

**FINAL
2016 SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
MONITORING REPORT**



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TABLE OF CONTENTS

	Page
ACRONYMS AND ABBREVIATIONS.....	iii
UNITS OF MEASURE	iv
1.0 INTRODUCTION.....	1-1
1.1 Previous Studies in SIYB.....	1-1
1.1.1 Annual SIYB TMDL Monitoring.....	1-1
1.1.2 Bosse et al., 2014.....	1-3
1.1.3 Neira et al., 2009	1-3
1.2 MAMPEC Model Study.....	1-3
2.0 SAMPLING COLLECTION METHODS.....	2-1
2.1 Sampling Design	2-1
2.1.1 Sampling Stations.....	2-1
2.2 Collection Schedule.....	2-5
2.2.1 Annual SIYB TMDL Monitoring Stations.....	2-5
2.2.2 Special Study Stations.....	2-5
2.3 Field Collection Procedures	2-5
2.3.1 Collection Station Positioning	2-5
2.3.2 Tidal Heights and Direction During Collection Operations	2-7
Figure 2-2. Tidal Height and Direction at Time of Sample Collection	2-8
2.3.3 Sample Collection Conditions.....	2-8
2.3.4 Sample Collection Procedures	2-9
2.3.5 Sample Collection Completeness.....	2-10
2.3.6 Equipment Decontamination and Cleaning	2-10
3.0 SAMPLE HANDLING AND ANALYSES	3-1
3.1 <i>In Situ</i> Analysis.....	3-1
3.2 Analytical Analyses	3-1
3.3 Quality Assurance and Quality Control.....	3-1
3.4 Data Review and Management	3-2
3.4.1 Data Review	3-2
3.4.2 Data Management	3-3
3.5 Data Analysis	3-3
4.0 RESULTS.....	4-1
4.1 <i>In situ</i> Measurements	4-1
4.2 Analytical Chemistry	4-6
4.2.1 Copper and Zinc Results.....	4-9
4.2.2 Organic Carbon and Suspended Solids Results	4-12
5.0 DISCUSSION.....	5-1
6.0 STUDY LIMITATIONS AND ASSUMPTIONS.....	6-1
7.0 QA/QC SUMMARY	7-1
8.0 REFERENCES.....	1

LIST OF TABLES

Table 2-1.	Sampling Station Coordinates	2-2
Table 2-2.	Sample Collection Schedule Matrix.....	2-6
Table 2-3.	Distance Between Proposed and Actual Sampling Location.....	2-6
Table 2-4.	Tides During Sample Collection	2-7
Table 3-1.	<i>In Situ</i> Analytical Methods and Measurement Accuracy	3-1
Table 3-2.	Laboratory Analytical Methods and Detection Limits.....	3-2
Table 4-1.	Range of Water Quality Measurements	4-1
Table 4-2.	Special Study Water Chemistry Results.....	4-7
Table 5-1.	Basin-Wide Average Dissolved Copper Concentrations	5-2
Table 5-2.	Updated Environmental Input Parameters	5-3
Table 5-3.	Calculated Dissolved Copper PECs by Leach Rate Scenario.....	5-4

LIST OF FIGURES

Figure 1-1.	Mean Surface Water Basin-wide Dissolved Copper Levels in SIYB TMDL Monitoring Events (2011–2015)	1-2
Figure 1-2.	Surface Water Dissolved Copper Levels at SIYB TMDL Monitoring Stations (2011–2015).....	1-2
Figure 2-1.	Proposed Versus Actual Special Study Station Locations	2-3
Figure 4-1.	Temperature Profile at Stations SIYB-1 and SS-02	4-2
Figure 4-2.	Temperature Profile at Station SS-06.....	4-3
Figure 4-3.	Temperature Profile at Station SIYB-6	4-3
Figure 4-4.	DO Profiles at Stations SIYB-1, SS-02, SS-04, and SS-06.....	4-4
Figure 4-5.	DO Profiles at Station SIYB-6	4-5
Figure 4-6.	Light Transmissivity at Stations SIYB-1 and SS-03.....	4-6
Figure 4-7.	Light Transmissivity at Stations SIYB-6 and SS-12.....	4-6
Figure 4-8.	Comparison of Dissolved and Total Copper Concentrations Among Sampling Depths	4-11
Figure 4-9.	Comparison of Dissolved and Total Zinc Concentrations Among Sampling Depths	4-12
Figure 4-10.	Comparison of DOC and TOC Concentrations Among Sampling Depths.....	4-13
Figure 5-1.	Spatial Distribution of Dissolved Copper Concentrations in SIYB.....	5-7

LIST OF APPENDICES

APPENDIX A	SIYB ENHANCED WATER QUALITY SPECIAL STUDY SAMPLING AND ANALYSIS PLAN/QUALITY ASSURANCE PROJECT PLAN
APPENDIX B	COMPLETED QA/QC FIELD CHECKLIST FORMS
APPENDIX C	CHAIN-OF-CUSTODY FORMS
APPENDIX D	ANALYTICAL REPORTS
APPENDIX E	FIELD DATA FORMS
APPENDIX F	IN SITU DATA

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ACRONYMS AND ABBREVIATIONS

AFP	antifoulant paint
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc. (formerly AMEC Environment & Infrastructure, Inc.)
BLM	Biotic Ligand Model
CCC	criterion continuous concentration
COC	chain of custody
CTD	conductivity, temperature, depth
CTR	California Toxics Rule
DO	dissolved oxygen
DOC	dissolved organic carbon
DPR	California Department of Pesticide Regulation
ELAP	California Environmental Laboratory Accreditation Program
HDPE	high-density polyurethane
ID	identification
Investigative Order	Investigative Order No. R9-2011-0036
ISO	International Organization for Standardization
MAMPEC	Marine Antifoulant Model to Predict Environmental Concentrations
NA	not applicable
PDF	Portable Data Format
PEC	predicted environmental concentration
Port	San Diego Unified Port District
QA	quality assurance
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan
QC	quality control
Regional Board	San Diego Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SBE	SeaBird Electronics
SIYB	Shelter Island Yacht Basin
SIYB TMDL	Total Maximum Daily Load for Dissolved Copper in the San Diego Shelter Island Yacht Basin
SM	Standard Method
SOP	standard operating procedure
Special Study	Enhanced Water Quality Special Study
SS	Special Study
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
TOC	total organic carbon
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
Weck	Weck Laboratories
WQO	water quality objective
YSI	YSI Incorporated

UNITS OF MEASURE

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

1.0 INTRODUCTION

This report presents the results of the Enhanced¹ Water Quality Special Study (Special Study) investigation conducted in Shelter Island Yacht Basin (SIYB) in August 2016. This Special Study involved collection of water samples at three depths in the water column (in the top 1 meter, at mid-depth, and at 1 meter from the bottom) at 18 locations throughout the basin. The Special Study was conducted in conjunction with the annual monitoring required for the Total Maximum Daily Load for Dissolved Copper in the San Diego Shelter Island Yacht Basin (SIYB TMDL).

Water quality parameters monitored in the Special Study include dissolved and total copper and zinc, dissolved and total organic carbon, total suspended solids, and other water quality characteristics of interest (e.g., water clarity, temperature, dissolved oxygen, pH, and salinity). Details regarding sample collection procedures for the Special Study are summarized in this report, and are discussed in more detail the project-specific Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler Environment & Infrastructure, Inc. [Amec Foster Wheeler], 2016a; Appendix A).

The purpose for conducting the enhanced water quality study was twofold:

1. Develop an enhanced understanding of the basin-wide characteristics of dissolved copper in SIYB that complements existing water quality information generated by the annual SIYB TMDL monitoring and other studies (e.g., Neira et al., 2009; Bosse et al., 2014). The study results may help to determine whether the existing SIYB TMDL monitoring program is sufficient to accurately assess basin-wide conditions, or whether modifications should be considered.
2. Provide an enhanced understanding of the basin-wide dissolved copper levels in SIYB that can be compared with the predicted environmental concentration (PEC) output of the Marine Antifoulant Model for Predicting Environmental Concentrations (MAMPEC) model (Amec Foster Wheeler, 2016b).

1.1 Previous Studies in SIYB

Several studies have been conducted within SIYB to evaluate concentrations of dissolved copper in the water column. These studies are briefly discussed in Sections 1.1.1 through 1.1.3.

1.1.1 Annual SIYB TMDL Monitoring

The SIYB TMDL Monitoring and Progress Report is completed annually to satisfy the requirements of 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. Annual monitoring of the water column is required to determine whether water quality objectives (WQOs) have been attained. Water quality is evaluated at six fixed surface stations within SIYB, and one reference station (adjacent to SIYB, within San Diego Bay) to determine dissolved copper concentrations within the basin.

¹ This special investigation is referred to as the “Enhanced Water Quality Special Study” because it was conducted at the same time and at some of the same collection locations as those assessed annually for the SIYB TMDL.

The mean surface water basin-wide dissolved copper concentrations from each SIYB TMDL monitoring event (from 2011 through 2015) compared with ambient acute and chronic marine water quality objectives (WQOs)² are presented in Figure 1-1.

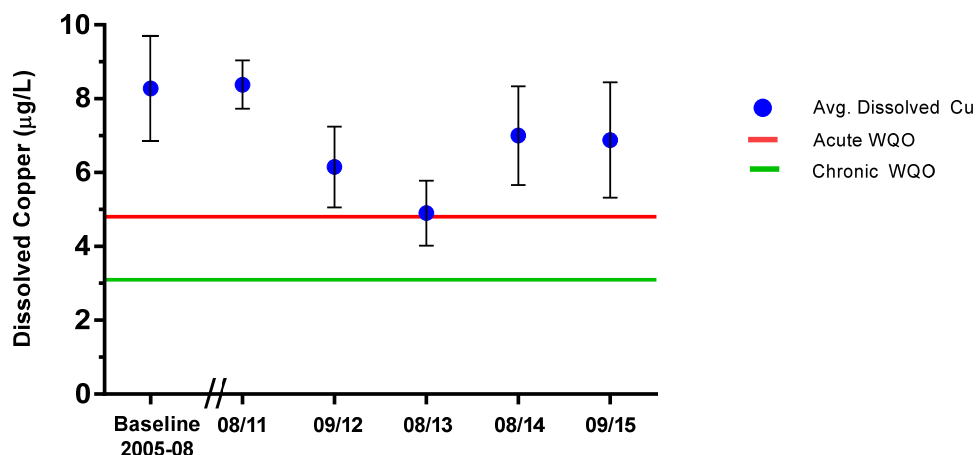


Figure 1-1. Mean Surface Water Basin-wide Dissolved Copper Levels in SIYB TMDL Monitoring Events (2011–2015)

(Average ± Standard Error)

Dissolved copper concentrations have remained consistent since 2014. The horizontal gradient of dissolved copper among stations has also remained consistent through monitoring years, with a gradient of dissolved copper increasing from the mouth to the inner head of SIYB (Figure 1-2).

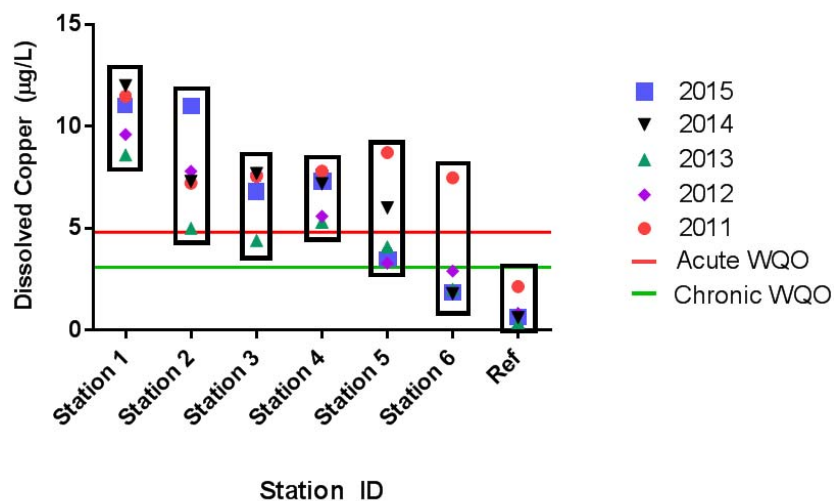


Figure 1-2. Surface Water Dissolved Copper Levels at SIYB TMDL Monitoring Stations (2011–2015)

(Average ± Standard Error)

² Published in the 2013 California Ocean Plan. State Water Resources Control Board: Water Quality Control Plan, Ocean Waters of California (Resolution No. 2005-0013). Sacramento, CA.

