-5090 to -5096
Test No.: S14D-1 through 7, -REF
Test Species: *M. galloprovincialis*
Animal Source: Kamilche Farms, Shelton, WA
Date Received: 8/13/14
Test Chambers: 30 mL shell vials
Sample Volume: 10 mL

Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700
Technician Initials: AG

Spawn Information

First Gamete Release Time: 1155

Sex	Number Spawning
Male	3
Female	2

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	1 to 3	good density, & motility
Female 1	1	high density, good color & shape
Female 2	2	low density, odd shapes
Female ~~3~~ 1.1	3	average density, good color & shape

Egg Fertilization Time: 1330

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	88
Female 2	80
Female 3	91

Stock(s) chosen for testing: 3

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

AG ~~9~~ 7	7
8	6
8	7
6	5
6	6

Mean: 6.6

Mean 6.6 X 50 = 330 embryos/ml

Initial Density: 330 = 1.1 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

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

Rand. No.	No. Dividing	Total	% Dividing	Mean % Dividing
A	202	227	89.0	90.9
B	220	240	91.7	
C	200	220	90.9	
D	205	224	91.5	
E	199	206	91.3	

48-h QC: 190/209 = 91%

Comments: $\bar{X}$ = 203

QC Check: SS 8/22/14

Final Review: AC 9/3/14

Pacific Topsmelt 96-hr Survival

Site: SIYB-1

CETIS Summary Report

Report Date: 27 Aug-14 12:12 (p 1 of 1)
Test Code: 1408-S083 | 12-8791-7518

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	04-8755-2082	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:05	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	94h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	07-0065-6291	**Code:**	14-0668	**Client:**	AMEC
Sample Date:	12 Aug-14 14:00	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	23h (0.2 °C)	**Station:**	SIYB-1		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
18-1682-3663	96h Survival Rate	100	>100	NA	8.02%	KC ~~1~~ 0.0	Steel Many-One Rank Sum Test

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	1	1	1	1	1	0	0	0.0%	0.0%
25		6	0.9667	0.9362	0.9972	0.8	1	0.03333	0.08165	8.45%	3.33%
50		6	1	1	1	1	1	0	0	0.0%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	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	1	1
25		1	1	0.8	1	1	1
50		1	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: KB QA: 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:12 (p 1 of 1)
Test Code: 1408-S083 | 12-8791-7518

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 18-1682-3663 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 27 Aug-14 12:11 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	AcX 0.0	8.02%

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	36	26	1	10	0.5503	Asymp	Non-Significant Effect
		50	39	26	1	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	1	10	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007088488	0.002362829	3	1	0.4133	Non-Significant Effect
Error	0.04725658	0.002362829	20			
Total	0.05434507		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	4.938	0.4133	Equal Variances
Variances	Levene Equality of Variance	6.25	4.938	0.0036	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.4436	0.884	<0.0001	Non-normal Distribution

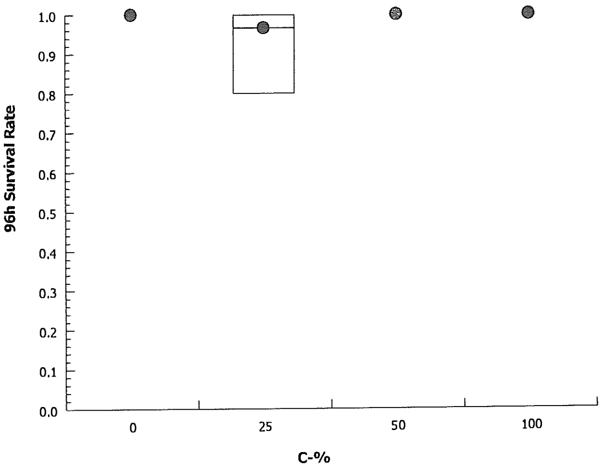
96h Survival Rate Summary

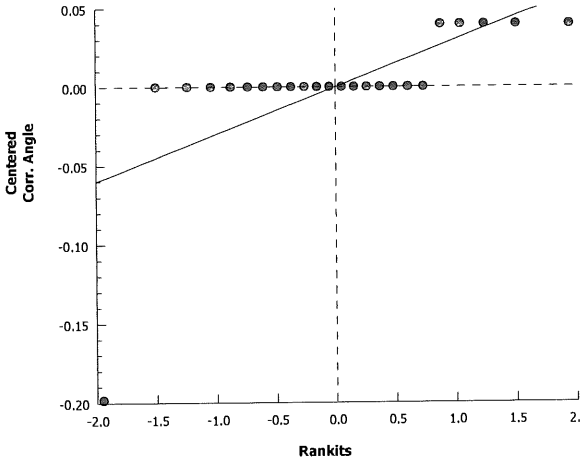
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1	1	1	1	1	1	0	0.0%	0.0%
25		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	3.33%
50		6	1	1	1	1	1	1	0	0.0%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
25		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	2.95%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%

Graphics





Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-1
Test No.: 1408-S083

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1235
End Date/Time: 8/17/2014 1105

	Tech Initials				
	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	KB		BG		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C) Q1					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	33.3	33.1	i 33.3	33.3	33.6	20.3	22.5	i 20.8	21.8	21.9	7.6	6.0	i 7.0	6.3	6.3	8.05	7.85	i 8.09	7.93	7.88
#1	B	5	5	5	5	5			f 33.1					f 21.3					f 6.0					f 7.82		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
25	A	5	5	5	5	5	33.3	33.4	i 33.4	33.5	33.6	20.3	22.4	i 20.8	21.7	21.9	7.5	6.0	i 7.2	6.4	6.3	8.06	7.84	i 8.07	7.84	7.89
	B	5	5	5	5	5			f 33.4					f 21.3					f 6.1					f 7.85		
	C	5	5	5	5	4																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
50	A	5	5	5	5	5	33.3	33.3	i 33.4	33.6	33.8	20.2	22.4	i 20.8	21.8	21.7	7.6	6.1	i 7.5	6.5	6.4	8.06	7.83	i 8.04	7.95	7.99
	B	5	5	5	5	5			f 33.5					f 21.3					f 6.0					f 7.85		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
100	A	5	5	5	5	5	33.5	33.6	i 33.5	33.7	33.7	20.2	22.4	i 20.9	21.8	21.7	8.1	6.0	i 8.2	6.4	6.4	8.04	7.82	i 8.00	7.84	7.98
	B	5	5	5	5	5			f 33.6					f 21.2					f 5.8					f 7.83		
	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: AB

Animal Source/Date Received: ABS / 8/9/14

Age at Initiation: 13d

	Feeding Times				
	0	24	48	72	96
AM:		0820	0830	0834	0915
PM:	1640	—	—	—	—

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: AC 8/18/14

Final Review: KB 8/26/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-2

CETIS Summary Report

Report Date:	27 Aug-14 12:15 (p 1 of 1)
Test Code:	1408-S084 | 10-6732-6697

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	17-0868-1347	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:05	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	94h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	17-4612-8349	**Code:**	14-0669	**Client:**	AMEC
Sample Date:	12 Aug-14 13:13	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	23h (12.1 °C)	**Station:**	SIYB-2		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
14-0049-3090	96h Survival Rate	100	>100	NA	NA	AK ~~1~~ 0.0	Steel Many-One Rank Sum Test

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	1	1	1	1	1	0	0	0.0%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	0.0%
50		6	1	1	1	1	1	0	0	0.0%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	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	1	1
25		1	1	1	1	1	1
50		1	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: KB QA: 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:15 (p 1 of 1)
Test Code: 1408-S084 | 10-6732-6697

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 14-0049-3090 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 27 Aug-14 12:14 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	<10.0

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	1	10	0.7500	Asymp	Non-Significant Effect
	50	39	26	1	10	0.7500	Asymp	Non-Significant Effect
	100	39	26	1	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	65540	<0.0001	Significant Effect
Error	0	0	20			
Total	0		23			

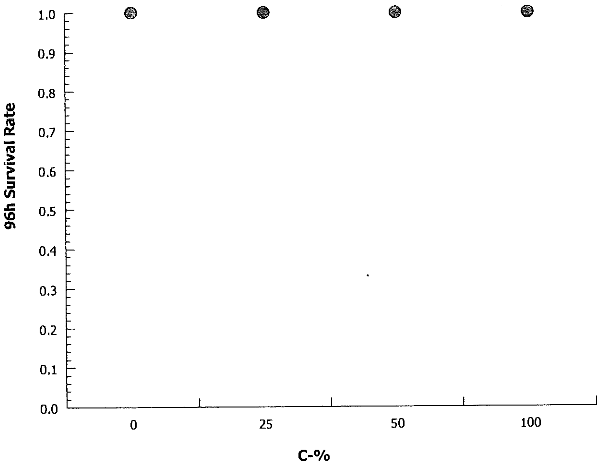
96h Survival Rate Summary

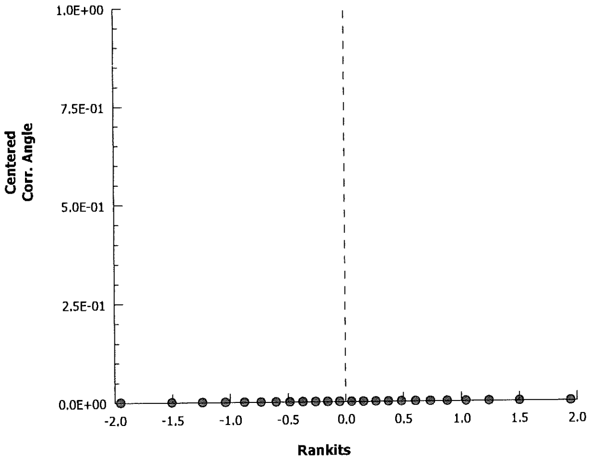
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1	1	1	1	1	1	0	0.0%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	0.0%
50		6	1	1	1	1	1	1	0	0.0%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%

Graphics





Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-2
Test No.: 1408-S084

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1235
End Date/Time: 8/17/2014 1105

	Tech Initials				
	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	KB		BG		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C) Q1 ~~Q1~~ AD					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	33.3	33.1	i33.3	~~33.4~~	33.6	20.3	22.5	i20.8	21.8	21.4	7.6	6.0	i7.0	~~6.9~~	6.3	8.05	~~7.78~~ SG	i8.09	~~7.94~~	7.88
#1	B	5	5	5	5	5			f33.3	33.3 NH				f21.3					f6.0	6.3 NH			7.85	f7.82	7.83 NH	
	C	5	5	5	5	5			SG i33.4																	
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
25	A	5	5	5	5	5	33.4	33.3	i33.4	33.4	33.7	20.2	22.3	i20.7	21.7	21.6	7.5	6.0	i7.2	6.4	6.3	8.08	7.83	i8.05	7.95	7.97
	B	5	5	5	5	5			f33.3					f21.2					f5.8					f7.83		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
50	A	5	5	5	5	5	33.4	33.5	i33.4	33.6	33.8	20.2	22.2	i20.6	21.7	21.6	7.6	6.1	i7.6	6.5	6.3	8.07	7.84	i8.08	7.86	7.97
	B	5	5	5	5	5			f33.6					f21.3					f5.8					f7.85		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
100	A	5	5	5	5	5	33.6	33.7	i33.5	33.6	33.8	20.4	22.2	i20.4	21.7	21.6	7.9	6.1	i8.2	6.4	6.3	8.03	7.83	i8.01	7.46	7.95
	B	5	5	5	5	5			f33.7					f21.2					f5.9					f7.89		
	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: AG

Animal Source/Date Received: ABS/8/9/14

Age at Initiation: 13d

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)

	Feeding Times				
	0	24	48	72	96
AM:		0820	0830	0830	0815
PM:	1640	–	–	–	–

QC Check: AC 8/18/14

Final Review: KB 8/26/14

Site: SIYB-3

CETIS Summary Report

Report Date: 27 Aug-14 12:18 (p 1 of 1)
Test Code: 1408-S085 | 14-2860-1648

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	03-1884-4952	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:05	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	94h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	14-3288-9134	**Code:**	14-0670	**Client:**	AMEC
Sample Date:	12 Aug-14 12:15	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	24h (12.6 °C)	**Station:**	SIYB-3		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
15-9558-2324	96h Survival Rate	100	>100	NA	NA	AC 1 0.0	Steel Many-One Rank Sum Test

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	1	1	1	1	1	0	0	0.0%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	0.0%
50		6	1	1	1	1	1	0	0	0.0%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	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	1	1
25		1	1	1	1	1	1
50		1	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: KB QA: 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:18 (p 1 of 1)
Test Code: 1408-S085 | 14-2860-1648

Pacific Topsmelt 96-hour Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 15-9558-2324
Analyzed: 27 Aug-14 12:18
Endpoint: 96h Survival Rate
Analysis: Nonparametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	Ac ~~1~~ 0.0

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	1	10	0.7500	Asymp	Non-Significant Effect
		50	39	26	1	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	1	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	65540	<0.0001	Significant Effect
Error	0	0	20			
Total	0		23			

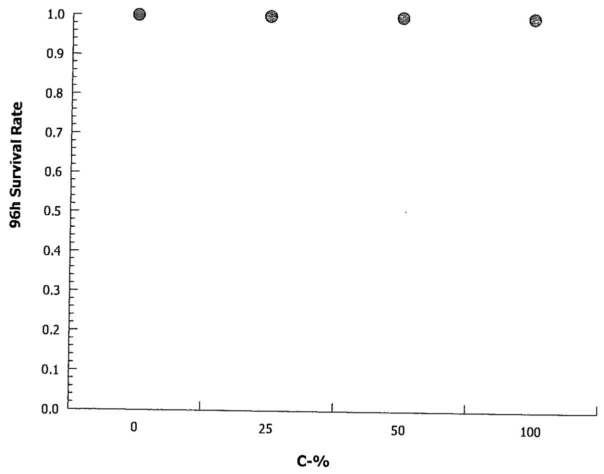
96h Survival Rate Summary

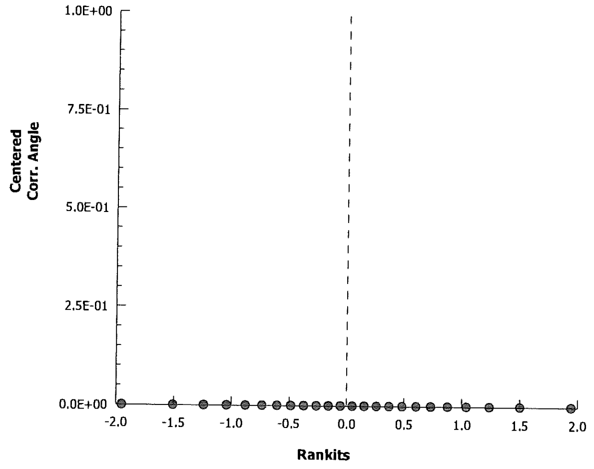
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1	1	1	1	1	1	0	0.0%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	0.0%
50		6	1	1	1	1	1	1	0	0.0%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%

Graphics





Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-3
Test No.: 1408-S085

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1235
End Date/Time: 8/17/2014 1105

	Tech Initials				
	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	KB		BG		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature Q1 (°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	33.3	33.1	i33.3	33.3	33.6	20.3	22.5	i20.8	21.6	21.9	7.6	6.0	i7.0	6.3	6.3	8.05	7.85	i8.09	7.93	7.88
#1	B	5	5	5	5	5			f33.1					f21.3					f6.0					f7.82		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5						~~Q~~	Q1													
25	A	5	5	5	5	5	33.3	33.2	i33.4	33.4	33.5	20.3	22.1	i20.7	21.7	21.6	7.7	6.1	i7.2	6.3	6.3	8.07	7.82	i8.01	7.92	7.93
	B	5	5	5	5	5			f33.3					f21.2					f6.0					f7.83		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
50	A	5	5	5	5	5	33.3	33.5	i33.4	33.5	33.6	20.3	22.2	i20.6	21.7	21.6	7.7	6.1	i7.5	6.3	6.3	8.06	7.82	i8.04	7.93	7.94
	B	5	5	5	5	5			f33.5					f21.2					f6.0					f7.84		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5		33.5					Q1													
100	A	5	5	5	5	5	33.4	~~34.0~~	i33.6	33.6	33.7	20.3	22.2	i20.6	21.7	21.5	7.9	6.1	i8.1	6.2	6.3	8.02	7.82	i7.98	7.93	7.95
	B	5	5	5	5	5		SL	f33.7					f21.2					f5.8					f7.83		
	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: AB

Animal Source/Date Received: ABS/8/9/14

Age at Initiation: 13d

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)

	Feeding Times				
	0	24	48	72	96
AM:		0820	0830	0830	1015
PM:	1640	—	—	—	—

QC Check: AC 8/18/14

Final Review: KB 8/26/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-4

CETIS Summary Report

Report Date: 27 Aug-14 12:24 (p 1 of 1)
Test Code: 1408-S086 | 12-0334-0969

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	06-4039-4455	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:15	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	17-7802-6699	**Code:**	14-0671	**Client:**	AMEC
Sample Date:	12 Aug-14 11:07	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	26h (3.1 °C)	**Station:**	SIYB-4		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa ac	Method
10-0264-0660	96h Survival Rate	100	>100	NA	8.86%	<1 ~~0.52~~ 0.31	Steel Many-One Rank Sum Test

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	0.9362	0.9972	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	-3.45%
50		6	1	1	1	1	1	0	0	0.0%	-3.45%
100		6	0.9667	0.9362	0.9972	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	0.8	1	1	1	1	1
25		1	1	1	1	1	1
50		1	1	1	1	1	1
100		1	1	0.8	1	1	1

Analyst: KB QA: Sc 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:24 (p 1 of 1)
Test Code: 1408-S086 | 12-0334-0969

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 10-0264-0660 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 27 Aug-14 12:24 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	~~<1~~ 0.31	8.86%

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
	50	42	26	1	10	0.8900	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	0.009451317	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

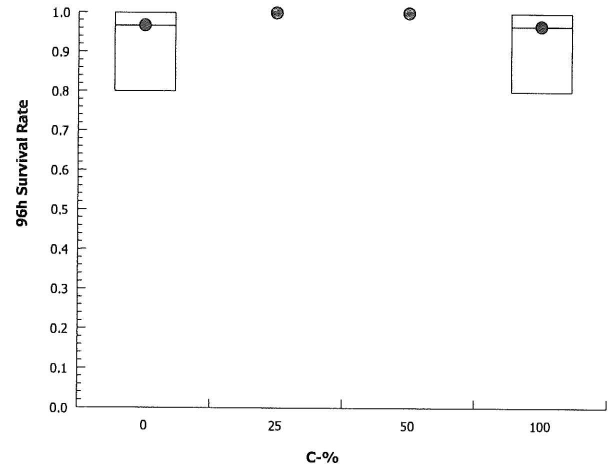
96h Survival Rate Summary

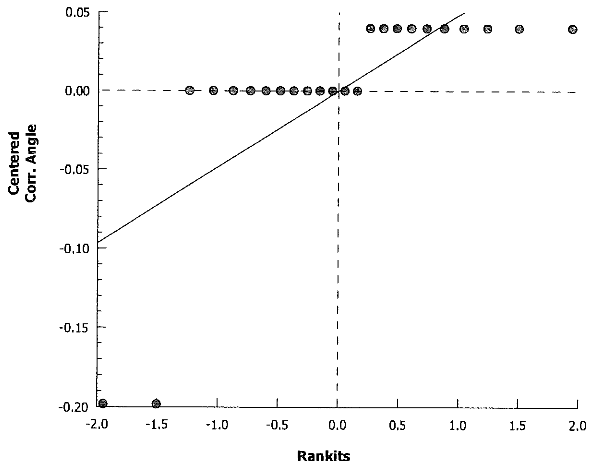
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	-3.45%
50		6	1	1	1	1	1	1	0	0.0%	-3.45%
100		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%

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	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-3.04%
100		6	1.306	1.204	1.408	1.345	1.107	1.345	0.03969	7.45%	0.0%

Graphics





Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-4
Test No.: 1408-S086

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1240
End Date/Time: 8/17/2014 1115

Tech Initials	0	24	48	72	96
Counts:	BG	KR	AG	NH	AP
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	KB		BG		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature Q1 (°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	4	33.3	33.5	i33.3	33.2	33.6	20.4	22.2	i20.9	21.4	21.8	7.4	6.1	i7.0	6.1	6.4	8.07	7.82	i8.09	~~7.94~~	7.93
#2	B	5	5	5	5	5			f33.1					f21.2					f6.0					f7.86		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5							Q1													
25	A	5	5	5	5	5	33.3	33.4	i33.4	33.6	33.5	20.5	22.1	i20.7	21.3	21.7	7.4	5.9	i7.2	6.1	6.4	8.07	7.78	i8.08	7.93	7.92
	B	5	5	5	5	5			f33.5					f21.2					f5.9					f7.84		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
50	A	5	5	5	5	5	33.3	33.4	i33.5	33.5	33.6	20.6	22.0	i20.6	21.4	21.6	7.7	6.0	i7.4	6.1	6.4	8.05	7.82	i8.06	7.93	7.91
	B	5	5	5	5	5			f33.5					f21.2				SG	f5.7					f7.82		
	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	33.4	33.6	i33.6	33.7	33.8	20.7	22.0	i20.3	21.4	21.6	7.8	5.9	SG i7.8	6.2	6.3	8.04	7.81	i8.07	7.91	7.93
	B	5	5	5	5	5			f33.6					f21.3					f5.7					f7.83		
	C	5	5	5	5	4																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				

Initial Counts QC'd by: AB

Animal Source/Date Received: ABS/8/9/14

Age at Initiation: 13d

Feeding Times	0	24	48	72	96
AM:		0820	0830	0830	0945
PM:	1640	—	—	—	—

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: AC 8/18/14

Final Review: KB 8/26/14

Site: SIYB-5

CETIS Summary Report

Report Date: 27 Aug-14 12:27 (p 1 of 1)
Test Code: 1408-S087 | 19-9594-9196

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	16-4539-2453	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:15	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	06-7425-7939	**Code:**	14-0672	**Client:**	AMEC
Sample Date:	12 Aug-14 10:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	26h (0.9 °C)	**Station:**	SIYB-5		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
10-3970-8889	96h Survival Rate	100	>100	NA	12.7%	AC ~~1~~ 0.0	Steel Many-One Rank Sum Test

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	0.9362	0.9972	0.8	1	0.03333	0.08165	8.45%	0.0%
25		6	0.8333	0.7771	0.8896	0.6	1	0.06146	0.1506	18.07%	13.79%
50		6	0.9667	0.9362	0.9972	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	0.8	1	1	1	1	1
25		1	0.8	0.6	0.8	0.8	1
50		1	1	1	1	0.8	1
100		1	1	1	1	1	1

Analyst: KB QA: 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:27 (p 1 of 1)
Test Code: 1408-S087 | 19-9594-9196

Pacific Topsmelt 96-hour Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 10-3970-8889
Analyzed: 27 Aug-14 12:27
Endpoint: 96h Survival Rate
Analysis: Nonparametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	Act 0.0	12.7%

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		25	29.5	26	2	10	0.1479	Asymp	Non-Significant Effect
		50	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	0.1350415	0.04501384	3	3.66	0.0298	Significant Effect
Error	0.2459474	0.01229737	20			
Total	0.3809889		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.614	4.938	0.2176	Equal Variances
Variances	Levene Equality of Variance	3.721	4.938	0.0283	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8242	0.884	0.0008	Non-normal Distribution

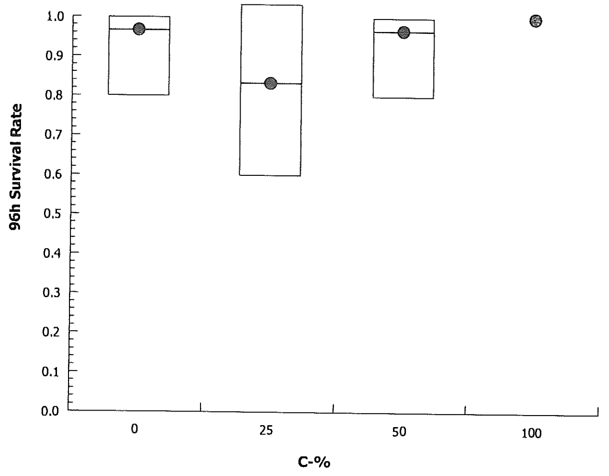
96h Survival Rate Summary

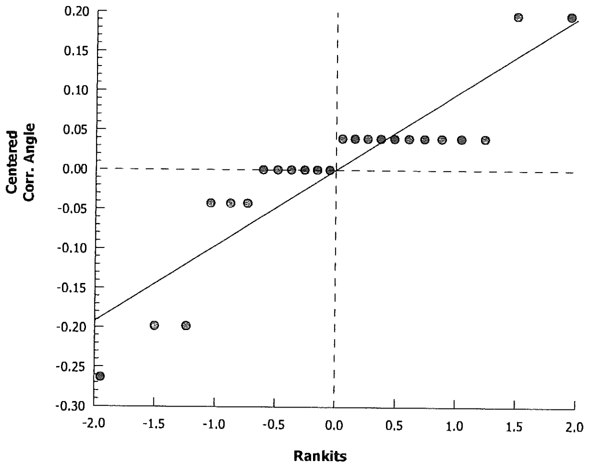
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
25		6	0.8333	0.6753	0.9913	0.8	0.6	1	0.06146	18.07%	13.79%
50		6	0.9667	0.881	1	1	0.8	1	0.03333	8.45%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	-3.45%

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	1.15	0.967	1.332	1.107	0.8861	1.345	0.07105	15.14%	11.94%
50		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: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-5
Test No.: 1408-S087

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1240
End Date/Time: 8/17/2014 1115

Tech Initials	0	24	48	72	96
Counts:	BG	KB	AG	MK	AD
Readings:	BK	SG	SG	NH	NU
Dilutions made by:	KB		BG		

Concentration %	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C) Q1					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~~ 4	33.3	33.5	i33.3	33.2	33.6	20.4	22.2	i20.9	21.4	21.8	7.4	6.1	i7.0	6.1	6.4	8.07	7.82	i8.09	7.94	7.93
#2	B	5	5	5	5	5			f33.1					f21.2					f6.0					f7.86		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	33.3	33.3	i33.4	33.4	33.7	20.3	22.0 ~~X~~ SG	i20.8	21.4	21.6	7.7	6.1	i7.4	6.1	6.5	8.07	7.85	i8.08	7.92	7.96
	B	5	5	5	5	4			f33.3					f21.3					f5.9					f7.85		
	C	5	5	5	5	3																				
	D	5	5	5	5	4																				
	E	5	5	5	5	4																				
	F	5	5	5	5	5																				
50	A	5	5	5	5	5	33.3	33.4	i33.6	33.5	33.8	20.3	21.9	i20.8	21.4	21.6	7.8	6.1	i7.6	6.2	6.4	8.05	7.83	i8.06	7.94	7.97
	B	5	5	5	5	5			f33.5					f21.3					f5.9					f7.84		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	4	4	4	4																				
	F	5	~~4~~ 5 KB	5	5	5																				
100	A	5	5	5	5	5	33.4	33.6	i33.6	33.7	33.8	20.2	22.0	i20.8	21.4	21.7	8.0	6.1	i8.0	6.0	6.3	8.03	7.81	i8.01	7.94	7.94
	B	5	5	5	5	5			f33.6					f21.3					f5.9					f7.84		
	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: AB

Animal Source/Date Received: ABS/8/9/14

Age at Initiation: 13d

Feeding Times	0	24	48	72	96
AM:		0820	0830	0830	0815
PM:	1640	—	—	—	—

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: AC 8/18/14

Final Review: KB 8/26/14

Site: SIYB-6

CETIS Summary Report

Report Date: 27 Aug-14 12:29 (p 1 of 1)
Test Code: 1408-S088 | 03-9739-4945

Pacific Topsmelt 96-hour Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	10-5682-8534	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:45	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	20-7446-1515	**Code:**	14-0673	**Client:**	AMEC
Sample Date:	12 Aug-14 09:17	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	27h (1.1 °C)	**Station:**	SIYB-6		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TUa	Method
11-8210-7647	96h Survival Rate	100	>100	NA	NA	~~1~~ 0.0	Steel Many-One Rank Sum Test

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	1	1	1	1	1	0	0	0.0%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	0.0%
50		6	1	1	1	1	1	0	0	0.0%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	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	1	1
25		1	1	1	1	1	1
50		1	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: KB QA: SC 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:29 (p 1 of 1)
Test Code: 1408-S088 | 03-9739-4945