1.1.2 Bosse et al., 2014

Bosse et al. (2014) conducted a water column assessment to examine the toxicological effects and bioavailability of copper in SIYB and determine whether copper poses a potential threat to sensitive organisms inhabiting the site. In this study, seawater samples were collected at depths of 1 meter below the surface (surface water) and 1 meter above the bottom (bottom water) from 16 stations located mostly outside of the marina leaseholds. Samples were collected during one wet season sampling event (collected on March 22, 2011) and one dry season sampling event (collected on July 5, 2011). In general, the study showed more significantly elevated levels of dissolved copper in the surface waters than in the deeper waters during both the wet and dry season events. During the dry season, the average basin-wide dissolved copper levels observed in the Bosse study were 4.5 micrograms per liter ($\mu\text{g/L}$) (for 16 surface samples) and 2.8 $\mu\text{g/L}$ (for 16 bottom samples).

1.1.3 Neira et al., 2009

Neira et al. (2009) conducted a water column and sediment assessment in 2006 and 2007 to test the hypothesis that the presence of “hotspots” of copper concentrations in SIYB are linked to boat distribution (number of boats and distance from the boats) and to basin environmental characteristics. In this study, 32 stations were evenly distributed throughout SIYB using a spatial grid design, similar in pattern to that used in this Special Study. Study results showed a definite horizontal gradient in copper levels from the head of the basin to the mouth. Higher copper levels were observed in water and sediment samples collected at the head of the basin; decreasing levels were observed moving toward the mouth of the basin at San Diego Bay. The researchers noted that the observed dissolved copper concentrations tended to be greater in surface waters than in near-bottom waters, and that, despite the shallow depth of the basin (approximately 5 meters), a statistically significant, depth-related difference in copper concentrations was observed across the entire basin. The researchers also concluded that the results provided strong evidence that dissolved copper concentrations in surface waters of SIYB are associated with the presence of boats in the basin. The average basin-wide dissolved copper levels observed during the 2006 sampling event in the Neira study were 9.1 $\mu\text{g/L}$ in the surface samples and 4.3 $\mu\text{g/L}$ in the bottom samples.

1.2 MAMPEC Model Study

In 2016, Amec Foster Wheeler and Chemetrics conducted a modeling study to evaluate the PEC of dissolved copper in SIYB waters with varying average paint leach rates. The purpose of this study was to estimate changes in water quality (i.e., reduction in dissolved copper levels) expected in SIYB as higher leach rate paints are phased out or reformulated. For this study, the MAMPEC model (Deltares, 2010) was used to predict expected water column dissolved copper levels in SIYB using multiple leach rate scenarios and SIYB-specific physical and chemical characteristics as input variables. The MAMPEC model was selected because it has been widely used worldwide to provide PECs for generic marine environments, such as marinas. The MAMPEC model was also recently used by the Department of Pesticide Regulation (DPR) to develop a maximum allowable leach rate for copper-based antifoulant paint (AFP) use in California saltwater marinas (DPR, 2014).

The results of the modeling study demonstrated the potential of changes in water quality (i.e., reduced water column copper levels) that may be expected in SIYB with movement toward hull paints with lower leach rates. However, one of the main limitations of the study was that the annual SIYB TMDL compliance monitoring data could not be used in a direct comparison with the model output because the MAMPEC model provides a basin-wide (i.e., water column) concentration prediction, whereas the basin-wide average used for compliance monitoring is calculated using samples collected in the upper 1 meter of the water column.

Thus, in the 2015 SIYB TMDL Monitoring and Progress Report (Amec Foster Wheeler, 2016b), the following recommendation was made (Table 6-2, Recommendation 2):

“It is recommended that an enhanced water column testing special study effort be considered. This effort would allow for a better comparison of current basin-wide dissolved copper levels to the predicted environmental concentration (PEC) output of the MAMPEC model.”

The Special Study described in this report was implemented to fulfill this recommendation, as well as to develop an enhanced understanding of the basin-wide characteristics of SIYB.

2.0 SAMPLING COLLECTION METHODS

This section describes the Special Study collection methods, including methods to assess dissolved copper levels throughout SIYB, and project-specific quality assurance and quality control (QA/QC) procedures used during water quality monitoring.

2.1 Sampling Design

To meet the study goals, water quality samples were collected from multiple depths at 18 stations within SIYB, and at one reference station outside the basin in San Diego Bay. Station locations were chosen using a rectangular systematic grid design. A 250-meter by 200-meter grid was designed to incorporate the existing SIYB TMDL monitoring stations into the Special Study, as well as to identify additional Special Study station locations to ensure that all areas in SIYB were equally represented and sampled. The Special Study stations were assigned by identifying the grid nodes that did not intersect or were not proximal to a SIYB TMDL monitoring station (Figure 2-1). This resulted in the addition of 12 Special Study stations to the existing six TMDL stations. This sampling strategy provides sufficient spatial coverage, representation of basin use, and sufficient resolution to address the Special Study goals³.

2.1.1 Sampling Stations

For this Special Study, sample collection at each station was performed at three depths: a surface sample (collected 1 meter from the surface), a mid-depth sample (collected at mid-column depth), and a deep sample (collected approximately 1 meter from the bottom). This strategy included supplementing the SIYB TMDL monitoring stations with additional monitoring depths, because the annual SIYB TMDL monitoring program includes collecting surface samples only.

The target locations for the 12 Special Study stations are identified by the orange triangles in Figure 2-1. The 12 Special Study stations were not a part of the SIYB TMDL monitoring program; consequently, a set of sampling rules for each station was established to meet the Special Study goals described in Section 1. Ideally, Special Study samples were to be collected within 30 feet of the grid node (target location). However, because of obstructions or restrictions (such as boats, docks, or depth limitations), sampling within 30 feet of the target location was not always possible.

When necessary, the collection station was repositioned (for the Special Study stations only) in compliance with the following rules:

1. Each Special Study station location must be at least 12 feet in depth at the time of collection so that a top, mid-depth, and bottom sample could be collected with at least 1 meter between sample depths.
2. Sample collection at each Special Study station must be at least 20 feet from the nearest vessel.

³ Special Study Station SS-12 was located outside the SIYB leasehold; however, regardless of position, the location was chosen because the waters have direct input into the basin.

Proposed and actual station coordinates are provided in Table 2-1. In cases where the proposed location did not meet both requirements, the station location was repositioned to the nearest point that fulfilled the two requirements, as represented by the blue circles in Figure 2-1.

Table 2-1.
Sampling Station Coordinates

Station ID	Proposed		Actual	
	Latitude	Longitude	Latitude	Longitude
SIYB-1*	32.71821	-117.22601	32.71828	-117.22602
SIYB-1 (REP)*	32.71821	-117.22601	32.71822	-117.22604
SIYB-2*	32.71412	-117.22921	32.71422	-117.22924
SIYB-3*	32.71550	-117.22989	32.71546	-117.22985
SIYB-4*	32.71683	-117.23203	32.71685	-117.23200
SIYB-5*	32.71217	-117.23297	32.71217	-117.23293
SIYB-6*	32.70858	-117.23514	32.70878	-117.23512
SIYB-REF*	32.70406	-117.23232	32.70407	-117.23235
SS-01	32.71677	-117.22466	32.71646	-117.22498
SS-02	32.71939	-117.22779	32.71883	-117.22824
SS-03	32.71540	-117.22674	32.71550	-117.22659
SS-04	32.71661	-117.22811	32.71681	-117.22806
SS-04 (REP)	32.71661	-117.22811	32.71670	-117.22805
SS-05	32.71751	-117.23308	32.71741	-117.23309
SS-06	32.71212	-117.23078	32.71191	-117.23042
SS-07	32.71343	-117.23220	32.71346	-117.23218
SS-07 (REP)	32.71343	-117.23220	32.71353	-117.23222
SS-08	32.71602	-117.23499	32.71606	-117.23492
SS-09	32.71033	-117.23307	32.71037	-117.23314
SS-10	32.71176	-117.23434	32.71174	-117.23425
SS-11	32.71037	-117.23611	32.71035	-117.23613
SS-12	32.70765	-117.23653	32.70765	-117.23647

*To maintain consistency among annual monitoring events, SIYB TMDL samples were collected within approximately ± 3 meters of the target coordinates.

A continuous vertical profile of water quality characteristics (pH, temperature, salinity, dissolved oxygen, and light transmittance) was also obtained at each station (including SIYB TMDL monitoring and Special Study stations) using a SeaBird Electronics (SBE) conductivity, temperature, depth (CTD) profiling instrument.

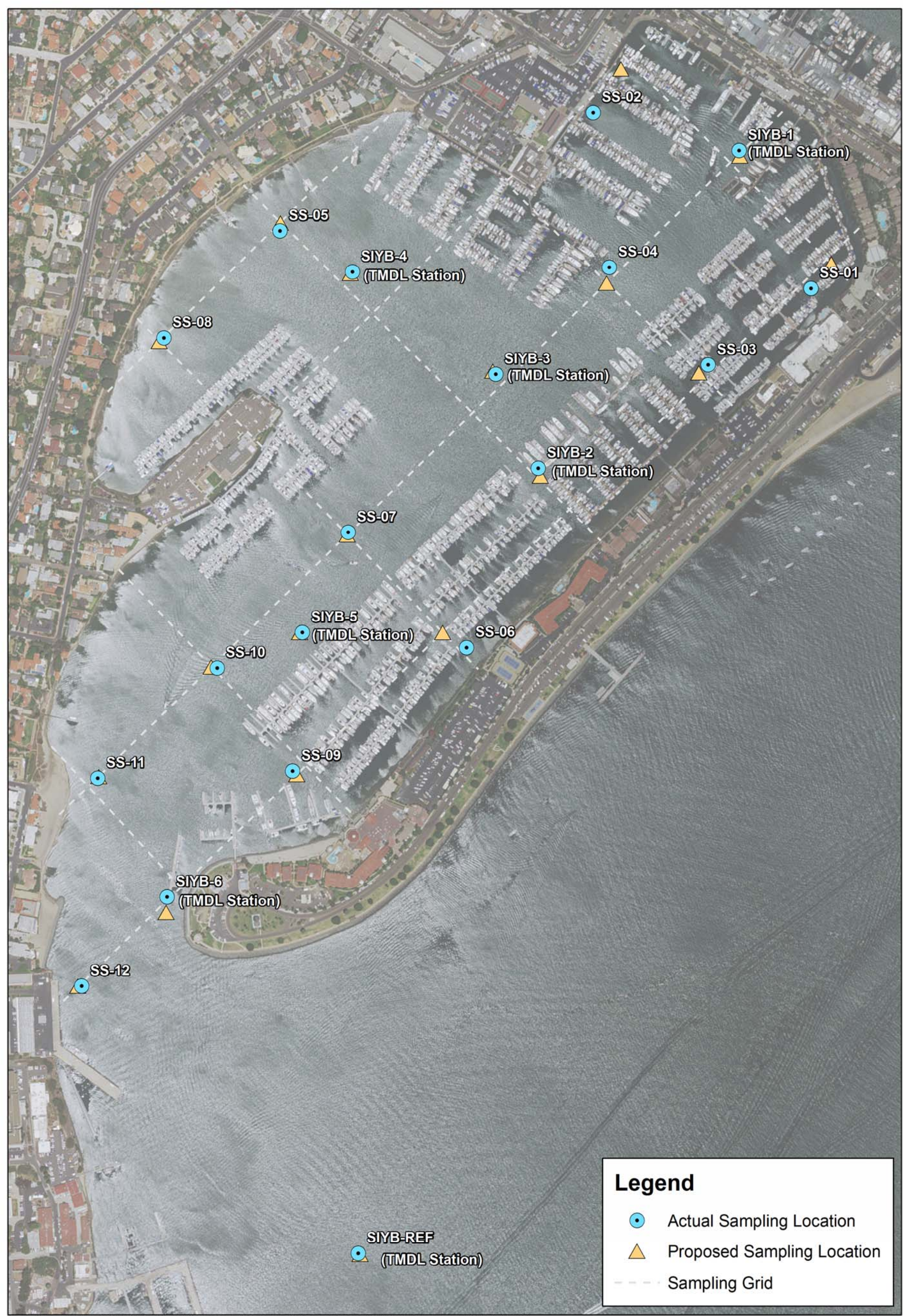


Figure 2-1. Proposed Versus Actual Special Study Station Locations

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2.2 Collection Schedule

Sampling was conducted in two phases, as described in Sections 2.2.1 and 2.2.2.

2.2.1 Annual SIYB TMDL Monitoring Stations

Sample collection at the six SIYB TMDL monitoring stations and one San Diego Bay reference station occurred on August 23, 2016. Collection followed the SIYB TMDL Monitoring Plan (Amec Foster Wheeler, 2016c) and QAPP (Amec Foster Wheeler, 2015), with the addition of mid-depth and bottom sample collection and a CTD profile cast. Sampling began at the monitoring stations near the mouth of SIYB and moved toward the head of SIYB, approximately bracketing the high tide.

2.2.2 Special Study Stations

Sample collection at the 12 Special Study stations was performed on the two days following the SIYB TMDL monitoring (August 24 and 25, 2016). To maintain consistency with the SIYB TMDL sampling methods, collection at the Special Study stations followed the same sampling sequence used in the SIYB TMDL monitoring (i.e., daily sampling began at stations near the mouth and moved toward the head of SIYB. Table 2-2 presents the collection schedule for the Special Study stations and SIYB TMDL monitoring stations.

2.3 Field Collection Procedures

Collection methods are presented in Sections 2.3.1 through 2.3.6. Field collection procedures are described in detail in the project-specific SAP/QAPP (Amec Foster Wheeler, 2016a; Appendix A).

2.3.1 Collection Station Positioning

All stations were located using a differential Global Positioning System. Per the SIYB TMDL Monitoring Plan (Amec Foster Wheeler, 2016c), samples for the SIYB TMDL monitoring stations were collected within approximately ± 3 meters of the target coordinates listed in Table 2-1. Samples for the Special Study stations followed the procedures described in Section 2.1.1. Distances between the actual sampling location and the proposed location for the Special Study are presented in Table 2-3, as well as justification for moving the sampling location.

Table 2-2.
Sample Collection Schedule Matrix

Station ID	Collection Day		
	Day 1 – SIYB TMDL & Special Study (8/23/16)	Day 2 Special Study (8/24/16)	Day 3 Special Study (8/25/16)
SIYB-REF	X		
SIYB-1	X		
SIYB-2	X		
SIYB-3	X		
SIYB-4	X		
SIYB-5	X		
SIYB-6	X		
SS-01		X	
SS-02			X
SS-03		X	
SS-04			X
SS-05		X	
SS-06			X
SS-07		X	
SS-08			X
SS-09		X	
SS-10			X
SS-11		X	
SS-12			X

Table 2-3.
Distance Between Proposed and Actual Sampling Location

Station Identification (ID)	Distance Between Proposed and Actual Sampling Location (feet)	Justification
SIYB-1	On target	No adjustment in station position necessary.
SIYB-1 (REP)	On target	No adjustment in station position necessary.
SIYB-2	On target	No adjustment in station position necessary.
SIYB-3	On target	No adjustment in station position necessary.
SIYB-4	On target	No adjustment in station position necessary.
SIYB-5	On target	No adjustment in station position necessary.
SIYB-6	10	Police boat in way of SIYB-6; moved north and side tied to dock.
SIYB-REF	On target	No adjustment in station position necessary.
SS-01	145	Moved away from target coordinates because of proximity to vessels.
SS-02	250	Fairway too narrow with the wind direction at the time. Would have had to drop anchor in a slip so moved to wider fairway (1 fairway directly west).
SS-03	80	Current too strong to hold position and hull cleaners in immediate vicinity.

Table 2-3.
Distance Between Proposed and Actual Sampling Location (continued)

Station Identification (ID)	Distance Between Proposed and Actual Sampling Location (feet)	Justification
SS-04	On target	No adjustment in station position necessary.
SS-04 (REP)	On target	No adjustment in station position necessary.
SS-05	On target	No adjustment in station position necessary.
SS-06	100	Approximately 100 feet east of proposed coordinates; channel too narrow and wind variable.
SS-07	On target	No adjustment in station position necessary.
SS-07 (REP)	On target	No adjustment in station position necessary.
SS-08	On target	No adjustment in station position necessary.
SS-09	18	Proximity of vessels.
SS-10	On target	No adjustment in station position necessary.
SS-11	On target	No adjustment in station position necessary.
SS-12	30	Best position possible.

2.3.2 Tidal Heights and Direction During Collection Operations

To maintain consistency with the SIYB TMDL monitoring program, daily sampling began at the stations near the mouth of SIYB and moved toward the head of SIYB. Table 2-4 lists the tidal cycle in relation to the first sample taken (surface water) at each station. Figure 2-2 depicts the time at which samples were collected relative to the tide cycle. As shown on Figure 2-2, the daily sample collection process was initiated close to the beginning of the flood tide sequence. The sample collection effort ended after the peak high tide.

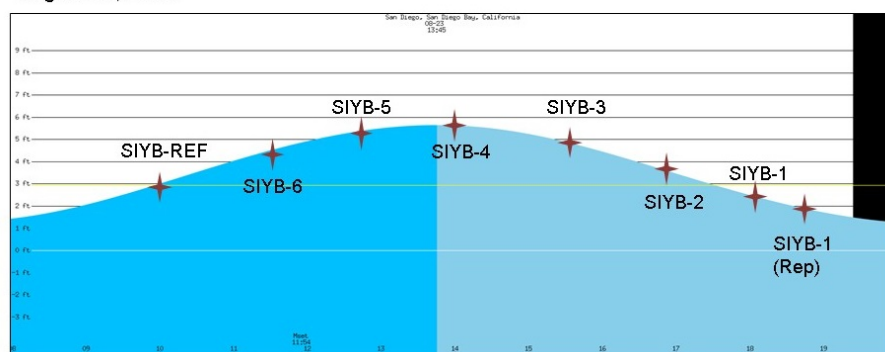
Table 2-4.
Tides During Sample Collection

Station ID	Date Sampled	Tide (feet)	Station ID	Date Sampled	Tide (feet)	Station ID	Date Sampled	Tide (feet)
SIYB-1	8/23/16	↓+2.7	SS-01	8/24/16	↑+5.4	SS-02	8/25/16	↓+5.5
SIYB-1 (REP)		↑+2.0	SS-03		↓+5.4	SS-04		↑+4.9
SIYB-2		↓+3.8	SS-05		↑+4.7	SS-04 (REP)		↑+5.4
SIYB-3		↓+5.0	SS-07		↑+3.1	SS-06		↑+4.2
SIYB-4		↓+5.4	SS-07 (REP)		↑+3.9	SS-08		↑+3.9
SIYB-5		↑+5.2	SS-09		↑+2.3	SS-10		↑+2.4
SIYB-6		↑+4.2	SS-11		↑+1.8	SS-12		↑+2.2
SIYB-REF		↑+3.0	--					--

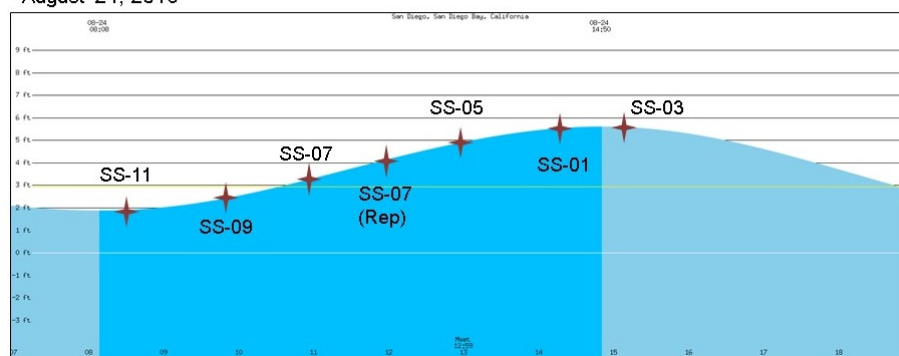
Notes:

ID = identification; + = height above mean lower low water; ↑ = flood tide at time of sampling; ↓ = ebb tide at time of sampling

Day 1
San Diego Bay,
August 23, 2016



Day 2
San Diego Bay,
August 24, 2016



Day 3
San Diego Bay,
August 25, 2016

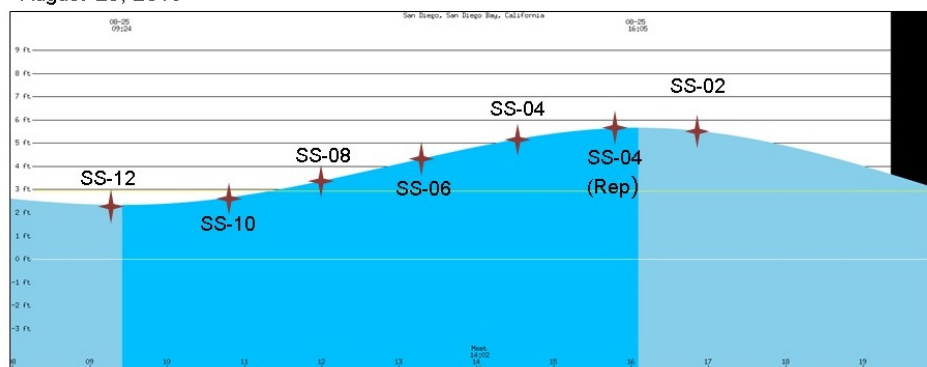


Figure 2-2. Tidal Height and Direction at Time of Sample Collection

2.3.3 Sample Collection Conditions

To ensure sample integrity, specific sample collection conditions were required, as described in the project-specific SAP/QAPP (Amec Foster Wheeler, 2016a; Appendix A). These conditions included taking special care during the anchoring process to ensure that the anchor did not cause excessive sediment resuspension and avoid the contamination of bottom-depth samples. Once the boat was anchored, the engine was turned off, and a minimum period of 5 minutes elapsed prior to commencing collection activities to allow any potential resuspension to settle. During the 5-minute waiting period, the area was carefully surveyed to identify any nearby

vessel maintenance activities and/or any other observations of particular interest, which were noted in the field logs.

2.3.4 Sample Collection Procedures

Following the 5-minute waiting period, the surface water field measurements of pH, temperature, and salinity were made using a YSI Incorporated (YSI) meter. A Secchi disk was used to record the visual clarity of the water column. A lead line tape was used to determine water depth; this measured depth was used to determine the collection depth for the mid-water and bottom samples.

Discrete water samples were collected at each station using a weighted⁴ Niskin bottle deployed from the sampling vessel at the three specified collection depths. Surface samples at each station were collected at approximately 1 meter (approximately 3 feet) from the surface, mid-depth samples were collected halfway down the water column, and bottom samples were collected within 1 meter of the bottom. After the vessel arrived at the station and the depth measurements were taken, the length of line used on the Niskin bottle was carefully measured and marked to ensure that the bottle did not contact the bottom sediments. The Niskin bottle line was pre-marked in 1-foot increments. Bottom samples were collected by slowly lowering the Niskin bottle to a depth that was approximately 1 meter from the bottom; field staff paid close attention to ensure that the bottom sediments were not suspended during this process. Field staff also carefully observed the line angle of the Niskin bottle to ensure that the sample was collected at the specified depth. All sampling steps followed the Surface Water Ambient Monitoring Program (SWAMP)-defined “clean hands” techniques (California State Water Resources Control Board [State Board], 2014) to prevent potential sample contamination, consistent with the project-specific and approved SIYB Enhanced Water Quality Special Study SAP/QAPP (Amec Foster Wheeler, 2016a; Appendix A).

After collection at each sampling depth, water samples were transferred to labeled containers for analysis of total and dissolved copper and zinc, total organic carbon (TOC), dissolved organic carbon (DOC), and total suspended solids (TSS).

To maintain consistency with the SIYB TMDL methods for dissolved metals analyses for the SIYB TMDL monitoring stations (i.e., the surface water of stations SIYB-1 through SIYB-6 and SIYB-REF), samples intended for dissolved metals analysis were transferred into precleaned, non-preserved high-density polyethylene bottles (HDPE) bottles. Samples were filtered and preserved within 24 hours at the analytical laboratory. For all other samples (all stations with the prefix of Special Study [SS] or the mid-depths and bottom depths of stations SIYB-1 through SIYB-6 and SIYB-REF), water intended for dissolved metals analyses was filtered in the field using a pre-acid-rinsed VWR International 0.45-micrometer (μm) bottle-top vacuum filtration system. Field-filtered samples were preserved upon arrival within 48 hours at the analytical laboratory.