Pacific Topsmelt 96-hour Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 11-8210-7647
Analyzed: 27 Aug-14 12:29
Endpoint: 96h Survival Rate
Analysis: Nonparametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	ACT 0.0

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	1	10	0.7500	Asymp	Non-Significant Effect
		50	39	26	1	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	1	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	65540	<0.0001	Significant Effect
Error	0	0	20			
Total	0		23			

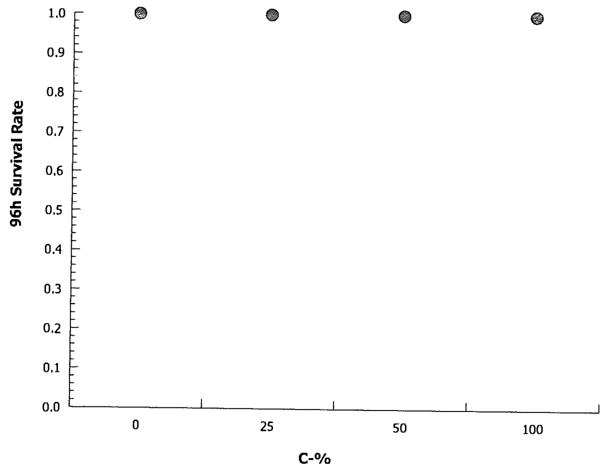
96h Survival Rate Summary

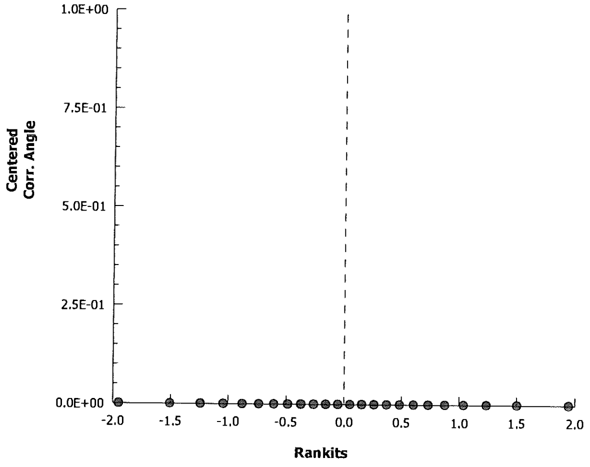
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1	1	1	1	1	1	0	0.0%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	0.0%
50		6	1	1	1	1	1	1	0	0.0%	0.0%
100		6	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%

Graphics





Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-6
Test No.: 1408-S088

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1245
End Date/Time: 8/17/2014 1120

Tech Initials	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	MH
Dilutions made by:	KB		BG		

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	BK ~~33.3~~	33.3	i 33.3	33.4	33.4	BK ~~20.4~~	22.0	i 20.9	21.3	21.8	BK ~~7.4~~	6.1	i 7.3	6.1	6.3	BK ~~8.67~~	7.84	i 8.10	7.93	7.44
#3	B	5	5	5	5	5	33.4		f 33.3			20.3		f 21.2			7.5		f 5.9			8.06		f 7.86		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	33.3	33.2	i 33.4	33.4	33.4	20.1	22.0	i 20.8	21.3	21.7	7.5	6.1	i 7.4	6.1	6.3	8.07	7.83	i 8.09	7.90	7.48
	B	5	5	5	5	5			f 33.4					f 21.2					f 6.0					f 7.88		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
50	A	5	5	5	5	5	33.4	33.4	i 33.5	33.5	33.7	20.0	21.9	i 20.7	21.3	21.7	7.7	6.1	i 7.5	6.1	6.3	8.06	7.82	i 8.06	7.91	7.96
	B	5	5	5	5	5			f 33.4					f 21.3					f 5.9					f 7.85		
	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	33.5	33.6	i 33.6	33.7	33.6	BG ~~19.8~~	21.8	i 20.5	21.4	21.6	8.0	6.2	i 7.9	6.0	6.3	8.04	7.84	i 8.05	7.90	7.43
	B	5	5	5	5	5			f 33.7			20.0		f 21.2					f 5.9					f 7.86		
	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: AB

Animal Source/Date Received: ABS 8/9/14

Age at Initiation: 13d

Feeding Times	0	24	48	72	96
AM:		0820	0630	0830	0615
PM:	1640	—	—	—	—

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: AC 8/18/14

Final Review: KB 8/26/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Site: SIYB-REF

CETIS Summary Report

Report Date: 27 Aug-14 12:32 (p 1 of 1)
Test Code: 1408-S089 | 00-5992-0236

Pacific Topsmelt 96-hour Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	19-2144-1886	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	13 Aug-14 12:4~~6~~5	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Natural Seawater
Ending Date:	17 Aug-14 11:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Biosystems, CO	**Age:**	13 d

Sample ID:	20-6916-3164	**Code:**	14-0674	**Client:**	AMEC
Sample Date:	12 Aug-14 08:12	**Material:**	Ambient Water	**Project:**	
Receive Date:	12 Aug-14 16:45	**Source:**	Shelter Island Yacht Basin		
Sample Age:	29h (2.4 °C)	**Station:**	SIYB-REF		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU a	Method
13-5595-0894	96h Survival Rate	100	>100	NA	NA	ac ~~1~~ 0.0	Steel Many-One Rank Sum Test

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	1	1	1	1	1	0	0	0.0%	0.0%
25		6	1	1	1	1	1	0	0	0.0%	0.0%
50		6	1	1	1	1	1	0	0	0.0%	0.0%
100		6	1	1	1	1	1	0	0	0.0%	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	1	1
25		1	1	1	1	1	1
50		1	1	1	1	1	1
100		1	1	1	1	1	1

Analyst: KB QA: 8/28/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:32 (p 1 of 1)
Test Code: 1408-S089 | 00-5992-0236

Pacific Topsmelt 96-hour Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	13-5595-0894	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Aug-14 12:32	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TUa
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	<1.00

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	1	10	0.7500	Asymp	Non-Significant Effect
		50	39	26	1	10	0.7500	Asymp	Non-Significant Effect
		100	39	26	1	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	65540	<0.0001	Significant Effect
Error	0	0	20			
Total	0		23			

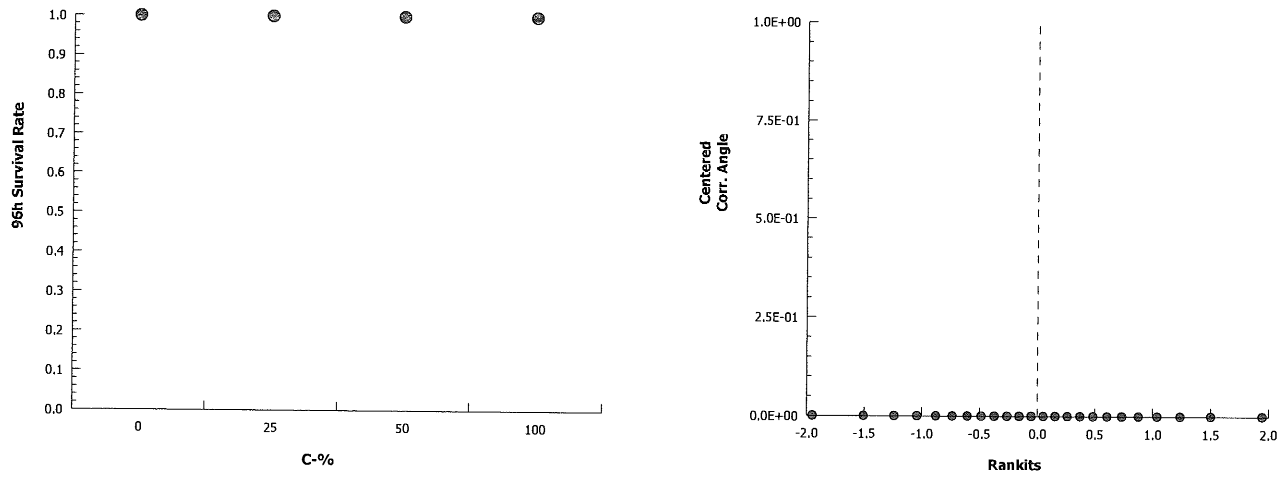
96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	6	1	1	1	1	1	1	0	0.0%	0.0%
25		6	1	1	1	1	1	1	0	0.0%	0.0%
50		6	1	1	1	1	1	1	0	0.0%	0.0%
100		6	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	6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
25		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
50		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%
100		6	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	0.0%

Graphics



Analyst: KB QA:

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/POSD
Sample ID: SIYB-REF
Test No.: 1408-S089

Test Species: *A. affinis*
Start Date/Time: 8/13/2014 1245
End Date/Time: 8/17/2014 1120

Tech Initials	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	KB		BG		

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	33.4	33.3	i33.3	33.4	33.4	20.3	22.0	i20.9	21.3	21.6	7.5	6.1	i7.3	6.1	6.3	8.06	7.84	i8.10	7.93	7.94
#3	B	5	5	5	5	5			f33.3					f21.2					f5.9					f7.86		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
25	A	5	5	5	5	5	33.3	33.2	i33.4	33.4	33.5	20.4	21.8	i20.6	21.2	21.4	7.4	6.0	i7.2	6.0	6.3	8.06	7.86	i8.08	7.88	7.93
	B	5	5	5	5	5			f33.2					f21.1					f5.7					f7.80		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
	E	5	5	5	5	5																				
	F	5	5	5	5	5																				
50	A	5	5	5	5	5	33.2	33.6	i33.4	33.5	33.7	20.5	21.8	i20.4	21.3	21.4	7.8	6.0	i7.4	6.0	6.3	8.05	7.86	i8.08	7.90	7.96
	B	5	5	5	5	5			f33.5					f21.1					f5.7					f7.83		
	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	33.5	33.3	i33.4	~~33.1~~ 33.6	33.7	20.8	21.8	i20.1	21.3	21.4	8.1	6.0	i7.8	5.9	6.1	8.05	7.83	i8.06	7.93	7.95
	B	5	5	5	5	5			f33.4					f21.2					f5.8					f7.85		
	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: AB

Animal Source/Date Received: ABS/8/9/14

Age at Initiation: 13d

Feeding Times	0	24	48	72	96
AM:		0820	0630	0830	0615
PM:	1640	–	–	–	–

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: AC 8/18/14

Final Review: KB 8/26/14

Appendix B

Sample Receipt Information

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Sample Check-In Information

Client: AMEC/POSD

Project: SIYB TMDL Monitoring

Tests Performed: topsmelt acute and mussel development

Test ID No.(s) : 1408-S083 to S096

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. (14-xxxx):	0668	0669	0670	0671	0672	0673	0674
Sample Collection Date & Time:	8/12/14 1400	8/12/14 1313	8/12/14 1215	8/12/14 1107	8/12/17 1017	8/12/14 0917	8/12/14 0812
Sample Receipt Date & Time:	8/12/14 1645	8/12/14 1645	8/12/14 1645	8/12/14 1645	8/12/14 1645	8/12/14 1645	8/12/14 1645
Number of Containers & Container Type:	2, 10L cubi	2, 10L cubi	2, 10L cubi	2, 10L cubi	2, 10L cubi	2, 10L cubi	2, 10L cubi
Approx. Total Volume Received (L):	18L	18L	17L	19 L	17L	15 L	16L
Check-in Temp (°C)	0.2	12.1	12.6	3.1	0.9	1.1	2.4
Temperature OK? [1]	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y] N	[✓ Y]
DO (mg/L)	8.0	8.0	7.8	7.8	7.8	7.9	8.2
pH (units)	8.10	8.13	8.13	8.14	8.12	8.13	8.17
Conductivity (µS/cm)	–	–	–	–	–	–	–
Salinity (ppt)	32.9	32.7	32.8	33.0	33.0	33.3	33.0
Alkalinity (mg/L) [2]	118	117	119	120	119	118	119
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	AB	AB	AB	AB	AB	AB	AB

Sample Descriptions:

1) Colorless, Clear, odorless, no debris
2) Colosless, Clear, odorless, no debris
3) Colorless, clear, odorless, no debris
4) Colorless, clear, odorless, no debris
5) colorless, Clear, odorless, no debris
6) Colorless, clear, odorless, no debris
7) colorless, clear, odorless, no debris

COC Complete? [✓ Y] N

Filtration? [✓ Y] N (mussel)

Pore Size: 0.45µm

[✓ **Organisms**] or **Debris**

pH Adjustment? Y [✓ N]

	1	2	3	4	5	6
Initial pH:						
Amount of HCl added:						
Final pH:						

Freshwater Tests:

Control/Dilution Water Source: 8:2 Culligan Other: ________ Alkalinity: ________ Hardness: ________

Additional Control? Y N = ________ Alkalinity: ________ Hardness: ________

Marine Tests:

Control/Dilution Water Source: [✓ LAB SW] ART SW Other: ________ Alkalinity: 110 Salinity: 34ppt

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? ________

Cl_2 Adjustment? Y [✓ N]

	1	2	3	4	5	6
Initial Free Cl_2:						
STS added:						
Final Free Cl_2:						

Sample Aeration? Y [✓ N]

	1	2	3	4	5	6
Initial D.O.						
Duration & Rate						
Final D.O.						

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 ________

Subsamples For Additional Chemistry Required? Y [✓ N]

NH3 **Other** ________

Tech Initials ____

QC Check: JD 8/22/14

Final Review: KB 8/27/14

Appendix C

Chain of Custody Form

Nautilus Environmental

4340 Vandever Ave. San Diego, CA 92120

Chain of Custody (electronic)

Date 8/12/14 Page 1 of 1

Sample Collection By:	AMEC Environment & Infrastructure	
	Report to:	Invoice to:
Company	AMEC Environment & Infrastructure	AMEC 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

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	ANALYSES REQUIRED Topsmelt 96-hr Acute Survival	Mussel 48-hr Survival and Dev.							Receipt Temperature (°C)
1	SIYB-1	8/12/14	14:00	SW	10-L Poly	2		X	X							0.2
2																
3	SIYB-2	8/12/14	13:3	SW	10-L Poly	2		X	X							12.1
4	SIYB-3	8/12/14	12:15	SW	10-L Poly	2		X	X							12.6
5	SIYB-4	8/12/14	11:07	SW	10-L Poly	2		X	X							3.1
6	SIYB-5	8/12/14	10:17	SW	10-L Poly	2		X	X							0.9
7	SIYB-6	8/12/14	09:17	SW	10-L Poly	2		X	X							1.1
8	SIYB-REF	8/12/14	08:12	SW	10-L Poly	2		X	X							2.4

PROJECT INFORMATION		SAMPLE RECEIPT		Relinquished By:	Received By (courier):
Client:	AMEC	Total # Containers:	14	Signature: 8/12/14 Date	Signature: Date
P.O. No.:	POSD/SIYB	Good Condition?	Y	Print Name: Tyler Huff 16:45 Time	Print Name: Time
Shipped Via:	Hand delivered - TH	Matches Test Schedule?	Y	Company: AMEC	Company:
				Relinquished By (courier):	**Received By Lab:**
				Signature: Date	Signature: Adrienne Cibor 8/12/14 Date
				Print Name: Time	Print Name: Adrienne Cibor 16:45 Time
				Company:	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: 14-0668 to 14-0674

Appendix D

Reference Toxicant Tests

Test Data and Statistical Analyses

Bivalve Survival and Development

Reference Toxicant Test

Raw Data and Statistical Analyses

CETIS Summary Report

Test Code: 140813msdv | 10-0453-8269

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Batch ID:	14-5826-4850	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	13 Aug-14 17:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Aug-14 17:00	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Kamilche Sea Farms	**Age:**	

Sample ID:	07-9011-6442	**Code:**	140813msdv	**Client:**	Internal
Sample Date:	13 Aug-14	**Material:**	Copper chloride	**Project:**	
Receive Date:	13 Aug-14	**Source:**	Reference Toxicant		
Sample Age:	17h	**Station:**	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-1079-1821	Combined Development Ra	10	20	14.14	11.2%		Dunnett Multiple Comparison Test
18-4275-6905	Development Rate	5	10	7.071	8.07%		Dunnett Multiple Comparison Test
20-0087-7876	Survival Rate	10	20	14.14	8.49%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
04-7096-3883	Combined Development Ra	EC25	11.68	10.27	12.54		Linear Interpolation (ICPIN)
		EC50	14.45	13.52	15.03		
17-0528-9470	Development Rate	EC25	11.74	10.66	12.44		Linear Interpolation (ICPIN)
		EC50	14.5	13.78	14.96		
10-1933-8043	Survival Rate	EC25	25.87	14.42	36.01		Linear Interpolation (ICPIN)
		EC50	>40	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
17-0528-9470	Development Rate	Control Resp	0.9207	0.9 - NL	Yes	Passes Acceptability Criteria
18-4275-6905	Development Rate	Control Resp	0.9207	0.9 - NL	Yes	Passes Acceptability Criteria
10-1933-8043	Survival Rate	Control Resp	0.9015	0.5 - NL	Yes	Passes Acceptability Criteria
20-0087-7876	Survival Rate	Control Resp	0.9015	0.5 - NL	Yes	Passes Acceptability Criteria
15-1079-1821	Combined Development Ra	PMSD	0.1122	NL - 0.25	No	Passes Acceptability Criteria

Analyst: KTP QA: AC 10/12/14

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	0.8305	0.8079	0.8532	0.7635	0.9212	0.0271	0.06059	7.3%	0.0%
2.5		5	0.7517	0.7257	0.7778	0.6552	0.8374	0.03118	0.06972	9.27%	9.49%
5		5	0.7655	0.7443	0.7868	0.67	0.8177	0.02544	0.05687	7.43%	7.83%
10		5	0.7488	0.7165	0.781	0.6601	0.8424	0.03863	0.08638	11.54%	9.85%
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	0.9207	0.9036	0.9379	0.8757	0.9894	0.02053	0.04591	4.99%	0.0%
2.5		5	0.9202	0.8988	0.9417	0.8313	0.9714	0.02568	0.05741	6.24%	0.06%
5		5	0.9111	0.8938	0.9285	0.8293	0.9432	0.02079	0.04649	5.1%	1.04%
10		5	0.8363	0.8119	0.8607	0.7363	0.9043	0.02924	0.06538	7.82%	9.17%
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	0.9015	0.8895	0.9135	0.8719	0.9409	0.01436	0.03211	3.56%	0.0%
2.5		5	0.8158	0.8048	0.8267	0.7882	0.8621	0.01309	0.02927	3.59%	9.51%
5		5	0.8394	0.8306	0.8482	0.8079	0.867	0.01052	0.02352	2.8%	6.89%
10		5	0.8946	0.872	0.9172	0.798	0.9606	0.0271	0.06059	6.77%	0.77%
20		5	0.7192	0.6791	0.7593	0.5911	0.8473	0.04799	0.1073	14.92%	20.22%
40		5	0.5724	0.5439	0.6009	0.4729	0.6552	0.03411	0.07627	13.32%	36.5%

Combined Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.7882	0.7635	0.8374	0.8424	0.9212
2.5		0.7192	0.8374	0.7537	0.6552	0.7931
5		0.8177	0.67	0.7931	0.7635	0.7833
10		0.7241	0.6601	0.8374	0.8424	0.6798
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	0.8989	0.8757	0.9444	0.8953	0.9894
2.5		0.9068	0.9714	0.9217	0.8313	0.9699
5		0.9432	0.8293	0.9253	0.9226	0.9353
10		0.8122	0.7363	0.9043	0.8769	0.8519
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	0.8768	0.8719	0.8867	0.9409	0.931
2.5		0.7931	0.8621	0.8177	0.7882	0.8177
5		0.867	0.8079	0.8571	0.8276	0.8374
10		0.8916	0.8966	0.9261	0.9606	0.798
20		0.7143	0.5911	0.8473	0.6404	0.803
40		0.4729	0.6552	0.5764	0.5222	0.6355

Analyst: VFP QA: AC 10/12/14

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	160/203	155/203	170/203	171/203	187/203
2.5		146/203	170/203	153/203	133/203	161/203
5		166/203	136/203	161/203	155/203	159/203
10		147/203	134/203	170/203	171/203	138/203
20		0/203	0/203	0/203	0/203	0/203
40		0/203	0/203	0/203	0/203	0/203

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	160/178	155/177	170/180	171/191	187/189
2.5		146/161	170/175	153/166	133/160	161/166
5		166/176	136/164	161/174	155/168	159/170
10		147/181	134/182	170/188	171/195	138/162
20		0/145	0/120	0/172	0/130	0/163
40		0/96	0/133	0/117	0/106	0/129

Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	178/203	177/203	180/203	191/203	189/203
2.5		161/203	175/203	166/203	160/203	166/203
5		176/203	164/203	174/203	168/203	170/203
10		181/203	182/203	188/203	195/203	162/203
20		145/203	120/203	172/203	130/203	163/203
40		96/203	133/203	117/203	106/203	129/203

Analyst: KFP QA: AC 10/12/14

CETIS Analytical Report

Report Date: 08 Sep-14 14:33 (p 1 of 4)
Test Code: 140813msdv | 10-0453-8269

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	15-1079-1821	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	20	14.14		11.2%

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	1.862	2.227	0.119	8	0.0952	CDF	Non-Significant Effect
		5	1.581	2.227	0.119	8	0.1501	CDF	Non-Significant Effect
		10	1.891	2.227	0.119	8	0.0908	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03484313	0.01161438	3	1.62	0.2242	Non-Significant Effect
Error	0.114719	0.007169939	16			
Total	0.1495622		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.7204	11.34	0.8684	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9447	0.866	0.2940	Normal Distribution

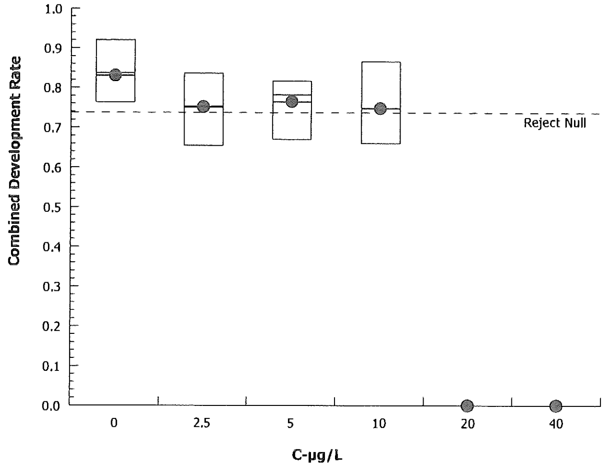
Combined Development Rate Summary

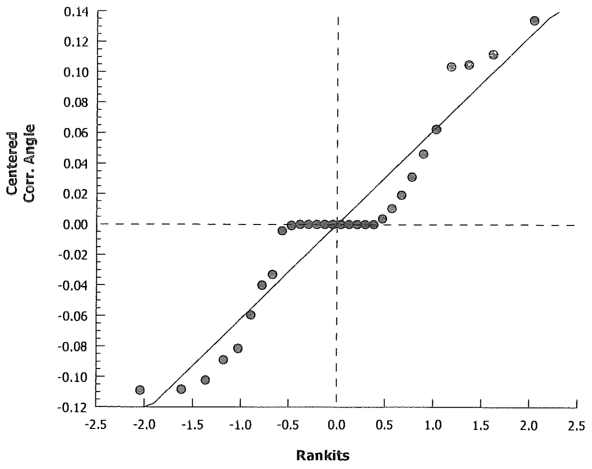
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8305	0.7553	0.9058	0.8374	0.7635	0.9212	0.0271	7.3%	0.0%
2.5		5	0.7517	0.6652	0.8383	0.7537	0.6552	0.8374	0.03118	9.27%	9.49%
5		5	0.7655	0.6949	0.8361	0.7833	0.67	0.8177	0.02544	7.43%	7.83%
10		5	0.7488	0.6415	0.856	0.7241	0.6601	0.8424	0.03863	11.54%	9.85%
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	1.152	1.045	1.259	1.156	1.063	1.286	0.03847	7.47%	0.0%
2.5		5	1.052	0.9515	1.153	1.051	0.9432	1.156	0.0363	7.72%	8.66%
5		5	1.067	0.9863	1.148	1.087	0.9588	1.13	0.02918	6.11%	7.35%
10		5	1.051	0.9239	1.178	1.018	0.9484	1.163	0.04567	9.72%	8.79%
20		5	0.0351	0.03509	0.03511	0.0351	0.0351	0.0351	0	0.0%	96.95%
40		5	0.0351	0.03509	0.03511	0.0351	0.0351	0.0351	0	0.0%	96.95%

Graphics





Analyst: KFP QA: AC 10/12/14

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID: 18-4275-6905 **Endpoint:** Development Rate **CETIS Version:** CETISv1.8.4
Analyzed: 08 Sep-14 14:31 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	5	10	7.071		8.07%

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	0.02362	2.227	0.132	8	0.7415	CDF	Non-Significant Effect
		5	0.4331	2.227	0.132	8	0.5742	CDF	Non-Significant Effect
		10*	2.37	2.227	0.132	8	0.0383	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06667691	0.02222564	3	2.538	0.0932	Non-Significant Effect
Error	0.1400972	0.008756077	16			
Total	0.2067741		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.5771	11.34	0.9017	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9752	0.866	0.8585	Normal Distribution

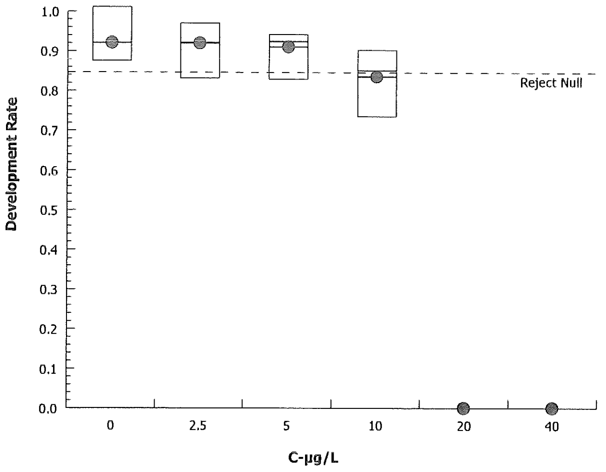
Development Rate Summary

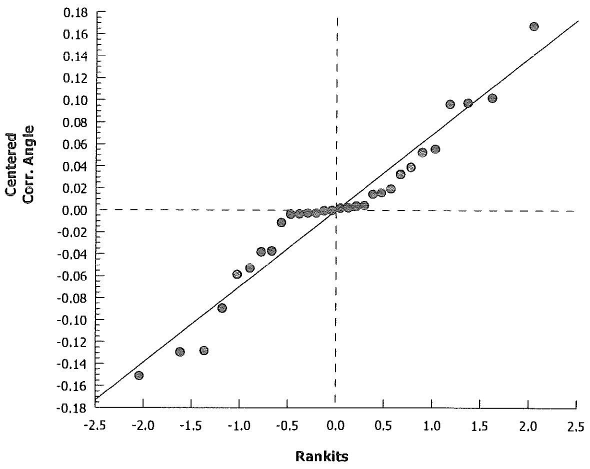
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9207	0.8637	0.9778	0.8989	0.8757	0.9894	0.02053	4.99%	0.0%
2.5		5	0.9202	0.8489	0.9915	0.9217	0.8313	0.9714	0.02568	6.24%	0.06%
5		5	0.9111	0.8534	0.9689	0.9253	0.8293	0.9432	0.02079	5.1%	1.04%
10		5	0.8363	0.7551	0.9175	0.8519	0.7363	0.9043	0.02924	7.82%	9.17%
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	1.3	1.17	1.429	1.247	1.21	1.468	0.04662	8.02%	0.0%
2.5		5	1.299	1.168	1.429	1.287	1.147	1.401	0.04714	8.12%	0.11%
5		5	1.274	1.182	1.366	1.294	1.145	1.33	0.03318	5.82%	1.97%
10		5	1.16	1.052	1.267	1.176	1.031	1.256	0.03884	7.49%	10.79%
20		5	0.04167	0.03777	0.04558	0.04153	0.03813	0.04566	0.001405	7.54%	96.79%
40		5	0.04666	0.04269	0.05063	0.04624	0.04337	0.05105	0.00143	6.85%	96.41%