Detailed field notes were recorded during sample collection at each station and all samples were logged on a chain-of-custody (COC) form, and then placed in a cooler on ice. Samples

⁴ A decontaminated, plastic coated anchor was used to weight the Niskin bottle line.

were stored at approximately 4 degrees Celsius (°C) in the dark until delivered to the appropriate laboratory for analysis on the day following collection. Water chemistry analyses were conducted by Weck Laboratories (Weck) of the City of Industry, California, a laboratory accredited through the California Environmental Laboratory Accreditation Program (ELAP).

Once all discrete water samples were collected, a second final set of field measurements of pH, temperature, and salinity were taken at a depth of 1 meter below the water surface using portable YSI meters. A full water column profile of temperature, pH, light transmissivity, salinity, and dissolved oxygen (DO) was measured using a SeaBird Electronics SBE-19 Plus CTD profiling instrument.

2.3.5 Sample Collection Completeness

Upon completion of the CTD cast, the Field Quality Assurance (QA) Officer completed the station-specific Special Study QA/QC checklist to ensure both the completeness and accuracy of the field data logs and analytical samples (Appendix B). Once the dataset was deemed complete by the Field QA Officer, the field team proceeded to the next station.

2.3.6 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, HDPE bottles. The Niskin bottle was also soaked and rinsed thoroughly with the site water at each station before sample collection.

3.0 SAMPLE HANDLING AND ANALYSES

3.1 *In Situ* Analysis

Surface water field measurements were taken twice at each station for pH, salinity, and temperature using a YSI Pro Plus data sonde. Additionally, a CTD profile of the water column was completed after discrete water sample collection. Measurement accuracy for *in situ* water quality measurements is provided in Table 3-1; instrument details are provided in the project-specific SAP/QAPP (Appendix A; Amec Foster Wheeler, 2016a).

Table 3-1.
***In Situ* Analytical Methods and Measurement Accuracy**

Water Quality Measurement	Method	Method Accuracy
Salinity	SBE-19 Plus CTD and YSI Pro Plus	± 0.1 ppt
Temperature	SBE-19 Plus CTD and YSI Pro Plus	± 0.1 °C
pH	SBE-19 Plus CTD and YSI Pro Plus	± 0.1 pH unit
Dissolved Oxygen	SBE-19 Plus CTD	± 0.1 mg/L
Light Transmittance	SBE-19 Plus CTD	± 0.1 %

Notes:

± = plus or minus; % = percent; °C = degrees Celsius; CTD = conductivity, temperature, depth; mg/L = milligrams per liter; pH = hydrogen ion concentration; ppt = part(s) per thousand; SBE = SeaBird Electronics; YSI = YSI Incorporated

3.2 Analytical Analyses

Samples were analyzed for total and dissolved copper, total and dissolved zinc, TOC, and DOC, following certified United States Environmental Protection Agency (USEPA) or Standard Method (SM) test methods. Test methods and reporting limits are provided in Table 3-2; method selection and justification are provided in the 2016 SIYB TMDL Monitoring Plan (Amec Foster Wheeler, 2016c). The Special Study included analysis of TSS to encompass all parameters necessary to assess bioavailability using the Biotic Ligand Model (BLM)⁵, in case this evaluation is desired in the future.

3.3 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) in accordance with the Special Study SAP/QAPP (Amec Foster Wheeler, 2016a) and with the annual SIYB TMDL Monitoring Plan (Amec Foster Wheeler, 2016c). COC procedures were used for all samples throughout the collection, transport, and analytical process. Completed COC forms are provided in Appendix C. For more information regarding COC procedures, refer to the project-specific SAP/QAPP (Amec Foster Wheeler, 2016a; Appendix A).

⁵ Parameters required for the Copper BLM published in 2003 (USEPA, 2003a). In 2016, the USEPA published an update to the Copper BLM; this model does not include TSS as a parameter.

Table 3-2.
Laboratory Analytical Methods and Detection Limits

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Total Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Dissolved Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Total Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
Dissolved Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
TOC	SM 5310 B	0.016 mg/L	0.10 mg/L
DOC	SM 5310 B	0.016 mg/L	0.10 mg/L
TSS	SM 2540 D	1.0 mg/L	5.0 mg/L

Notes:

µg/L = microgram(s) per liter; DOC = dissolved organic carbon; mg/L = milligram(s) per liter;

pH = hydrogen ion concentration; SM = Standard Method; TOC = total organic carbon; TSS = total suspended solids;

USEPA = United States Environmental Protection Agency

3.4 Data Review and Management

Field and laboratory data were reviewed for completeness and accuracy prior to analysis and reporting, and were stored in a database, as described in Sections 3.4.1 and 3.4.2.

3.4.1 Data Review

After each sampling day, field data sheets were checked for completeness and accuracy by the field crew and the Field QA Officer. In addition, all sample COC forms were checked against sample labels at the end of the day. In the laboratory, technicians documented sample receipt and sample preparation activities in laboratory logbooks or on bench sheets. Data validation included use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and quality control (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.

3.4.2 Data Management

All laboratory supplied analytical results were provided as Adobe Portable Data Format (PDF) files. Analytical laboratory results were reviewed by the Weck QA/QC Officer, and then forwarded to Amec Foster Wheeler for review and reporting. All laboratory records are provided in Appendix D.

3.5 Data Analysis

Analysis of water quality data includes included calculations of average surface, mid-depth, and bottom water dissolved copper concentrations. Measured values were compared to the California Toxics Rule (CTR) dissolved copper criterion continuous concentration (CCC) WQO of 3.1 micrograms per liter ($\mu\text{g/L}$). Two average basin-wide calculations are presented:

1. The arithmetic average of dissolved copper, which includes a straight mean (i.e., each sample is evenly weighted) of all samples (excluding replicates) within SIYB. This method is used for calculating the annual SIYB TMDL average.
2. The depth-weighted average⁶ of dissolved copper, which allows more influence for the mid-depth layer of the water column. The effect of the mid-depth layer is variable, depending on location in the basin (i.e., station depth), while the volumes of the surface and bottom-water layers were assumed to be fixed. Although the continuous profile of dissolved copper in the water column at each station is unknown, the depth-weighted average may provide a more realistic representation of the water column (based on hydrodynamics) than the arithmetic average of each sampling station.

The horizontal and vertical distribution of dissolved copper was also plotted geographically to compare dissolved copper concentrations throughout the basin.

⁶ The depth-weighted average was calculated with the following assumptions: (1) the surface sample represented the top 3 feet at any given point in SIYB; (2) the bottom sample represented the bottom 3 feet; and (3) the mid-depth section represented the distance in-between the surface and bottom "layers." For example, if a station was 15 feet deep, the mid-depth layer represented 9 feet of the water column.

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4.0 RESULTS

This section discusses and summarizes the *in situ* measurements and analytical chemistry results of the August 2016 Special Study. Detailed laboratory reports are in Appendix D, and field data forms are in Appendix E.

4.1 *In situ* Measurements

Upon arrival on station, the field team determined depth using a lead line and water clarity using a Secchi disk. Surface water quality indicators were measured using a YSI data sonde. *In situ* measurements were taken twice while on station: upon arrival and after the completion of water sample collection. The range of each indicator within the basin is presented in Table 4-1. A complete summary of all measurements is provided in Appendix F.

A SBE-19 Plus CTD instrument was used to capture the full vertical profile of water quality indicators: pH, DO, temperature, salinity, and light transmittance. The range of each indicator within the basin using the CTD is presented in Table 4-1 and the text below. Continuous measurements were recorded from the surface to the bottom at each station, and data were bin averaged in 1-foot increments. The full set of CTD vertical profiles figures are provided in Appendix F.

Table 4-1.
Range of Water Quality Measurements

Binned Depth	Temperature (°C)	pH	DO (mg/L)	Salinity (ppt)	Light Transmittance (%)
Surface ^a	21.0 – 22.5	8.04 – 8.15	NA	32.2 – 33.4	NA
Top ^b	20.9 – 22.7	7.97 – 8.08	5.86 – 7.14	33.4 – 33.8	51.7 – 84.2
Mid-Depth ^{b,c}	20.0 – 21.9	8.00 – 8.10	4.64 – 7.13	33.6 – 34.0	53.2 – 80.0
Bottom ^b	18.6 – 21.8	7.95 – 8.07	3.93 – 6.90	33.1 – 34.5	13.8 – 74.8

Notes:

°C = degrees Celsius; mg/L = milligrams per liter; NA = not applicable; ppt = parts per thousand; % = percent

a Measurements indicate the range of *in situ* surface readings using the YSI data sonde within SIYB (SIYB-REF is not included).

b Measurements indicate the range of binned CTD data for each sample depth. Top represents the average of the top 3 feet of each measurement; bottom represents the bottom 3 feet; and mid-depth represents the ranges of the average of all measurements in between the top and bottom ranges. SIYB-REF values are not included in these calculations.

In situ measurements are discussed in more detail below.

Temperature

Temperatures varied across the basin; cooler temperatures were generally observed at stations closer to the mouth, and warmer temperatures toward the head of SIYB. Nearly all stations had the warmest temperatures at the surface, with a gradual decrease with depth; however, differences between top and bottom were generally around 1–2°C. Although thermoclines are known to be present within this geographic area (especially in summer months), strong thermoclines were not necessarily present at all stations.

Examples are as follows:

- At station SIYB-1, the station depth was approximately 18 feet, and the beginning of a thermocline was present at approximately 5 feet. In comparison, station SS-02 (also approximately 18 feet in depth) displayed a sharp thermocline at approximately 11–12 feet of depth. Stations SIYB-1 and SS-02 are closely located, although station SS-02 was within a narrow fairway, and station SIYB-1 was in more open water. Samples were collected on different days, but around the same time relative to the tides. Figure 4-1 displays the temperature profiles for stations SIYB-1 and SS-02, respectively.

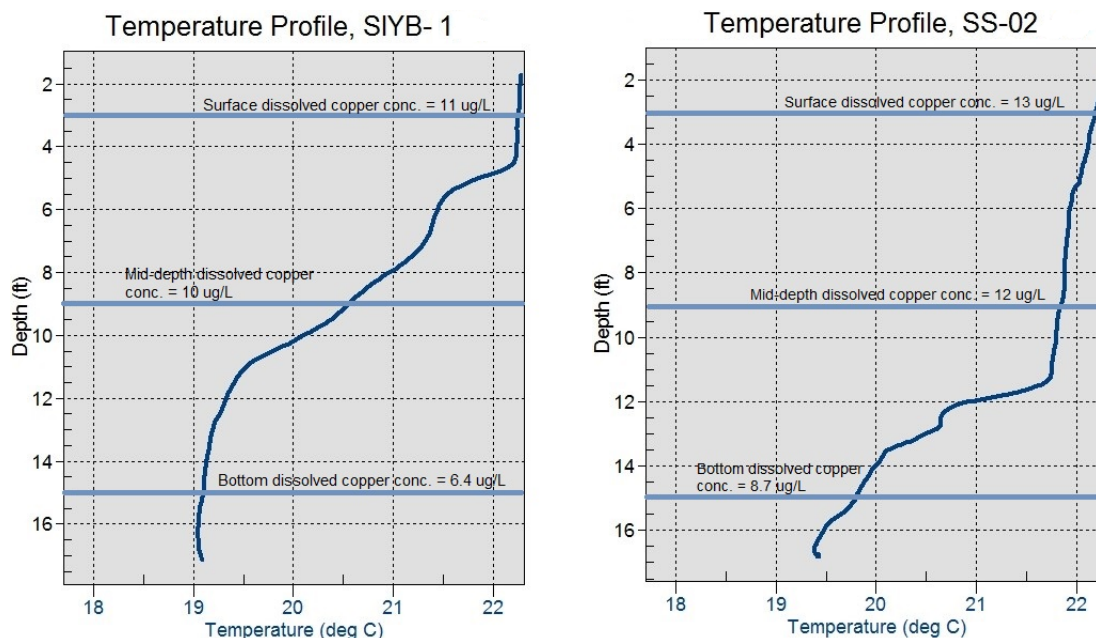


Figure 4-1. Temperature Profile at Stations SIYB-1 and SS-02

Horizontal blue lines represent each sample depth.

- At station SS-06, located deep in a marina and away from open water, there was no apparent thermocline. The temperature was consistent through the entire water column (station depth was approximately 13 feet at time of sampling). Notably, dissolved copper concentrations slightly increased with depth at this station, a result that is the opposite of what was observed at most other locations. Figure 4-2 displays the temperature profile at this station.