Graphics





Analyst: KFP QA: AC 10/12/14

CETIS Analytical Report

Report Date: 08 Sep-14 14:33 (p 3 of 4)
Test Code: 140813msdv | 10-0453-8269

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	20-0087-7876	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:31	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	20	14.14		8.49%

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*	2.585	2.362	0.116	8	0.0316	CDF	Significant Effect
		5	1.952	2.362	0.116	8	0.1082	CDF	Non-Significant Effect
		10	0.1018	2.362	0.116	8	0.8015	CDF	Non-Significant Effect
		20*	4.824	2.362	0.116	8	0.0002	CDF	Significant Effect
		40*	8.079	2.362	0.116	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.5743752	0.114875	5	19.1	<0.0001	Significant Effect
Error	0.1443162	0.006013174	24			
Total	0.7186913		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.91	15.09	0.1127	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9819	0.9031	0.8742	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	0.9015	0.8616	0.9414	0.8867	0.8719	0.9409	0.01436	3.56%	0.0%
2.5		5	0.8158	0.7794	0.8521	0.8177	0.7882	0.8621	0.01309	3.59%	9.51%
5		5	0.8394	0.8102	0.8686	0.8374	0.8079	0.867	0.01052	2.8%	6.89%
10		5	0.8946	0.8193	0.9698	0.8966	0.798	0.9606	0.0271	6.77%	0.77%
20		5	0.7192	0.586	0.8524	0.7143	0.5911	0.8473	0.04799	14.92%	20.22%
40		5	0.5724	0.4777	0.6671	0.5764	0.4729	0.6552	0.03411	13.32%	36.5%

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	1.255	1.185	1.324	1.227	1.205	1.325	0.02504	4.46%	0.0%
2.5		5	1.128	1.08	1.176	1.13	1.093	1.19	0.01733	3.44%	10.1%
5		5	1.159	1.119	1.199	1.156	1.117	1.197	0.01432	2.76%	7.63%
10		5	1.25	1.129	1.371	1.243	1.105	1.371	0.04363	7.81%	0.4%
20		5	1.018	0.8667	1.17	1.007	0.877	1.169	0.05462	11.99%	18.85%
40		5	0.8587	0.7627	0.9548	0.8621	0.7583	0.9432	0.03459	9.01%	31.57%

Analyst: KFP QA: AC 10/12/14

CETIS Analytical Report

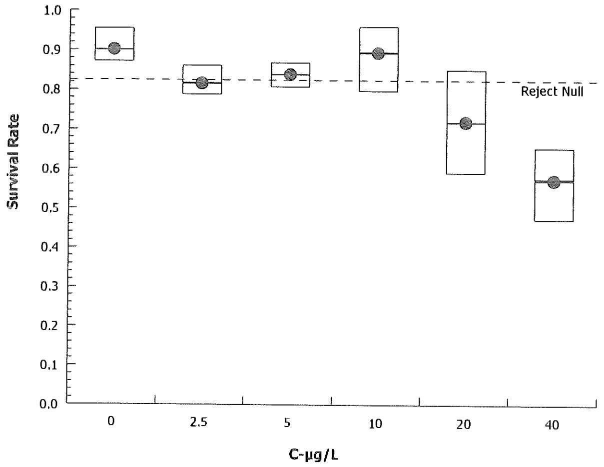
Report Date: 08 Sep-14 14:33 (p 4 of 4)
Test Code: 140813msdv | 10-0453-8269

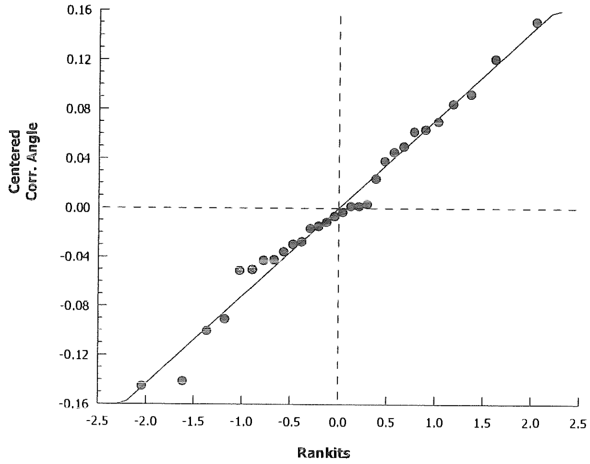
Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Analysis ID:	20-0087-7876	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:31	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: KFP QA: AC 10/12/14

CETIS Analytical Report

Report Date:	08 Sep-14 14:33 (p 1 of 3)
Test Code:	140813msdv | 10-0453-8269

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Analysis ID:	04-7096-3883	**Endpoint:**	Combined Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:30	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1175610	1000	Yes	Two-Point Interpolation

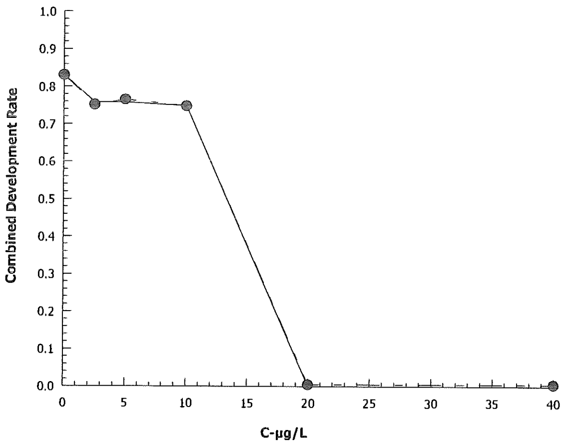
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	11.68	10.27	12.54
EC50	14.45	13.52	15.03

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	0.8305	0.7635	0.9212	0.0271	0.06059	7.3%	0.0%	843	1015
2.5		5	0.7517	0.6552	0.8374	0.03118	0.06972	9.27%	9.49%	763	1015
5		5	0.7655	0.67	0.8177	0.02544	0.05687	7.43%	7.83%	777	1015
10		5	0.7488	0.6601	0.8424	0.03863	0.08638	11.54%	9.85%	760	1015
20		5	0	0	0	0	0		100.0%	0	1015
40		5	0	0	0	0	0		100.0%	0	1015

Graphics



Analyst: KFP QA: AC 10/12/14

CETIS Analytical Report

Report Date: 08 Sep-14 14:33 (p 2 of 3)
Test Code: 140813msdv | 10-0453-8269

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	17-0528-9470	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	97449	1000	Yes	Two-Point Interpolation

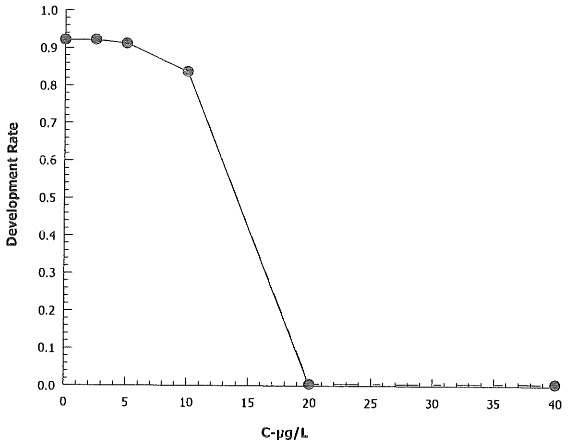
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	11.74	10.66	12.44
EC50	14.5	13.78	14.96

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	0.9207	0.8757	0.9894	0.02053	0.04591	4.99%	0.0%	843	915
2.5		5	0.9202	0.8313	0.9714	0.02568	0.05741	6.24%	0.06%	763	828
5		5	0.9111	0.8293	0.9432	0.02079	0.04649	5.1%	1.04%	777	852
10		5	0.8363	0.7363	0.9043	0.02924	0.06538	7.82%	9.17%	760	908
20		5	0	0	0	0	0		100.0%	0	730
40		5	0	0	0	0	0		100.0%	0	581

Graphics



Analyst:

QA: AK 10/12/14

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Analysis ID:	10-1933-8043	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	08 Sep-14 14:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1960670	1000	Yes	Two-Point Interpolation

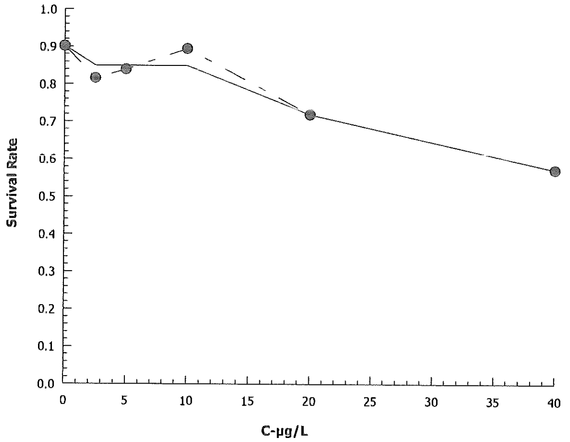
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	25.87	14.42	36.01
EC50	>40	N/A	N/A

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	0.9015	0.8719	0.9409	0.01436	0.03211	3.56%	0.0%	915	1015
2.5		5	0.8158	0.7882	0.8621	0.01309	0.02927	3.59%	9.51%	828	1015
5		5	0.8394	0.8079	0.867	0.01052	0.02352	2.8%	6.89%	852	1015
10		5	0.8946	0.798	0.9606	0.0271	0.06059	6.77%	0.77%	908	1015
20		5	0.7192	0.5911	0.8473	0.04799	0.1073	14.92%	20.22%	730	1015
40		5	0.5724	0.4729	0.6552	0.03411	0.07627	13.32%	36.5%	581	1015

Graphics



Analyst:

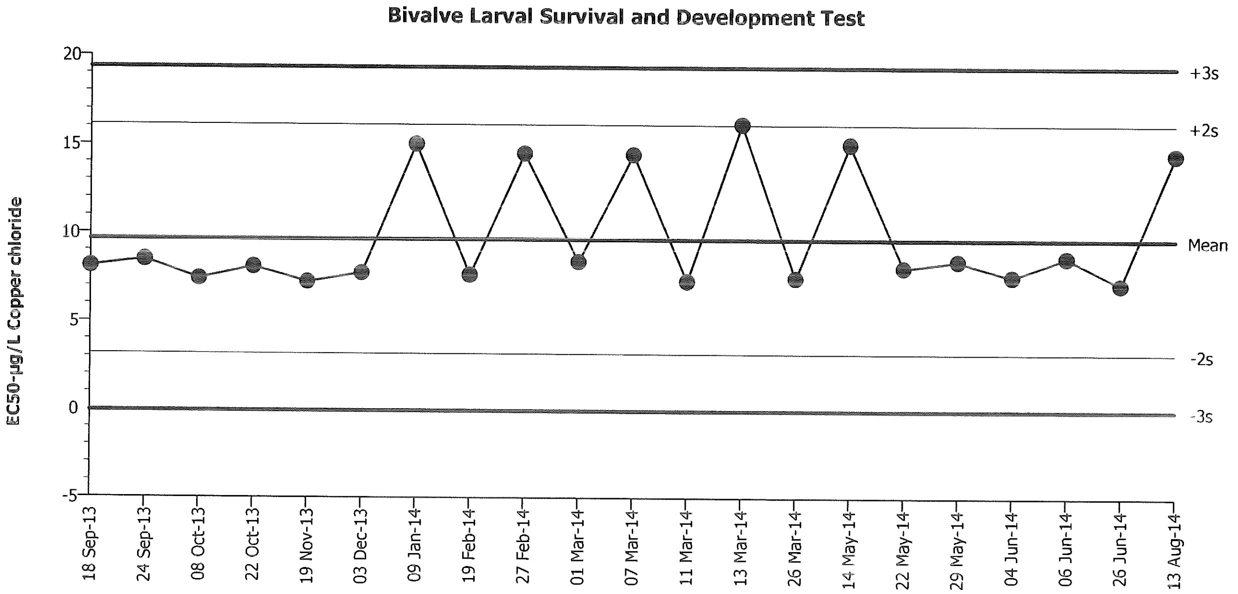
QA: AC 10/12/14

CETIS QC Plot

Report Date: 08 Sep-14 14:36 (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:	9.639	**Count:**	20	**-2s Warning Limit:**	3.163	**-3s Action Limit:**	-0.075
Sigma:	3.238	**CV:**	33.60%	**+2s Warning Limit:**	16.11	**+3s Action Limit:**	19.35

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2013	Sep	18	8.106	-1.533	-0.4733			16-2396-1800	10-8661-0280
2			24	8.484	-1.155	-0.3568			11-5200-3716	19-6377-1301
3		Oct	8	7.406	-2.233	-0.6896			18-9326-2859	06-2274-2968
4			22	8.084	-1.555	-0.4803			05-0902-4957	10-6558-4998
5		Nov	19	7.223	-2.416	-0.746			08-0395-9970	14-4262-8955
6		Dec	3	7.732	-1.907	-0.5888			01-3543-8034	19-6166-0388
7	2014	Jan	9	15.01	5.37	1.658			12-7517-3214	06-8841-7352
8		Feb	19	7.631	-2.008	-0.62			06-7067-5724	20-8102-3149
9			27	14.5	4.858	1.5			01-2599-3059	19-7457-0769
10		Mar	1	8.388	-1.251	-0.3863			09-6059-5046	04-1824-2956
11			7	14.45	4.808	1.485			13-9965-7496	14-7702-1879
12			11	7.285	-2.354	-0.7269			07-0583-5357	18-0173-9852
13			13	16.17	6.527	2.016	(+)		02-3824-2137	07-3791-5903
14			26	7.466	-2.173	-0.6711			12-4019-9661	21-2968-1439
15		May	14	15.02	5.383	1.662			13-6269-1203	17-2869-4422
16			22	8.058	-1.581	-0.4882			17-0817-3993	05-7544-0482
17			29	8.449	-1.19	-0.3676			06-5232-1020	05-4998-0999
18		Jun	4	7.566	-2.073	-0.6403			18-6963-3201	09-2665-9291
19			6	8.65	-0.9885	-0.3053			11-6783-0533	11-9599-2257
20			26	7.104	-2.535	-0.7828			05-3824-4983	15-8210-9995
21		Aug	13	14.45	4.815	1.487			10-0453-8269	04-7096-3883

Analyst:________ QA: AC 10/12/14

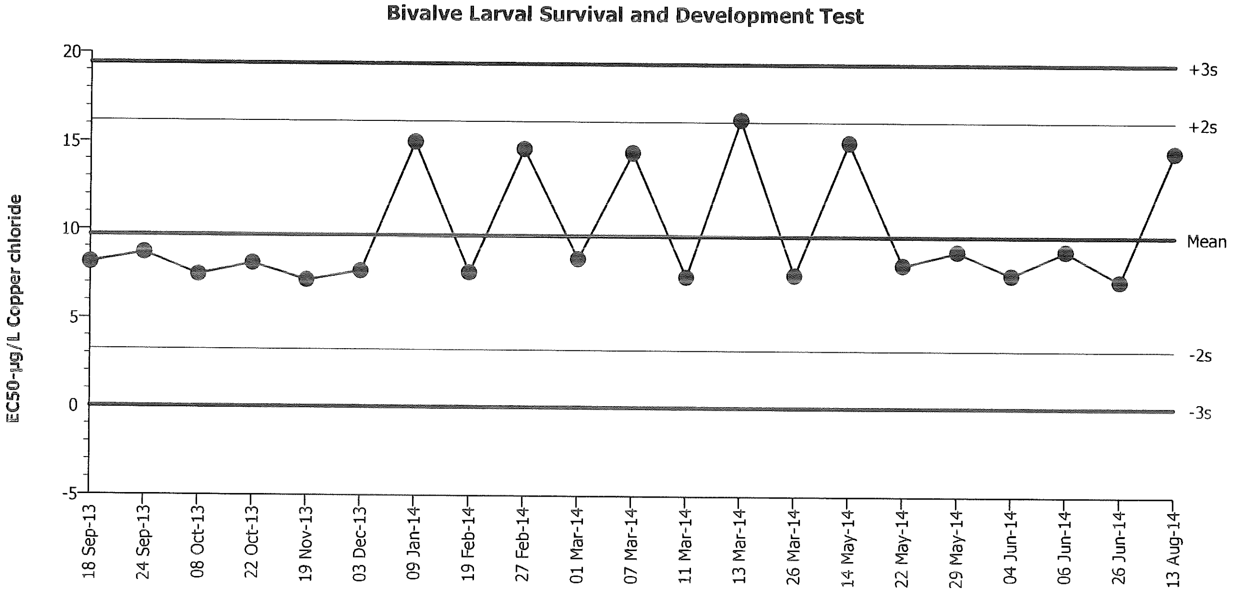
CETIS QC Plot

Report Date: 08 Sep-14 14:36 (1 of 1)

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Test Type: Development-Survival
Protocol: EPA/600/R-95/136 (1995)
Organism: Mytilus galloprovincialis (Bay Mussel
Endpoint: Development Rate
Material: Copper chloride
Source: Reference Toxicant-REF



Mean:	9.702	**Count:**	20	**-2s Warning Limit:**	3.226	**-3s Action Limit:**	-0.012
Sigma:	3.238	**CV:**	33.40%	**+2s Warning Limit:**	16.18	**+3s Action Limit:**	19.42

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2013	Sep	18	8.133	-1.569	-0.4846			16-2396-1800	03-2406-7434
2			24	8.697	-1.005	-0.3105			11-5200-3716	15-9143-0698
3		Oct	8	7.46	-2.242	-0.6923			18-9326-2859	00-0382-7835
4			22	8.108	-1.594	-0.4922			05-0902-4957	08-3276-5483
5		Nov	19	7.157	-2.545	-0.7859			08-0395-9970	08-6488-7852
6		Dec	3	7.675	-2.027	-0.626			01-3543-8034	00-8723-1728
7	2014	Jan	9	15	5.295	1.635			12-7517-3214	20-5291-1172
8		Feb	19	7.604	-2.098	-0.6478			06-7067-5724	03-1095-8191
9			27	14.62	4.915	1.518			01-2599-3059	21-1113-9605
10		Mar	1	8.399	-1.303	-0.4024			09-6059-5046	09-0949-6241
11			7	14.42	4.719	1.457			13-9965-7496	13-5573-1834
12			11	7.39	-2.312	-0.7139			07-0583-5357	08-6082-5537
13			13	16.3	6.598	2.038	(+)		02-3824-2137	19-8092-6871
14			26	7.5	-2.202	-0.68			12-4019-9661	03-5163-2191
15		May	14	15.02	5.321	1.643			13-6269-1203	19-7173-0463
16			22	8.082	-1.62	-0.5003			17-0817-3993	10-0589-1753
17			29	8.863	-0.8386	-0.259			06-5232-1020	03-7884-6457
18		Jun	4	7.517	-2.185	-0.6748			18-6963-3201	04-4717-0100
19			6	8.898	-0.8043	-0.2484			11-6783-0533	09-4505-5521
20			26	7.198	-2.504	-0.7734			05-3824-4983	00-5035-4208
21		Aug	13	14.5	4.794	1.48			10-0453-8269	17-0528-9470

Analyst:_________ QA: AL 10/12/14

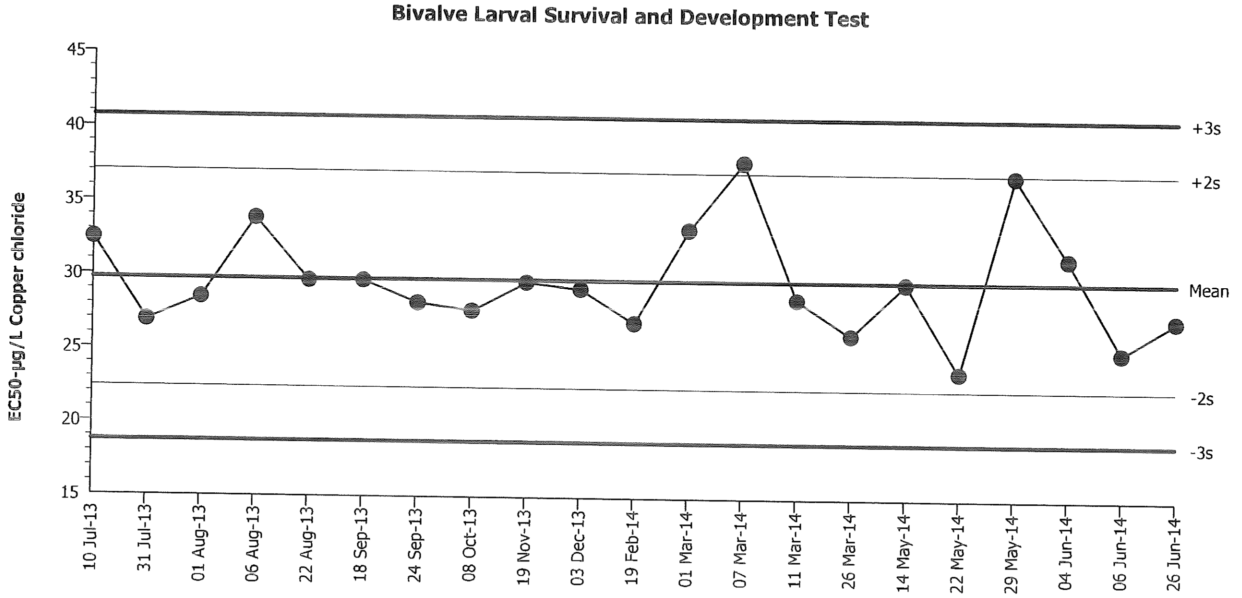
CETIS QC Plot

Report Date: 08 Sep-14 14:36 (1 of 1)

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Test Type: Development-Survival
Protocol: EPA/600/R-95/136 (1995)
Organism: Mytilus galloprovincialis (Bay Mussel
Endpoint: Survival Rate
Material: Copper chloride
Source: Reference Toxicant-REF



Bivalve Larval Survival and Development Test

Mean:	29.73	**Count:**	20	**-2s Warning Limit:**	22.4	**-3s Action Limit:**	18.73
Sigma:	3.666	**CV:**	12.30%	**+2s Warning Limit:**	37.06	**+3s Action Limit:**	40.73

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2013	Jul	10	32.45	2.722	0.7425			10-9836-3796	15-6444-9625
2			31	26.89	-2.839	-0.7745			08-4227-1473	14-9271-2076
3		Aug	1	28.45	-1.276	-0.348			01-3122-6798	16-0148-6448
4			6	33.84	4.112	1.122			15-3829-1959	08-6156-1376
5			22	29.63	-0.1032	-0.02816			15-4775-2708	21-1748-1190
6		Sep	18	29.64	-0.08503	-0.02319			16-2396-1800	20-8615-5105
7			24	28.15	-1.585	-0.4323			11-5200-3716	00-0893-2928
8		Oct	8	27.63	-2.097	-0.572			18-9326-2859	12-8235-7513
9		Nov	19	29.59	-0.1392	-0.03798			08-0395-9970	03-8870-0096
10		Dec	3	29.15	-0.5808	-0.1584			01-3543-8034	17-5496-0633
11	2014	Feb	19	26.88	-2.853	-0.7782			06-7067-5724	03-6674-7429
12		Mar	1	33.21	3.485	0.9505			09-6059-5046	02-1226-6873
13			7	37.79	8.059	2.198	(+)		13-9965-7496	01-9195-4963
14			11	28.52	-1.211	-0.3302			07-0583-5357	17-9116-7298
15			26	26.13	-3.598	-0.9813			12-4019-9661	11-2732-8032
16		May	14	29.64	-0.08835	-0.0241			13-6269-1203	09-9653-0290
17			22	23.62	-6.113	-1.668			17-0817-3993	10-3970-6034
18			29	36.94	7.212	1.967			06-5232-1020	08-9322-5166
19		Jun	4	31.36	1.627	0.4439			18-6963-3201	03-3648-3240
20			6	25	-4.73	-1.29			11-6783-0533	14-3757-0103
21			26	27.21	-2.519	-0.6871			05-3824-4983	06-2690-8606

Analyst:______ QA: AC 10/12/14

CETIS Test Data Worksheet

Report Date: 12 Oct-14 17:06 (p 1 of 1)
Test Code: 10-0453-8269/140813msdv

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Start Date: 13 Aug-14 17:30
End Date: 15 Aug-14 17:00
Sample Date: 13 Aug-14

Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Copper chloride

Sample Code: 140813msdv
Sample Source: Reference Toxicant
Sample Station: Copper Chloride

C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			182	134	
			2			174	161	
			3			181	147	
			4			106	0	
			5			191	171	
			6			188	170	
			7			189	187	
			8			133	0	
			9			129	0	
			10			168	155	
			11			195	171	
			12			180	170	
			13			160	133	
			14			164	136	
			15			176	166	
			16			163	0	
			17			172	0	
			18			130	0	
			19			166	161	
			20			117	0	
			21			162	138	
			22			175	170	
			23			170	159	
			24			177	155	
			25			166	153	
			26			120	0	
			27			161	146	
			28			96	0	
			29			178	160	
			30			145	0	

Analyst: SA QA: AC 10/12/14

CETIS Test Data Worksheet

Report Date: 11 Aug-14 12:29 (p 1 of 1)
Test Code: 10-0453-8269/140813msdv

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Start Date: 13 Aug-14
End Date: 15 Aug-14
Sample Date: 13 Aug-14
Species: Mytilus galloprovincialis
Protocol: EPA/600/R-95/136 (1995)
Material: Copper chloride
Sample Code: 140813msdv
Sample Source: Reference Toxicant
Sample Station: Copper Chloride

C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	29			176	164	
0	LC	2	24					
0	LC	3	12					
0	LC	4	5					
0	LC	5	7					
2.5		1	27					
2.5		2	22					
2.5		3	25					
2.5		4	13			185	169	
2.5		5	19					
5		1	15					
5		2	14					
5		3	2			191	174	
5		4	10					
5		5	23					
10		1	3					
10		2	1					
10		3	6					
10		4	11			210	176	
10		5	21					
20		1	30					
20		2	26					
20		3	17					
20		4	18					
20		5	16			182	0	
40		1	28					
40		2	8					
40		3	20					
40		4	4					
40		5	9			161	0	

QC: AG

Analyst: SD QA: AC 10/12/14

Marine Chronic Bioassay

Water Quality Measurements

Client: Internal
Sample ID: $CuCl_2$
Test No.: 140813msdv

Test Species: *M. galloprovincialis*
Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700

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	32.0	31.8	32.3	14.9	15.0	14.6	8.1	7.6	8.3	8.13	8.02	7.90
2.5	32.0	31.9	32.0	14.9	14.9	15.7	8.75	7.8	8.0	8.11	8.07	7.92
5	32.0	31.9	32.0	15.2	14.9	15.7	7.6	7.9	8.0	8.10	8.03	7.92
10	32.0	31.9	32.0	15.6	14.9	15.8	7.6	7.9	8.1	8.10	8.03	7.93
20	31.9	31.9	32.0	14.6	15.0	15.7	7.8	8.0	8.0	8.12	8.02	7.95
40	31.9	31.9	32.0	15.0	15.1	15.9	7.8	8.0	8.1	8.10	8.01	7.94

Technician Initials:

	0	24	48
WQ Readings:	AC	SG	AD
Dilutions made by:	AG		

High conc. made (µg/L):	40
Vol. Cu stock added (mL):	2.2
Final Volume (mL):	500
Cu stock concentration (µg/L):	9,050

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: SD 8/22/14

Final Review: AC 10/12/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay **Larval Development Worksheet**

Client: Internal - CuCl2 Reference Toxicant
Test No.: 140813msdv
Test Species: *M. galloprovincialis*
Animal Source: Kamilche Farms, Shelton, WA
Date Received: 8/13/14
Test Chambers: 30 mL shell vials
Sample Volume: 10 mL

Start Date/Time: 8/13/2014 1730
End Date/Time: 8/15/2014 1700
Technician Initials: AG

Spawn Information

First Gamete Release Time: 1155

Sex	Number Spawning
Male	3
Female	2

Gamete Selection

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	1 to 3	good density, & motility
Female 1	1	high density, good color & shape
Female 2	2	low density, odd shapes
Female 3 1.1	3	average density, good color & shape

Egg Fertilization Time: 1330

Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	88
Female 2	80
Female 3	91

Stock(s) chosen for testing: 3

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos

Number Counted:

AG ~~9~~ 7	7
8	6
8	7
6	5
6	6

Mean: 6.6

Mean 6.6 X 50 = 330 embryos/ml

Initial Density: 330 = 1.1 (dilution factor)
Desired Final Density: 300
(to inoculate with 0.5 ml)