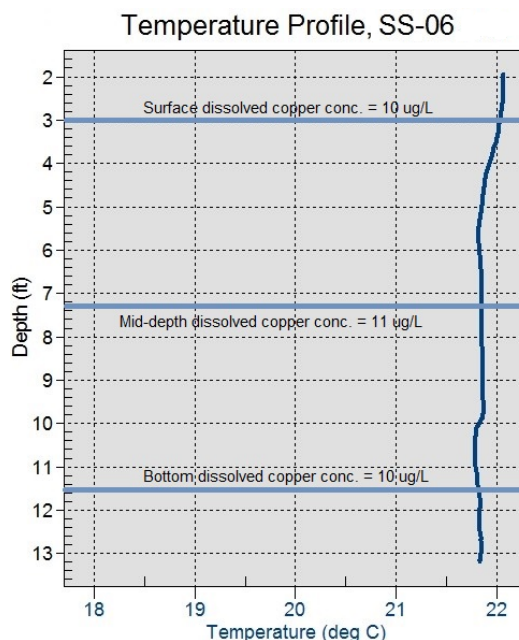


Figure 4-2. Temperature Profile at Station SS-06

Horizontal blue lines represent each sampling depth.

- Station SIYB-6, located close to the mouth of SIYB, was a well-mixed station that had a steady slight decrease in temperature with depth, but no distinct thermocline. Notably, the dissolved copper concentrations at this station were consistent throughout the entire water column (the mid-depth sample had the highest concentration by 0.2 µg/L). Figure 4-3 displays the temperature profile at this station.

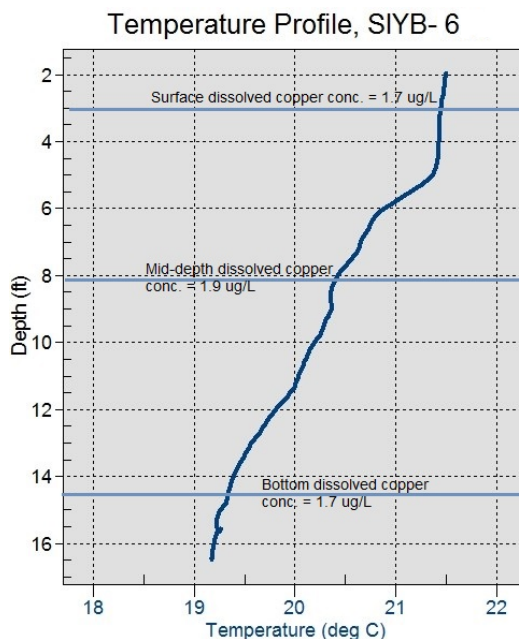


Figure 4-3. Temperature Profile at Station SIYB-6

Horizontal blue lines represent each sampling depth.

Overall, there was no observed pattern between dissolved copper levels and the presence or strength of a thermocline in the water column.

Dissolved Oxygen

DO tended to decrease with depth, particularly at stations closer to the head of the basin. A decrease in DO occurred at stations SIYB-1, SS-02, SS-04, and SS-06 (Figure 4-4).

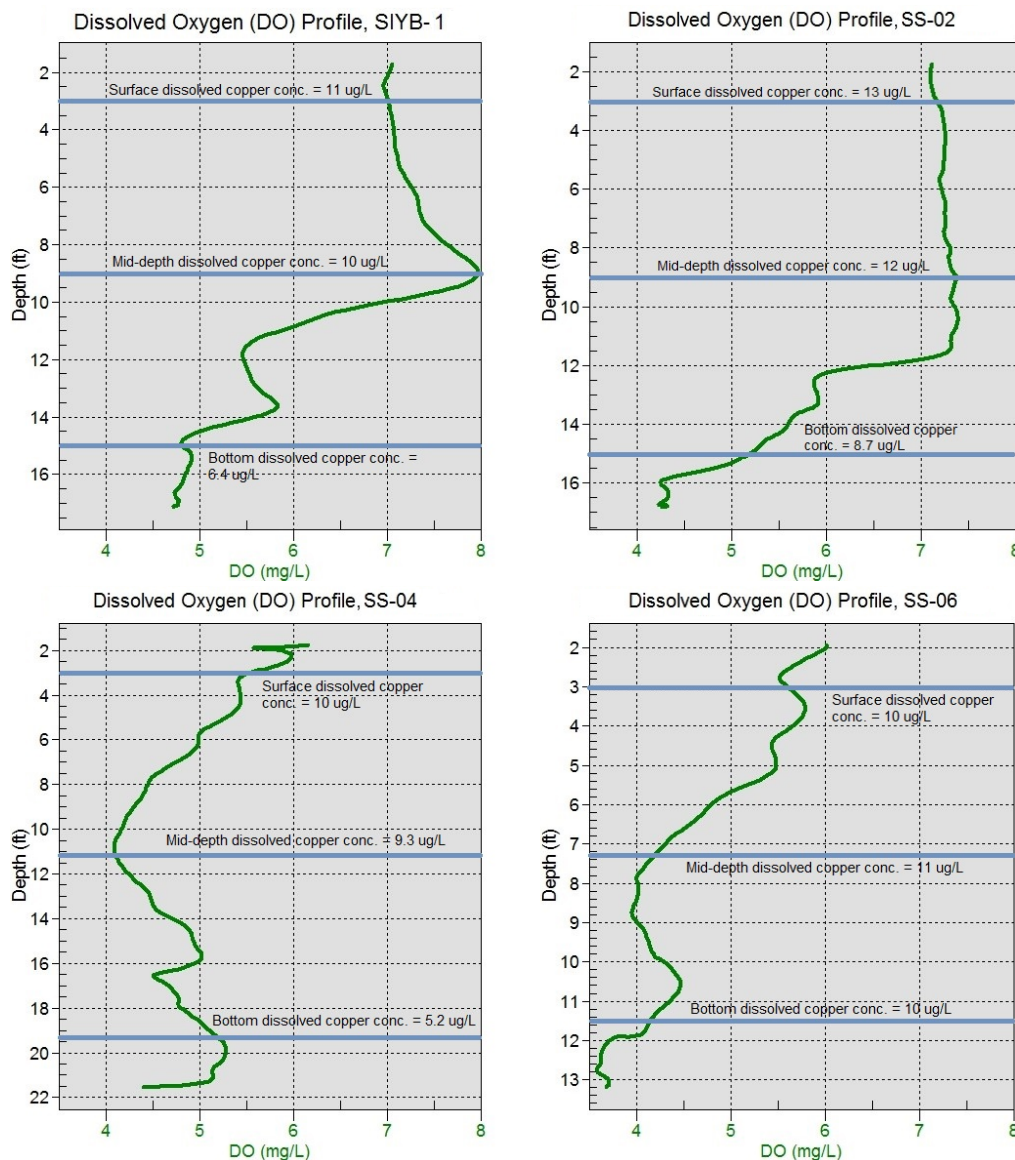


Figure 4-4. DO Profiles at Stations SIYB-1, SS-02, SS-04, and SS-06

Horizontal blue lines represent each sampling depth.

Stations closer to the mouth of the basin generally had stable DO profiles throughout the water column. For example, the DO profile for station SIYB-6, located at the mouth of the basin, is shown in Figure 4-5. Overall, there was no observable pattern between dissolved copper concentrations and dissolved oxygen levels.

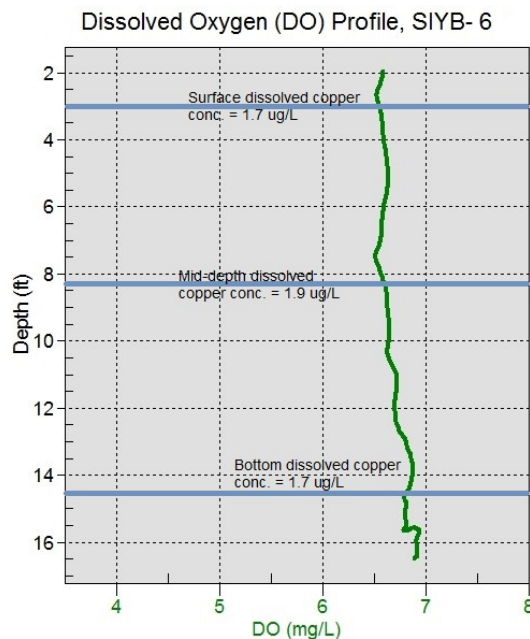


Figure 4-5. DO Profiles at Station SIYB-6

Horizontal blue lines represent each sampling depth.

Salinity

Salinity varied little with depth and across the basin, generally less than 1 part per thousand (ppt) from top to bottom at all stations, including the reference station. Surface salinities ranged from 33.3 to 33.8 ppt, mid-depth salinities ranged from 33.6 to 33.9 ppt, and bottom depth salinities ranged from 32.2 to 34.8 ppt. At the reference station, salinity ranged from 33.5 to 33.7 ppt.

pH

Measures of pH were largely consistent with depth across all stations, differing by no more than 0.1 unit from top to bottom at any station. Across all stations and depths within SIYB, pH ranged from approximately 8.0 to 8.1. At the reference station, pH remained at approximately 8.1 throughout the water column.

Light Transmissivity

Measures of light transmissivity varied throughout SIYB, both horizontally and vertically. Stations that were located closer to the head or within marinas tended to see greater decreases between the surface and bottom; the stations with the most pronounced changes included stations SIYB-1 (81 percent [%] at the surface; 14% at the bottom) and SS-03 (84% at the surface. 52% at the bottom) (Figure 4-6). Stations located closer to the mouth showed more consistent values between the surface and bottom (e.g., stations SIYB-6 and SS-12, Figure 4-7). Across all stations within SIYB, light transmittance measurements ranged from 52% to 84% within surface waters, 54% to 80% in the mid-depth waters, and 14% to 75% in the bottom waters. At the reference station, light transmittance ranged from 77 to 80%.

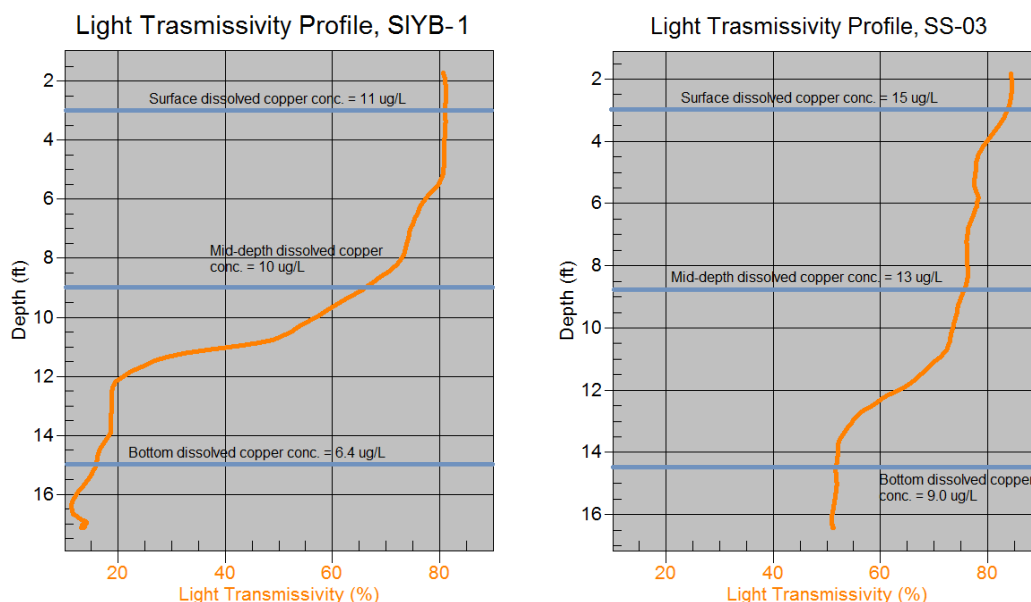


Figure 4-6. Light Transmissivity at Stations SIYB-1 and SS-03
Horizontal blue lines represent each sampling depth.

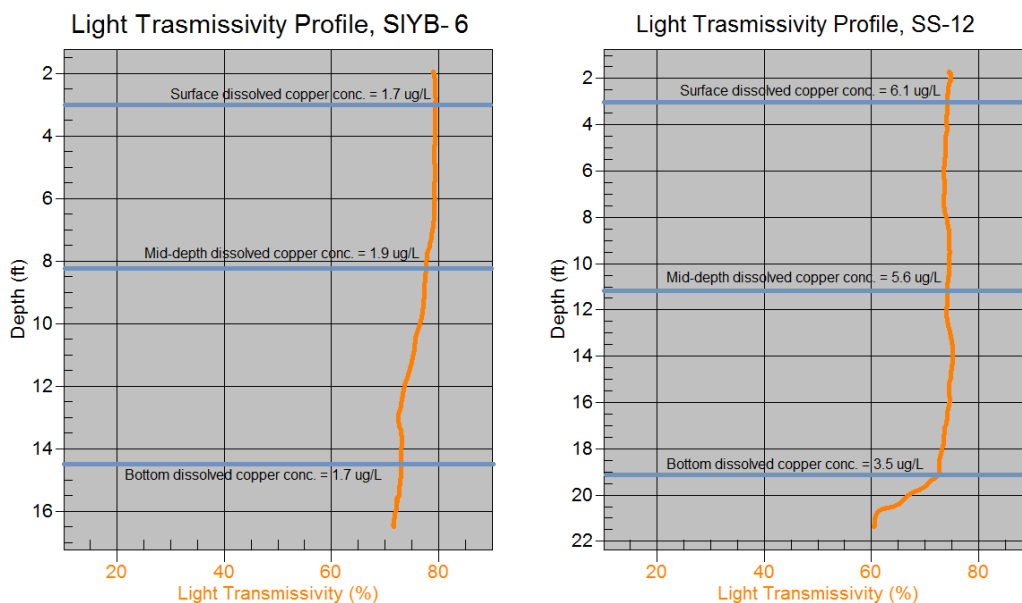


Figure 4-7. Light Transmissivity at Stations SIYB-6 and SS-12
Horizontal blue lines represent each sampling depth.

4.2 Analytical Chemistry

Water samples were collected on August 23–25, 2016, at three distinct depths at 18 stations within SIYB, and one reference station in San Diego Bay. Water samples were tested for concentrations of total and dissolved copper and zinc, TOC, DOC, and TSS. Analytical results of the survey are presented in Table 4-2. A QA/QC summary of all analytical laboratory data is provided in Section 7. The chemistry results reports submitted by the analytical laboratory are provided in Appendix D.

Table 4-2.
Special Study Water Chemistry Results

Collection Depth	Station	Date Sampled	Collection Depth Below Surface (ft)	Copper, Dissolved (µg/L)	Copper, Total (µg/L)	Zinc, Dissolved (µg/L)	Zinc, Total (µg/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
Surface Stations (collected 1 meter from the surface)	SIYB-REF	8/23/2016	3.0	1.5	2.2	5.7	6.5	1.3	1.4	14
	SIYB-1	8/23/2016	3.0	11	13	30	30	1.2	1.5	12
	SIYB-1 (REP)	8/23/2016	3.0	12	13	31	31	1.2	1.5	14
	SIYB-2	8/23/2016	3.0	8.9	10	23	24	1.3	1.5	21
	SIYB-3	8/23/2016	3.0	9.2	11	24	24	1.3	1.6	7.0
	SIYB-4	8/23/2016	3.0	8.5	9.7	22	23	1.2	1.6	10
	SIYB-5	8/23/2016	3.0	3.3	4.0	9.5	10	1.2	1.3	13
	SIYB-6	8/23/2016	3.0	1.7	2.3	5.3	5.6	1.2	1.2	14
	SS-01-T	8/24/2016	3.0	15	16	34	34	1.3	1.2	11
	SS-03-T	8/24/2016	3.0	15	17	30	30	1.3	1.2	11
	SS-05-T	8/24/2016	3.0	6.9	7.9	16	17	1.4	1.4	15
	SS-07-T	8/24/2016	3.0	10	11	23	23	1.3	1.3	15
	SS-07-T (REP)	8/24/2016	3.0	9.0	9.4	20	20	1.4	1.3	14
	SS-09-T	8/24/2016	3.0	9.0	9.3	23	22	1.2	1.2	8.0
	SS-11-T	8/24/2016	3.0	8.4	9.0	21	20	1.3	1.2	12
	SS-02-T	8/25/2016	3.0	13	14	33	35	1.7	1.5	11
	SS-04-T	8/25/2016	3.0	10	11	24	25	1.3	1.5	14
	SS-04-T (REP)	8/25/2016	3.0	14	14	31	33	1.4	1.5	14
	SS-06-T	8/25/2016	3.0	10	11	25	26	1.4	1.4	13
	SS-08-T	8/25/2016	3.0	6.4	7.4	15	17	1.5	1.7	15
	SS-10-T	8/25/2016	3.0	9.3	10	23	24	1.4	1.5	14
	SS-12-T	8/25/2016	3.0	6.1	6.6	15	16	1.4	1.5	11
Surface Arithmetic Average:				9.0	10	22	23	1.3	1.4	13
Mid-Depth Stations (collected mid-column)	SIYB-REF-M	8/23/2016	33.5	1.1	1.4	3.1	4.2	1.2	1.3	13
	SIYB-1-M	8/23/2016	9.0	10	11	24	25	1.2	1.5	13
	SIYB-1-M (REP)	8/23/2016	9.0	9.7	11	24	25	1.2	1.5	12
	SIYB-2-M	8/23/2016	7.5	9.7	11	22	24	1.2	1.4	14
	SIYB-3-M	8/23/2016	11	6.7	7.6	16	17	1.3	1.5	14
	SIYB-4-M	8/23/2016	8.8	7.2	8.0	17	18	1.2	1.5	15
	SIYB-5-M	8/23/2016	9.0	3.1	3.7	7.8	8.8	1.2	1.4	14
	SIYB-6-M	8/23/2016	8.2	1.9	2.3	4.6	5.9	1.2	1.3	14
	SS-01-M	8/24/2016	9.0	15	16	34	33	1.3	1.2	13
	SS-03-M	8/24/2016	8.8	13	15	28	27	1.3	1.3	13
	SS-05-M	8/24/2016	7.8	6.9	7.8	16	17	1.4	1.4	10
	SS-07-M	8/24/2016	10.8	7.5	7.8	18	17	1.3	1.3	12
	SS-07-M (REP)	8/24/2016	10.8	6.6	6.7	20	15	1.3	1.3	12
	SS-09-M	8/24/2016	11.2	8.8	9.0	22	21	1.3	1.2	14
	SS-11-M	8/24/2016	9.6	7.9	8.2	19	18	1.3	1.2	16
	SS-02-M	8/25/2016	9.0	12	14	32	34	1.4	1.5	15
	SS-04-M	8/25/2016	11.2	9.3	10	22	24	1.4	1.5	11
	SS-04-M (REP)	8/25/2016	11.2	10	11	24	26	1.4	1.5	16
	SS-06-M	8/25/2016	7.3	11	11	26	28	1.4	1.4	15
	SS-08-M	8/25/2016	6.4	6.4	7.6	15	17	1.5	1.8	13
	SS-10-M	8/25/2016	11.2	6.0	6.7	15	16	1.3	1.5	12
	SS-12-M	8/25/2016	11.2	5.6	6.4	14	16	1.4	1.4	14
Mid-Depth Arithmetic Average:				8.2	9.1	20	20	1.3	1.4	13
Bottom Stations (collected 1 meter from bottom)	SIYB-REF-B	8/23/2016	64.0	1.1	1.0	1.7	2.8	1.1	1.4	8.0
	SIYB-1-B	8/23/2016	15.0	6.4	7.6	15	17	1.3	1.7	13
	SIYB-1-B (REP)	8/23/2016	15.0	4.4	6	10	12	1.3	1.7	18
	SIYB-2-B	8/23/2016	12.0	7.0	8.3	17	19	1.2	1.4	14
	SIYB-3-B	8/23/2016	19.0	3.1	3.8	7.6	8.8	1.2	1.4	14
	SIYB-4-B	8/23/2016	15.0	4.3	5.0	9.9	11	1.2	1.5	7.0
	SIYB-5-B	8/23/2016	12.0	1.9	2.5	4.6	5.8	1.1	1.3	14
	SIYB-6-B	8/23/2016	14.5	1.7	2.1	4.4	5.3	1.1	1.3	14
	SS-01-B	8/24/2016	13.3	14	15	31	30	1.3	1.3	15
	SS-03-B	8/24/2016	14.5	9.0	9.8	20	20	1.3	1.3	14
	SS-05-B	8/24/2016	12.5	4.1	4.9	10	11	1.5	1.5	18
	SS-07-B	8/24/2016	18.5	2.9	3.3	7.1	7.3	1.3	1.3	14
	SS-07-B (REP)	8/24/2016	18.5	3.8	4.2	9.2	9.4	1.3	1.6	14
	SS-09-B	8/24/2016	19.3	4.4	4.6	11	11	1.3	1.5	16
	SS-11-B	8/24/2016	16.3	4.2	4.4	10	9.9	1.4	1.5	16

Table 4-2.
Special Study Water Chemistry Results (Continued)

Collection Depth	Station	Date Sampled	Collection Depth Below Surface (ft)	Copper, Dissolved µg/L	Copper, Total µg/L	Zinc, Dissolved µg/L	Zinc, Total µg/L	DOC mg/L	TOC mg/L	TSS mg/L
Bottom Stations (collected 1 meter from bottom) (continued)	SS-02-B	8/25/2016	15.0	8.7	10	22	24	1.4	1.5	14
	SS-04-B	8/25/2016	19.3	5.2	5.9	12	13	1.6	1.7	15
	SS-04-B (REP)	8/25/2016	19.3	5.2	6.2	12	14	1.4	1.7	16
	SS-06-B*	8/25/2016	11.5	11	9.5	27	28	1.3	1.5	13
	SS-08-B*	8/25/2016	9.8	5.7	4.6	13	13	1.5	1.8	16
	SS-10-B*	8/25/2016	19.3	3.8	1.7	9.2	7.8	1.3	1.5	11
	SS-12-B*	8/25/2016	19.3	3.5	1.8	8.6	7.7	1.3	1.5	12
Bottom Arithmetic Average:				5.6	5.8	13	14	1.3	1.5	14
Basin-wide Arithmetic Average:				7.6	8.3	18	19	1.3	1.4	13
Basin-wide Depth-weighted Average:				7.9	8.7	19	20	1.3	1.4	13

Notes:
DOC = dissolved organic carbon; TOC = total organic carbon; TSS = total suspended solids; µg/L = micrograms per liter; mg/L = milligrams per liter
Reference station (SIYB-REF) and replicate stations (REP) are not included in mean calculations.
*Identified by the Analytical QA Officer for follow-up. Refer to Section 6 for more information regarding these results.

4.2.1 Copper and Zinc Results

This section discusses total and dissolved copper and zinc results.

Dissolved Copper – Dissolved copper concentrations within SIYB ranged from 1.7 to 15 µg/L. The lowest concentrations within the basin occurred in the surface and bottom samples at the outermost station (SIYB-6); the highest levels were recorded in surface and mid-depth level samples at the innermost station (SS-01). The concentrations of dissolved copper in samples at the reference station (SIYB-REF) ranged from 1.1 µg/L in the bottom and mid-depth samples to 1.5 µg/L in the surface sample. Dissolved copper concentrations in samples at approximately 88% of stations within SIYB exceeded the dissolved copper USEPA National Recommended Water Quality CCC of 3.1 µg/L. The range of dissolved copper among surface, mid-depth, and deep stations is presented in Figure 4-8.

Overall, the distribution of dissolved copper in SIYB was similar to trends observed in previous SIYB-wide studies (i.e., previous TMDL monitoring events; Neira et al., 2009; Bosse et al., 2014). An overall gradient of dissolved copper concentrations was observed from the mouth (lower concentrations) to the head (higher concentrations) of SIYB, specifically along the southern boundary of the basin along the marinas. Across the basin, this gradient was present for all three of the sampling depths. Additionally, dissolved copper concentrations generally decreased between surface stations and bottom stations. Stations closer to the basin mouth tended to have higher differentials of dissolved copper between the surface and bottom, although at some stations, this pattern was not observed.

The following are instances where these general patterns were not followed:

- Stations SS-11 and SS-12 had elevated dissolved copper concentrations at all three depths, as compared with other stations near the mouth of the basin (i.e., SIYB-6). The difference in concentrations may be due to tidal influence (at both Stations SS-11 and SS-12, samples were collected at slack low tide, while at station SIYB-6, samples were collected during an incoming tide; see discussion regarding tides below), hydrodynamic effect from varying bathymetry, or another undetermined source.
- Stations SS-01, SS-06, and SIYB-6 showed very little stratification of dissolved copper concentrations within the basin. At station SS-01, concentrations differed by only 1 µg/L between the surface and mid-depth layer to the bottom layer. Station SS-06 showed dissolved copper concentrations that were lowest at the surface, and increased in the mid-water and bottom depth samples by 1 µg/L. As in previous TMDL monitoring events, station SIYB-6 had the overall lowest concentrations of copper within the basin. Concentrations were similar (within 0.2 µg/L) for all three depths.