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

Rand. No.	No. Dividing	Total	% Dividing	Mean % Dividing
A	202	227	89.0	90.9
B	220	240	91.7	
C	200	220	90.9	
D	205	224	91.5	
E	188	206	91.3	

48-h QC: 190/209 = 91%

Comments: $\bar{X} = 203$

QC Check: SO 8/22/14

Final Review: AZ 10/12/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Pacific Topsmelt 96-hr Survival

Reference Toxicant Test

Raw Data and Statistical Analyses

CETIS Summary Report

Report Date: 02 Sep-14 13:10 (p 1 of 1)
Test Code: 140813aara | 12-9208-7415

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID: 09-9864-6410
Start Date: 13 Aug-14 14:10
Ending Date: 17 Aug-14 12:10
Duration: 94h

Test Type: Survival (96h)
Protocol: EPA/821/R-02-012 (2002)
Species: Atherinops affinis
Source: Aquatic Biosystems, CO

Analyst:
Diluent: Diluted Natural Seawater
Brine: Not Applicable
Age: 13 d

Sample ID: 11-0317-4268
Sample Date: 13 Aug-14
Receive Date: 13 Aug-14
Sample Age: 14h

Code: 140813aara
Material: Copper chloride
Source: Reference Toxicant
Station: Copper Chloride

Client: Internal
Project:

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-8304-3920	96h Survival Rate	100	200	141.4	19.8%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
02-1974-5349	96h Survival Rate	EC50	156.9	136.3	180.7		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	1	1	1	1	1	0	0	0.0%	0.0%
100		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
200		4	0.2	0.1138	0.2862	0	0.4	0.1155	0.2309	115.5%	80.0%
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	1	1	1
100		1	1	0.8	1
200		0	0.4	0	0.4
400		0	0	0	0
800		0	0	0	0

Analyst: QA: AC 9/2/14

CETIS Analytical Report

Report Date: 02 Sep-14 13:10 (p 1 of 1)
Test Code: 140813aara | 12-9208-7415

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	02-1974-5349	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 Sep-14 13:09	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes

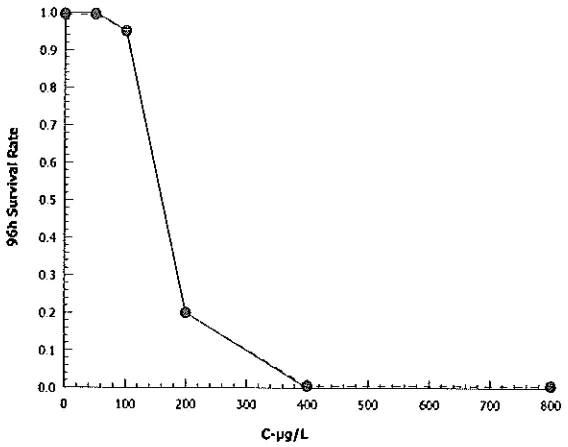
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.196	0.03066	156.9	136.3	180.7

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	1	1	1	0	0	0.0%	0.0%	20	20
100		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
200		4	0.2	0	0.4	0.1155	0.2309	115.5%	80.0%	4	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: VB QA: AC 9/2/14

CETIS Analytical Report

Report Date: 27 Aug-14 12:51 (p 1 of 2)
Test Code: 140813aara | 12-9208-7415

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 05-8304-3920 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 27 Aug-14 12:51 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	100	200	141.4		19.8%

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	50	18	10	1	6	0.7500	Asymp	Non-Significant Effect
	100	16	10	1	6	0.5065	Asymp	Non-Significant Effect
	200*	10	10	0	6	0.0276	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.281833	0.760611	3	36.02	<0.0001	Significant Effect
Error	0.2534009	0.02111674	12			
Total	2.535234		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	13.3	5.953	0.0004	Unequal Variances
Variances	Levene Equality of Variance	53.07	5.953	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8478	0.8408	0.0126	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	1	1	1	1	1	1	0	0.0%	0.0%
100		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
200		4	0.2	0	0.5675	0.2	0	0.4	0.1155	115.5%	80.0%
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

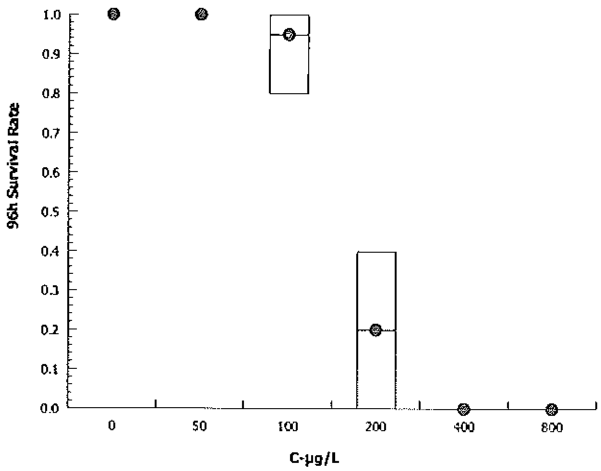
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
50		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
100		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
200		4	0.4551	0.03325	0.877	0.4551	0.2255	0.6847	0.1326	58.25%	66.17%
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%

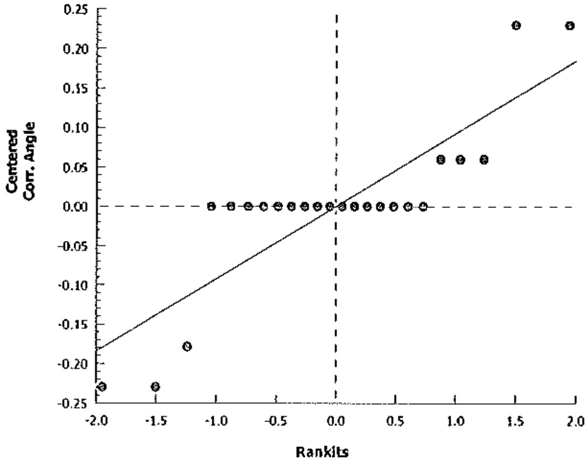
Analyst: KB QA: AC 8/28/14

Pacific Topsmelt 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	05-8304-3920	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Aug-14 12:51	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





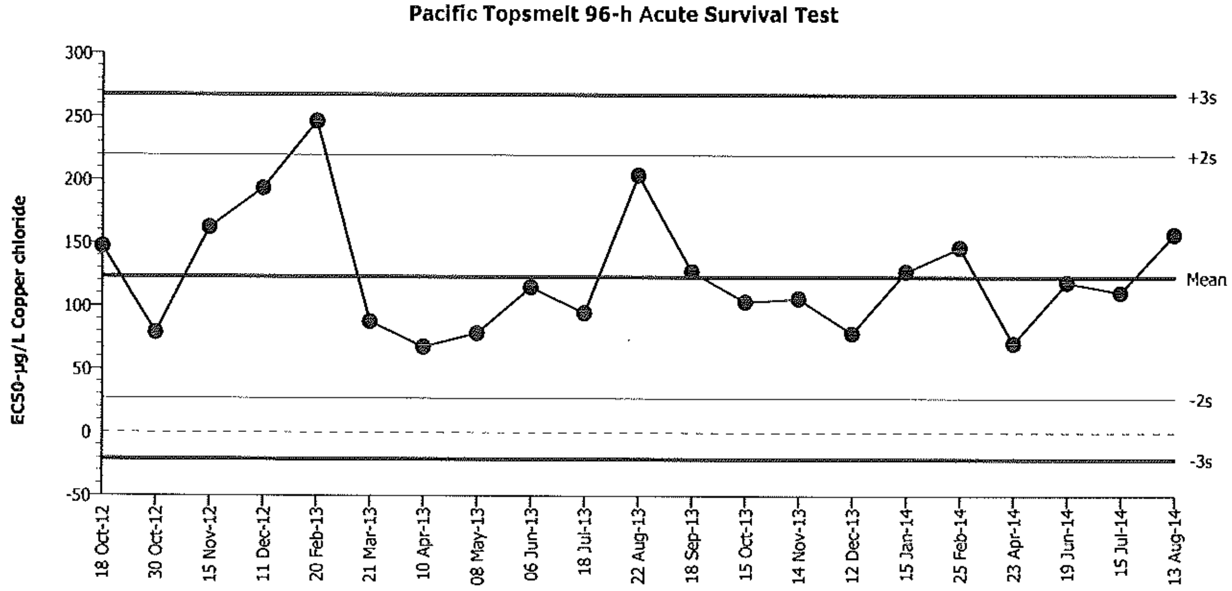
Analyst: KB QA: AC 8/28/14

CETIS QC Plot

Report Date: 27 Aug-14 12:52 (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



Pacific Topsmelt 96-h Acute Survival Test

Mean:	123.2	**Count:**	20	**-2s Warning Limit:**	27	**-3s Action Limit:**	-21.1
Sigma:	48.1	**CV:**	39.00%	**+2s Warning Limit:**	219.4	**+3s Action Limit:**	267.5

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Oct	18	147	23.77	0.4942			01-9731-2862	16-4615-4864
2			30	79.04	-44.16	-0.918			09-9727-3998	19-9793-8377
3		Nov	15	162.2	38.97	0.8102			20-9628-4686	05-9465-8472
4		Dec	11	193.2	69.99	1.455			12-0197-1017	19-7708-1555
5	2013	Feb	20	246.2	123	2.558	(+)		10-5580-3553	19-1631-0732
6		Mar	21	87.63	-35.57	-0.7395			09-0968-4599	13-3377-8097
7		Apr	10	67.71	-55.49	-1.154			05-4384-4439	18-8261-6164
8		May	8	78.46	-44.74	-0.9302			20-4581-2842	03-1879-8647
9		Jun	6	114.9	-8.33	-0.1732			12-0033-0929	20-0252-9346
10		Jul	18	94.59	-28.61	-0.5948			19-2632-6339	04-8526-8990
11		Aug	22	203.7	80.48	1.673			16-8357-2725	11-7110-5550
12		Sep	18	127.5	4.256	0.08848			09-9085-4812	11-5673-1751
13		Oct	15	103.5	-19.67	-0.409			00-5901-5898	17-6384-6991
14		Nov	14	106.1	-17.08	-0.3552			06-5418-8921	10-2371-6330
15		Dec	12	78.46	-44.74	-0.9302			12-4998-2305	03-2148-1441
16	2014	Jan	15	127.5	4.256	0.08848			13-3854-5258	05-1070-1044
17		Feb	25	146.4	23.21	0.4825			20-0325-5939	07-6658-0335
18		Apr	23	70.71	-52.49	-1.091			11-8272-9093	14-5541-7971
19		Jun	19	118.9	-4.279	-0.08897			11-2944-5183	19-5384-3170
20		Jul	15	111	-12.24	-0.2545			00-8730-8108	10-9428-5566
21		Aug	13	156.9	33.72	0.701			12-9208-7415	15-3530-0525

Analyst: KB QA: AC 8/28/14

Marine Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: Internal
Sample ID: $CuCl_2$
Test No.: 140813aarta AC

Test Species: *A. affinis*
Start Date/Time: 8/13/14 ~~1230~~ 1410
End Date/Time: 8/17/14 1210

Cu stock concentration (µg/L): 88,200

	Tech Initials				
	0	24	48	72	96
Counts:	BG	KB	AG	NH	AD
Readings:	BK	SG	SG	NH	NH
Dilutions made by:	BK	--	BG	-	-
High conc. made (µg/L):	800	--	200	--	--
Vol. Cu stock added (mL):	18.1	--	4.5	--	--
Final Volume (mL):	2000	--	2000	--	--

Concentration (µg/L)	Rand #	Number of Live Organisms					Salinity (ppt)					Temperature (°C) Q1					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	30.1	30.1	i30.0	30.0	30.2	20.1	22.4	i20.9	21.8	21.8	7.9	6.0	i7.2	6.4	6.1	7.94	7.78	i8.01	7.86	7.84
	2	5	5	5	5	5			f30.0					f21.4					f6.4					f7.80		
	10	5	5	5	5	5																				
	15	5	5	5	5	5			30.0				Q1													
50	24	5	5	5	5	5	30.1	30.3	i~~29.4~~	30.0	30.4	20.1	22.4	i20.9	21.7	21.7	7.8	6.5	i7.2	6.4	6.1	7.96	7.79	i8.02	7.97	7.85
	8	5	5	5	5	5			f30.2					f21.3					f6.4					f7.84		
	17	5	5	5	5	5																				
	11	5	5	5	5	5							Q1													
100	12	5	5	5	5	5	30.1	30.2	i30.0	30.1	30.3	20.2	22.3	i20.9	21.8	21.7	7.9	6.3	i7.2	6.3	6.1	7.95	7.78	i8.02	7.86	7.86
	4	5	4	5	5	5			f30.3					f21.4					f6.3					f7.84		
	1	5	5	5	4	4																				
	19	5	5	5	5	5							Q1					5.9								
200	23	5	5	1	1	0	30.0	30.2	i29.9	30.1	30.3	20.2	22.3	i20.9	21.8	21.7	7.6	~~7.7~~ SG	i7.2	6.5	6.3	7.94	7.71	i8.01	7.82	7.91
	13	5	5	3	2	2			f30.2					f21.4					f6.2					f7.78		
	14	5	5	1	0	–																				
	18	5	4	2	2	2							Q1													
400	9	5	0	all dead			30.0	30.1	i—			20.2	22.3	i—			7.8	6.3	i—			7.94	7.79	i—		
	16	5	0						f—					f—					f—					f—		
	7	5	0																							
	5	5	0										Q1													
800	3	5	0	all dead			30.0	29.9	i—			20.2	22.3	i—			7.8	6.4	i—			7.96	7.78	i—		
	21	5	0						f—					f—					f—					f—		
	6	5	0																							
	20	5	0																							

Rand # QC: BG
Initial Count QC: AB

Animal Source/Date Received: ABS/8/9/14
Age at Initiation: 13d

Comments: Temperature consistent with protocol and client sampling and analysis plan

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)

Feeding Times	0	24	48	72	96
AM:	--	0820	0820	0830	0815
PM:	1640	--	--	--	--

QC Check: AC 8/18/14

Final Review: KB 8/26/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Appendix E

Laboratory Qualifier Codes

Nautilus Environmental

Glossary of Qualifier Codes:

Laboratory Procedures

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%

Data Analysis/Reporting

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.