Other notable observations include the comparison of results at SIYB-5 and Special Study stations SS-07 and SS-10. Dissolved copper concentrations at station SIYB-5 were relatively low compared to those at stations SS-07 and SS-10, although the stations are located near each other in a similar environment and have similar characteristics.

Average Dissolved Copper Concentrations Throughout SIYB

The arithmetic average dissolved copper concentration was calculated basin-wide and for each station depth (excluding the reference station and replicate samples) for comparison with the prior SIYB TMDL monitoring results. The basin-wide average concentration of dissolved copper measured during the Special Study was $7.6 \mu\text{g/L} \pm 0.75 \mu\text{g/L}$ [mean \pm standard error]. The average dissolved copper concentration was $9.0 \mu\text{g/L} \pm 0.81 \mu\text{g/L}$ for all surface water samples, $8.2 \mu\text{g/L} \pm 0.78 \mu\text{g/L}$ for mid-depth samples, and $5.6 \mu\text{g/L} \pm 0.77 \mu\text{g/L}$ for bottom-depth samples.

Additionally, the depth-weighted average of dissolved copper concentrations for the entire basin was also considered. This average assumed that the volume of surface water and deep water remained consistent throughout the basin, while the volume of mid-depth water depended on station depth⁷. Based on these assumptions, the depth-weighted average of dissolved copper in SIYB was calculated to be $7.9 \mu\text{g/L} \pm 0.76 \mu\text{g/L}$.

Total Copper – Total copper concentrations measured in SIYB followed a similar spatial pattern, ranging from $1.7 \mu\text{g/L}$ at the bottom water depth of an outer-basin station (SS-10) to $17 \mu\text{g/L}$ at the water surface at an innermost station (SS-03). The total copper concentrations in samples at the reference station (SIYB-REF) ranged from $1.0 \mu\text{g/L}$ at the water bottom to $2.2 \mu\text{g/L}$ at the water surface. The distribution of total copper among surface, mid-depth, and deep stations is presented along with the distribution of dissolved copper in Figure 4-8.

Total copper concentrations generally followed the same distribution as dissolved copper concentrations. Total copper concentrations were generally within 20% of the dissolved copper concentrations; however, four samples (stations SS-06-B, SS-08-B, SS-10-B, and SS-12-B) all had total copper concentrations that were slightly below their respective dissolved copper fractions. This issue is discussed in the QA/QC Summary (Section 7).

⁷ Per this logic, the volume of surface water represented 17% of water in SIYB, mid-depth water represented 66% of water in SIYB, and bottom water represented 17% of water in SIYB. Concentrations for the SIYB-wide calculation were weighted accordingly.

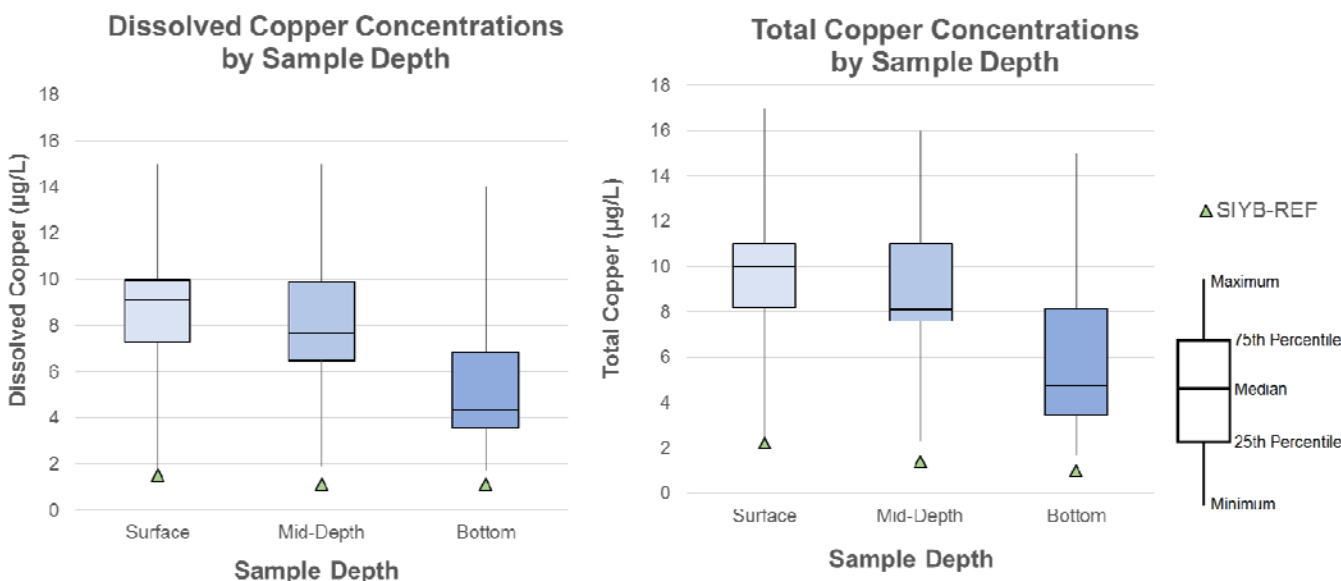


Figure 4-8. Comparison of Dissolved and Total Copper Concentrations Among Sampling Depths

Box plots showing median, 25th percent quartiles, and range of average values

Dissolved and Total Zinc – Dissolved zinc concentrations in SIYB followed a spatial pattern similar to that of dissolved copper concentrations. Concentrations ranged from 4.4 to 34 µg/L within SIYB (lowest at the bottom depth at station SIYB-6 and highest at the surface and mid-depth levels at station SS-01). The concentration at station SIYB-REF ranged from 1.7 µg/L at the bottom to 5.7 µg/L at the surface. All stations showed SIYB levels of dissolved zinc that are well below the USEPA CCC of 81 µg/L. The distribution of dissolved zinc among surface, mid-depth, and deep stations is presented in Figure 4-9.

Total zinc concentrations followed the same spatial pattern, with values ranging from 5.3 µg/L at the bottom depth at station SIYB-6 to 35 µg/L at the surface at station SS-02. The concentration of total zinc at the SIYB-REF station ranged from 2.8 µg/L at the bottom to 6.5 µg/L at the surface. The distribution of total zinc among surface, mid-depth, and deep stations is presented along with the distribution of dissolved zinc in Figure 4-9.

Zinc is commonly used as an alternative biocide in antifoulant paints, and most galvanic anodes are composed of zinc. Therefore zinc, similar to copper, is often associated with boating activities. The Special Study results indicated that total and dissolved zinc levels mostly mirrored the patterns and levels of total and dissolved copper. An overall gradient of total and dissolved zinc was observed from the mouth to the head of SIYB, and decreased from surface to bottom sampling depths. All dissolved zinc concentrations were well below the dissolved zinc CCC of 81 µg/L.

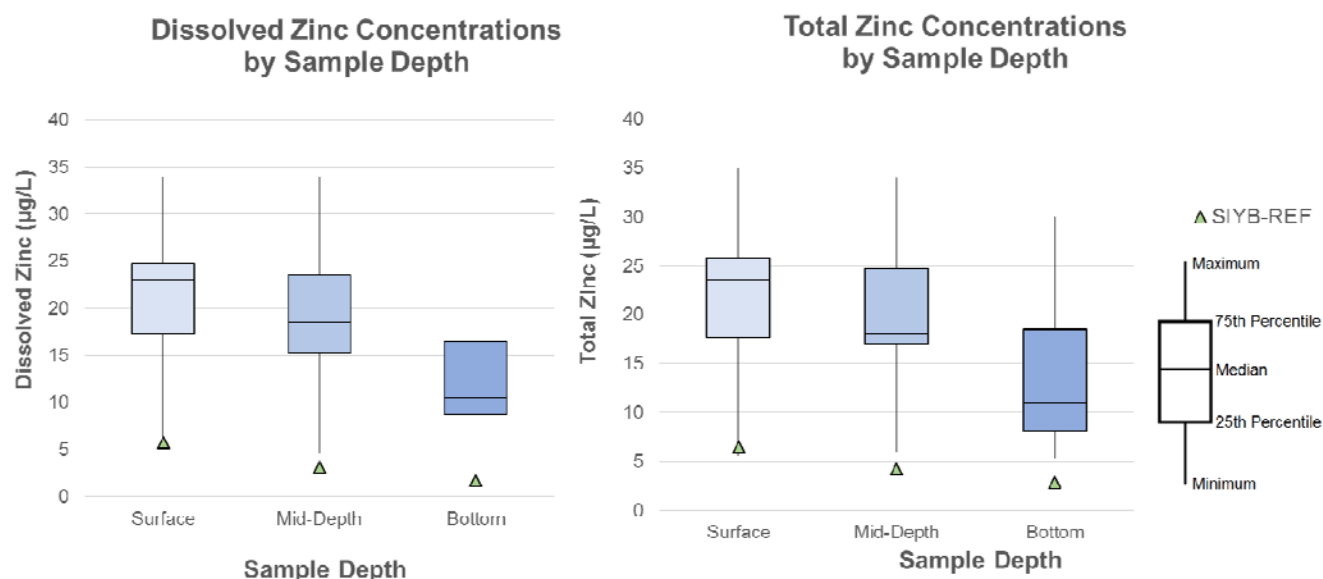


Figure 4-9. Comparison of Dissolved and Total Zinc Concentrations Among Sampling Depths

Box plots showing median, 25th percent quartiles, and range of average values

4.2.2 Organic Carbon and Suspended Solids Results

This section presents the analytical results for DOC, TOC, and TSS.

DOC and TOC – DOC concentrations in the water column, which have been shown to affect the bioavailability of free copper, remained relatively consistent throughout the basin, ranging from 1.1 milligram(s) per liter (mg/L) at the bottom depth at the SIYB-REF station and two outer stations (SIYB-5 and SIYB-6) to 1.7 mg/L at the water surface at station SS-02. The distribution of DOC among surface, mid-depth, and deep stations throughout SIYB is presented in Figure 4-10.

Measured concentrations of TOC were relatively consistent for all samples, ranging from 1.2 mg/L at several stations and depths throughout the basin to 1.8 mg/L (measured at station SS-08). The distribution of TOC among surface, mid-depth, and deep stations throughout SIYB is presented in Figure 4-10.

Unlike copper and zinc, there was no discernible pattern of TOC and DOC throughout the basin. Concentrations of both DOC and TOC remained consistent throughout the entire basin (including all three sampling depths) and the reference station. The majority of stations had DOC concentrations of 1.2 to 1.4 mg/L; the majority of TOC concentrations ranged from 1.3 to 1.5 mg/L.

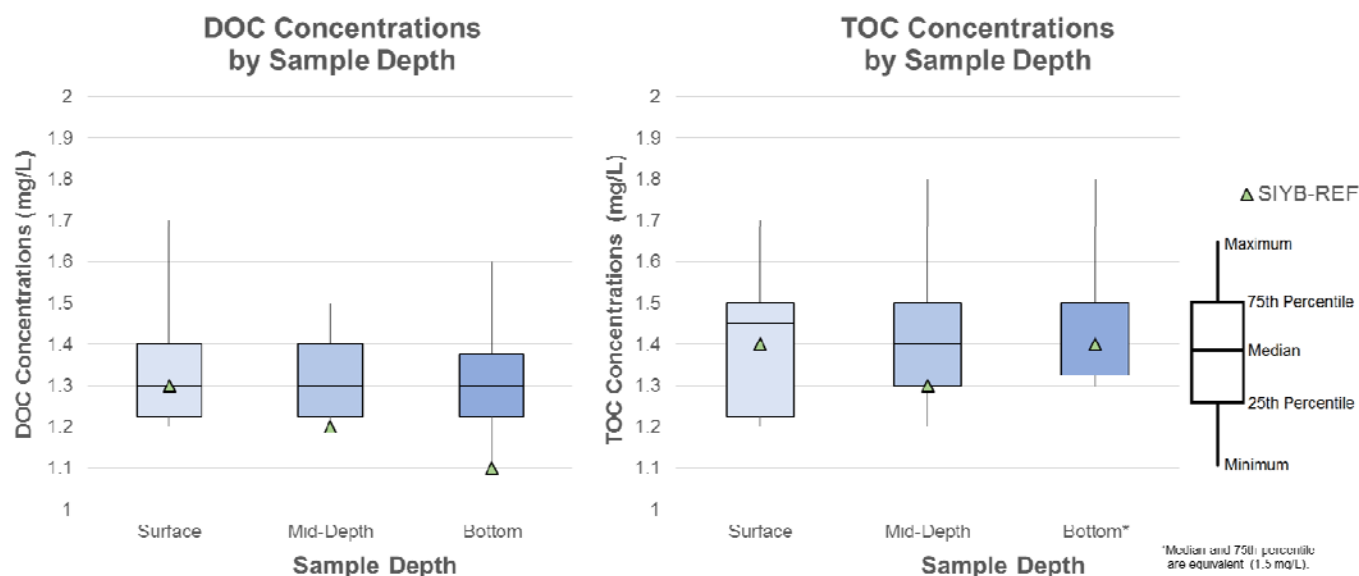


Figure 4-10. Comparison of DOC and TOC Concentrations Among Sampling Depths

Box plots showing median, 25th percent quartiles, and range of average values

TSS – Measured TSS levels were variable throughout the basin, and ranged from 7.0 mg/L to 21 mg/L.