Updated: 10/30/13

APPENDIX E

CORRESPONDENCE WITH STATE AND FEDERAL AGENCIES

This page intentionally left blank

Unified Port
of San Diego

Office of President / CEO
3165 Pacific Highway, San Diego, CA 92101
P.O. Box 120488, San Diego, CA 92112-0488
619.686.6201 • 619.686.6547 fax
www.portofsandiego.org

January 8, 2014

Dr. Elizabeth Behl
Director, Health & Ecological Criteria Division
Office of Water
Mail code: 4301M
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Subject: Consideration of Biotic Ligand Model for Marine Waters

Dear Dr. Behl,

The San Diego Unified Port District (Port), created by the California Legislature in 1962, serves to balance regional economic benefits, recreational opportunities, environmental stewardship and public safety while protecting the tidelands resources on behalf of the citizens of California. The Port is dedicated to protecting and improving the environmental conditions of San Diego Bay and the Port tidelands. As part of its role, the Port is committed to conducting its operations and managing resources in an environmentally sensitive and responsible manner and ensuring that tenant operations do the same.

As one of the key stakeholders named in the Shelter Island Yacht Basin Dissolved Copper Total Maximum Daily Load (TMDL)[1], the Port is faced with the challenges of complying with water quality regulations that stem from the use of a legally available product. For several years, the Port has been at the forefront of this copper matter and has made significant progress in developing a core understanding of the issues. The Port has taken a leadership role, distinguishing itself by developing model programs for hull paint research and policy-based copper reduction programs. As a result of our efforts, several state agencies are basing their policy decisions largely upon our findings[2,].

---

[1] SIYB TMDL: http://www.waterboards.ca.gov/sandiego/water_issues/programs/watershed/souwatershed.shtml#siybtmdl

[2] Marina Del Rey Proposed TMDL Amendment:
http://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/bpa_96_R13-XXX_td.shtml

As the Clean Water Act's list of impaired waters grows, the Port is faced with more sites having similar copper impairments. For example, in addition to Shelter Island, the seven remaining San Diego Bay marina basins now have copper impairments thereby requiring the development of TMDLs for each of these basins. Moreover, a 2009 study by the California Department of Pesticide Regulation identified high levels of copper in numerous marinas across the state.

The Biotic Ligand Model (BLM) has been successfully validated to predict the toxicity of a variety of dissolved metals to various freshwater organisms and is already being used in aquatic-quality guidance for copper. The BLM approach also has been shown to be an efficient substitute to performing bioassays in freshwater environments and may lead to more technically defensible ecological risk assessments. Advantages of a marine BLM would be similar; improved economy, speed, and the ability to generate site-specific water quality criteria that are cognizant of the multiple factors that affect water chemistry.

A federally approved marine BLM will be extremely beneficial to California. As the list of copper-related water impairments increases, it is imperative that regulators rely on the most up-to-date scientific approaches and information to develop consistent and appropriate water quality standards that are protective, yet appropriately represent conditions within those impaired areas.

The Port recognizes the importance of considering site-specific factors when developing TMDLs. There is an increasing body of evidence suggesting that the current water quality objective may be overly protective of water quality beneficial uses in the Shelter Island Yacht Basin and San Diego Bay. Moreover, California's Regional Water Quality Control Boards need time to incorporate the BLM into TMDL approaches and Basin Plan amendments. As additional TMDLs are forthcoming in the near future, the timing is critical so the BLM can be approved for their use.

On behalf of the Port, I want to commend the EPA for initiating the development of the biotic ligand model for marine waters, and we support its expeditious completion. The Port believes the BLM will become an important tool in improving the understanding of the health of our waters and will ensure that regulations are effective in preserving the beneficial uses of our bay while balancing the economic feasibility of implementing pollution control measures.

As we continue our efforts to support pollution prevention and source control measures and move forward in complying with the Total Maximum Daily Load for copper in the Shelter Island Yacht Basin, we will continue to encourage improvements in understanding the science and working with regulators to improve the waters, sediments, and resources within the bay and throughout the state.

Thank you for taking these comments into consideration.

Sincerely,

Wayne Darbeau

Wayne Darbeau
President/CEO

cc: Board of Port Commissioners, Jason H. Giffen, Ellen Gross, Karen Holman,
Senator Feinstein (D), Senator Boxer (D), Congressman Vargas (D-51st),
Congressman Peters (D-52nd), Assembly Majority Leader Atkins (D-San Diego)

cc via email: David W. Gibson (dgibson@waterboards.ca.gov)
Wayne Chiu (wchiu@waterboards.ca.gov)
Charles Delos (delos.charles@epa.gov)
Joe Beaman (beaman.joe@epa.gov)
Joseph Gorsuch (joseph.gorsuch@copperalliance.us)
Matt Newlson (Matthew_Nelson@feinstein.senate.gov)
Katherine Field (Katherine_Field@feinstein.senate.gov)
Lynn Abramson (Lynn_Abramson@boxer.senate.gov)
Caridad Sanchez (Caridad_Sanchez@boxer.senate.gov)
Aaron Allen (Aaron.Allen@mail.house.gov)
Lumay Wang (Lumay.Wang@mail.house.gov)
Deanna Spehn (Deanna.Spehn@asm.ca.gov)

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 14, 2014

California Regional Water Quality Control Board
Los Angeles Region
Attn: Shana Rapoport
320 W. 4th St, Suite 200
Los Angeles, CA 90013

Subject: Comment Letter - Marina del Rey Harbor Toxics TMDL Reconsideration

Dear Ms. Rapoport,

Thank you for the opportunity to provide comments on the proposed amendment to the Water Quality Control Plan – Los Angeles Region revising the Total Maximum Daily Load for Marina del Rey Harbor Toxic Pollutants (Marina del Rey TMDL Amendment). As one of the key stakeholders named in the Shelter Island Yacht Basin Dissolved Copper Total Maximum Daily Load (Shelter Island TMDL) adopted by the San Diego Regional Board in 2005, the San Diego Unified Port District (District) is faced with similar dissolved copper water quality impairments as the ones being proposed for Marina del Rey. We are respectfully submitting these comments based upon our experience and understanding of copper reduction approaches, as we move forward with complying with the Shelter Island TMDL.

For several years, the District has been at the forefront of this copper issue and has 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.

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. In that regard, the District noted that many of the technical references and findings identified in the proposed Marina del Rey TMDL Amendment are based largely upon the methodology and modeling used in the Shelter Island TMDL and the District's work implementing actions under that TMDL. On that note, the District respectfully submits the following comments on the Marina del Rey TMDL Amendment:

1. Modeling and Methodology There has been a long-standing concern over the load allocations identified in the Shelter Island TMDL, namely the loading estimates allocated to passive leaching and hull cleaning. Appendix A of the proposed Marina del Rey TMDL Amendment identifies the average dissolved copper emission rate from hull cleaning to be 8.5 $\mu g/cm^2$/event, the same rate used in the Shelter Island TMDL's loading calculations. Additionally, the proposed Marina del Rey TMDL Amendment (specifically pages 33-34 of the

technical report) notes that other studies also were evaluated, including a more-recent study by AMEC (2006) in which a hull cleaning rate of 10 μg/cm^2/event was calculated. Furthermore, on those same pages, you also acknowledge that the U.S. Navy is currently conducting a study on the contribution of copper from antifouling paint, and further, that the study may aid in future refinement of the loading calculations.

The aforementioned U.S Navy study was recently published, entitled, *Life Cycle Contributions of Copper from Vessel Painting and Maintenance Activities (SPAWAR, November 2013).* It examines copper paint emissions over a paint's three-year life cycle. This report was a part of the Department of Pesticide Regulation's (DPR) paint re-evaluation process. Of importance, the report identifies different hull cleaning emission rates from those used in the Shelter Island TMDL and identified in the AMEC 2006 study.

The District 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 calculating or considering water quality regulations. Your staff is commended for taking the 2006 AMEC study information and comparing it against the Shelter Island TMDL's loading calculations for boat hull cleaning inputs. As you noted, the differences in the emission rates (8.5 μg/cm2/event predicted in previous work compared to 10 μg/cm2/event in AMEC study) resulted in a less that 1% change in the modeling output. Now the most recent U.S. Navy study suggests an even a greater contribution may be attributable to boat cleaning and boat movement. Prior to the adoption of the TMDL, we recommend that the same analysis be conducted to determine how this new information may change the modeling output and the findings of this analysis should be included in your technical report.

Our experience has taught us that working through the TMDL adoption process and having success in implementing pollutant reducing activities requires support from the regulated community. Assertions have been made by stakeholders that the Shelter Island TMDL's hull cleaning emission rates and consequent loading allocations are incorrect, thus leading to questions about the scientific validity of the TMDL itself. The resulting uncertainty behind the supporting science creates implementation challenges because the general public (i.e. boating community) hears mixed messages about what needs to occur to remedy the situation.

To that end, the District would strongly encourage your staff do its due diligence to evaluate the emission rates from the multiple studies. While the Shelter Island box model may be appropriate tool for determining load allocations, the data used to populate the model should reflect the most up-to-date science. It is also suggested that the technical report clearly identify and discuss each study and how each one was evaluated and used in the TMDL amendment process. Additionally, as new studies continue to increase our understanding of how chemicals behave in the environment, we recommend including appropriate language in the TMDL resolution to enable this scientifically relevant information be easily incorporated, once data is collected without another re-opener process.

2. State Legislation (AB425) In October 2013, Governor Brown signed into law Assembly Bill 425 (Atkins) relating to copper-based antifouling paint. The legislation requires that, by February 1, 2014, the DPR "*shall determine a leach rate for copper based antifouling paint used on recreational vessels and make recommendations for appropriates mitigation measures that may be implemented to address the protection of aquatic environments from the effects of exposure to that paint if it is registered as a pesticide*". Thus, the DPR's copper antifouling paint re-evaluation process will consider management practices and other approaches to mitigate elevated copper concentrations in marinas. It is our understanding that the DPR's paint re-evaluation process as part of this legislation is on schedule.

   The District sponsored AB425 because the legislation's outcome could have positive benefits on the implementation strategy for the Shelter Island TMDL, and possibly reduce or eliminate the need for further copper-related TMDLs in San Diego Bay. Since the DPR's report and its findings may have relevance to the load allocations and/or implementation of the proposed Marina del Rey TMDL Amendment, it is recommended that the report's findings be included into your TMDL amendment. As such, there could be a benefit to reviewing and/or considering the DPR report prior to the adoption of the Marina del Rey TMDL Amendment to avoid any potential inconsistencies in regulatory approaches throughout the state.

3. Consider Site-specific Water Quality Objectives The District recognizes the importance of considering site-specific factors when developing TMDLs. The Shelter Island TMDL did not use site-specific objectives in the technical methodology; however, there is an increasing body of evidence suggesting that the current water quality objective of 3.1 µg/L may be overly protective of the beneficial uses in the Shelter Island Yacht Basin. For the District and other stakeholders subject to the Shelter Island TMDL, re-opening the TMDL for Shelter Island to consider site-specific water quality objectives will be a lengthy and expensive process for both the regulated parties and the Regional Board.

   As one of the parties implementing various copper reducing activities to meet the 3.1 µg/L water quality objective in the Shelter Island TMDL, the District would encourage the use of site-specific water quality objectives at the onset of the TMDL process. Because the Marina del Rey TMDL Amendment has not yet been adopted, it may be beneficial to 1) consider extending the amendment hearing until a site-specific study can be completed, or 2) include appropriate language in the TMDL resolution to enable site-specific objectives to be easily incorporated, once data is collected without another re-opener process.

4. Timeline for Compliance Based on District staff's experience, the proposed 11-year timeframe for complying with an 85% reduction in copper loading may be challenging. The District has been actively encouraging the use of alternative paints for over six years. While we recognize that much of the groundwork for evaluating paints has been expedited by some of our research and paint testing efforts, we have learned that informing the local boating public about alternative hull paints, securing grant funds, and encouraging a behavior change takes time.

   Additionally, the cost to convert boats to non-copper alternatives still remains significantly higher than the cost of using copper antifouling paint. Our local San Diego Bay boatyards have had years of experience applying alternative paints, yet some have only recently included the application process into their normal course of business. Our experience has taught us that the fundamental behavioral shifts needed to embrace alternative paints both at the boatyard and throughout the local boating community take time, regardless of the work that has been done elsewhere.

5. Statewide Consistency The District believes that reducing copper in marinas is a concern statewide. To that end, we continue to encourage a permanent resolution to hull paint-related pollutant loading and are therefore committed to supporting and encouraging that regulations be consistent at a state or federal level.

   The District believes that it is critical that the regions work together. Reducing copper levels in marinas is a statewide issue that requires consistency as new regulations are developed. As more TMDLs are adopted, they will drive local solutions that may not be the most appropriate approach for addressing an issue that is common throughout the state. We continue to encourage statewide solutions that do not place local businesses at an economic disadvantage.

   As your Regional Board embarks on the copper reduction requirements proposed in the Marina del Rey TMDL Amendment, we encourage you to work with our San Diego Regional Board as well as with the DPR to fully understand the complexities and impacts that TMDLs may have locally, regionally, and across the state.

The District remains firm to its commitment to conduct operations and manage resources in an environmentally sensitive and responsible manner; however, we also strive to ensure that regulations are effective in balancing the economic feasibility of implementing pollution control measures with protecting the health of our waters. Our interest in the proposed Marina del Rey TMDL Amendment stems from the need for developing and using consistent methods to develop the regulations that impact impairments that are common throughout California. As we in San Diego move through our own TMDL process, we appreciate the openness of your staff to work together and ensure that regulations being presented in Marina del Rey are created consistently and with the most updated information available.

Please feel free to contact Karen Holman at (619) 725-6073 or via email at kholman@portofsandiego.org if you have any questions or would like to further discuss the items raised in this letter.

Sincerely

Jason H. Giffen

Jason H. Giffen, Director
Environmental and Land Use Management

D2#866522
cc: Board of Port Commissioners, Ellen Gross, Karen Holman
cc via email: David W. Gibson (dgibson@waterboards.ca.gov), Wayne Chiu (wchiu@waterboards.ca.gov)

APPENDIX F

REFERENCE INFORMATION ON NEW STUDIES

(CONTAINED ON THE CD AT THE END OF THE REPORT)

This page intentionally left blank