TSS may be influenced by vessel discharge or disturbed sediments; sedimentation in the water column may have a negative impact on aquatic ecology (USEPA, 2003b). Overall, TSS concentrations varied throughout the basin. Most stations had TSS concentrations that ranged from 11 to 15 mg/L. Some stations had relatively low concentrations (i.e., ≤ 8 mg/L) at the surface (SIYB-3, SS-09), and at the bottom (SIYB-4, SIYB-REF). Station SIYB-2 showed a slightly elevated concentration of TSS (as compared to the majority of stations) in the surface sample (21 mg/L). Although Secchi depths were measured at each station, no clear correlation was found between Secchi depth and TSS concentrations. With the exception of the stations noted above, TSS concentrations in the bottom samples were nearly the same as concentrations in the surface samples and mid-depth samples, indicating that no significant resuspension of sediments was caused by sampling methods. Notably, during the process of filtering water through a 0.45- μ m filter (for dissolved metals analysis), little to no sediment, algae, and/or debris was observed in the filter at any station.

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5.0 DISCUSSION

The goal of the 2016 SIYB Special Study was an enhanced understanding of the recent water quality conditions in SIYB, specifically conditions related to dissolved copper. It is important to note that this Special Study was conducted over a short period of time during the summer months (i.e., dry weather conditions); therefore, the results discussed in this report are considered a snapshot of the conditions during a limited collection timeframe and effort. Specific study limitations are discussed in more detail in Section 6. The Special Study was conducted to coincide with the annual SIYB TMDL monitoring program. As mentioned previously, one of the main goals of this effort is to develop a broader understanding of the basin-wide dissolved copper concentrations in SIYB. Figure 5-1 displays the spatial distribution of dissolved copper throughout the basin.

To accomplish the study goals, a systematic sampling grid design was used to incorporate the existing SIYB TMDL monitoring stations and supplement the coverage of the basin with Special Study stations. Special Study stations were placed systematically using the grid design to eliminate location bias and to provide robust coverage of the basin. Although some station locations had to be modified (because of logistical reasons or safety concerns), the modified station locations were in areas that represented the environmental characteristics of the original location. Additionally, a vertical component was incorporated into the Special Study to allow for more thorough spatial assessment of dissolved copper levels throughout the basin and to better align with the MAMPEC model. Overall, this Special Study sampling scheme provided a substantial dataset of water quality information in addition to the annual SIYB TMDL monitoring results, to more thoroughly characterize existing basin-wide conditions.

The findings of this Special Study are discussed in relation to the two study objectives below.

1. Develop an enhanced understanding of the basin-wide characteristics of dissolved copper in SIYB that complements existing water quality information generated by the annual SIYB TMDL monitoring and other studies. Additionally, reassess whether the existing annual SIYB TMDL monitoring program is sufficient to provide an accurate assessment of basin-wide conditions, or whether modifications should be considered.

The Special Study confirmed that dissolved copper concentrations generally increased from the mouth to the head of SIYB. Additionally, dissolved copper concentrations in surface and mid-water samples tended to be higher than concentrations in the bottom water samples. These differences in concentrations may be explained in part by reduced tidal flushing and vertical water mixing in areas near the head of the basin. Higher concentrations may be explained in part by higher quantities of vessels near the head of the basin, because elevated concentrations were observed closer to vessels, regardless of sampling depth. Dissolved copper concentrations tended to be lower and more similar from surface to bottom at stations closer to the basin mouth, likely because of greater tidal flushing and a lower density of vessels. The overall spatial distribution of dissolved copper in the water column was similar to the patterns observed in previous studies by both Neira et al. (2009) and Bosse et al. (2014).

The sampling depth and overall basin-wide average concentrations of dissolved copper in SIYB are presented in Table 5-1.

Table 5-1.
Basin-Wide Average Dissolved Copper Concentrations

[mean ± standard error]

Sampling Depth	Dissolved Copper (µg/L)	
	Arithmetic Mean	Depth-Weighted Mean
Surface	9.0 ± 0.81	NA
Mid-Depth	8.2 ± 0.78	NA
Bottom	5.6 ± 0.77	NA
SIYB-wide	7.6 ± 0.75	7.9 ± 0.76

Notes:

µg/L = micrograms per liter; NA = not applicable

The arithmetic mean concentration of dissolved copper was calculated as 7.6 µg/L ± 0.75 µg/L, while the depth-weighted mean was 7.9 µg/L ± 0.76 µg/L. The Neira et al. (2009) study examined the surface and bottom waters of SIYB⁸ using a fixed collection grid sampling scheme, where the average dissolved copper concentration of the surface was 9.1 µg/L ± 0.5 µg/L (9.0 µg/L ± 0.81 µg/L in this study), and the bottom was 4.3 µg/L ± 0.4 µg/L (5.6 µg/L ± 0.77 µg/L in this study). The Bosse et al. (2013) study showed overall lower average concentrations (both basin-wide and for each depth); however, the goals and design of this study were different⁹, and therefore direct comparisons of the calculated average concentrations cannot be made.

The significance of the arithmetic and depth-weighted mean concentrations from the Special Study is discussed below.

Adequacy of the Current SIYB TMDL Sampling Regime

One of the primary goals of this Special Study was to evaluate the adequacy of the SIYB TMDL monitoring stations' ability to characterize dissolved copper throughout SIYB. One of the concerns regarding the SIYB TMDL monitoring stations is whether the sampling regime is representative of basin-wide conditions. To investigate this issue, the Special Study incorporated a fixed collection grid sampling scheme (including the SIYB TMDL monitoring stations) to characterize the basin's recent water quality conditions and calculate a basin-wide average of dissolved copper.

The 2016 SIYB TMDL average concentration of dissolved copper of 7.1 µg/L ± 1.5 µg/L (surface stations only) was compared with the basin-wide arithmetic average (7.6 ± 0.75) of all Special Study stations (including the SIYB TMDL monitoring stations) to assess whether the SIYB TMDL design was representative of the basin-wide conditions. Based upon this evaluation, the basin-wide dissolved copper average concentration is similar to the annual SIYB TMDL result (i.e., within the standard error). This result indicates that the SIYB TMDL sampling regime (surface stations only) may provide a suitable index of basin-wide average dissolved copper concentrations.

⁸ Neira et al., (2009) measured the average dissolved copper concentrations in the surface and bottom waters of SIYB. Surface water samples were taken 30 centimeters below the surface, and bottom samples were collected 30 centimeters above the bay floor.

⁹ Bosse et al. (2014) measured dissolved copper concentrations mostly outside of marinas.

2. Compare the basin-wide dissolved copper levels with the PEC outputs of the MAMPEC model (Amec Foster Wheeler, 2016b).

The 2016 MAMPEC model study indicated that in order to adequately compare dissolved copper PECs with actual conditions, a full water column assessment of SIYB was necessary (Amec Foster Wheeler 2016b). This is because the MAMPEC model calculates PECs for the entire volume of water in the basin, not just the surface waters where the TMDL samples are collected. The initial MAMPEC model study included environmental and emission input variables and several leach rate scenarios specific to SIYB, but one key assumption at this time was that water quality parameters, DOC, and copper concentrations near the surface were representative of the entire water column in SIYB. For this Special Study, the environmental inputs for the MAMPEC model were updated using the refined assessment of the full water column conditions measured during the Special Study. Updated environmental inputs included in the model are provided in Table 5-2.

Table 5-2.
Updated Environmental Input Parameters

Parameter	Initial Study Value	Special Study Input Value	Rationale for Updates
Temperature	22.4 °C	18.7 °C	Value changed to reflect updated basin-wide data.
Salinity	33.4 ppt	33.6 ppt	Value changed to reflect updated basin-wide data.
pH	7.77	8.05	Value changed to reflect updated basin-wide data.
DOC	1.4 mg/L	1.5 mg/L	Value changed to reflect updated basin-wide data.
Tidal height	1.23 m	1.16 m	Tidal height varied through sampling activities, however, this is a static model input. For this study, the average tidal height of the incoming tidal periods during sampling was used.
Background concentration of dissolved copper	0.5 µg/L	1.2 µg/L	The depth-weighted average of dissolved copper concentrations at the reference station was used.

°C = degrees Celsius; ppt = parts per thousand; m = meter; mg/L = milligrams per liter; µg/L = micrograms per liter

While applicable environmental parameters were modified to reflect current conditions, emission parameters (including the number of vessels within the basin and the average hull size) did not change from the initial MAMPEC model study. This was done to keep the emissions source consistent with the previous study and provide a comparison of how environmental parameters affect the model output. Seven leach rate scenarios were developed for the initial study; these scenarios were rerun with the updated environmental parameters. The seven leach rate scenarios and brief descriptions, the original study PECs, and the updated PECs are presented in Table 5-3.

Table 5-3.
Calculated Dissolved Copper PECs by Leach Rate Scenario

Model Scenario	Mean Leach Rate (µg/cm ² /day)	Scenario Description	Average PEC of Dissolved Copper (µg/L) in SIYB	
			Initial MAMPEC Model Study (2016)	Updated using 2016 Special Study Data***
1*	13.7	Assumes all vessels within SIYB are newly painted with high leach rate copper-based hull paints; assumes 100% occupancy.	6.8	9.9
2*	11.6	Assumes all vessels within SIYB are newly painted with high leach rate copper-based hull paints; assumes an occupancy rate of 95%.	5.9	8.6
3*	8.8	Uses the same parameters as in Scenario 2, but includes aged paints (respective leach rate of aged paints is diminished by 50%, per the SIYB TMDL).	4.6	6.8
4*	6.4	Uses the same parameters as in Scenario 2, but includes aged paints (respective leach rate of aged paints is diminished by 90%, as adopted by ISO 10890:2010).	3.4	5.3
5**	9.5	Assumes maximum leach rate permitted for Category I AFPs.	4.7	7.2
6**	6.2	Assumes the mean leach rate of Category I AFPs (≤ 9.5 µg/cm ² /day) from Appendix II of Zhang and Singhasemanon (2014).	3.3	5.1
7**	2.3	Assumes the average of the first quartile of leach rates meeting the Category I criteria (≤ 9.5 µg/cm ² /day) from Appendix II of Zhang and Singhasemanon (2014).	1.6	2.7

Notes:

% = percent; µg/cm²/day = micrograms per square centimeter per day; µg/L = micrograms per liter;

AFP = antifoulant paint; ISO = International Organization for Standardization; PEC = Predicted Environmental Concentration;

SIYB TMDL = Total Maximum Daily Load for Dissolved Copper in the San Diego Shelter Island Yacht Basin

*Mean leach rates for Scenarios 1–4 were calculated by taking the leach rates of paints used on the study data vessels, which were a subset of data from the 2014 SIYB TMDL vessel hull census. Paints were confirmed by product number, with the associated leach rates provided by the California Department of Pesticide Regulation (DPR) (DPR, 2014). The average wetted area of a single vessel was assumed to be 35 square meters, and SIYB was assumed to contain 2,263 vessels. These leach rates do not account for any hull cleaning effects.

**Scenarios 5–7 mean leach rates are derived from a 2014 memorandum from the DPR regarding determination of maximum allowable leach rate for copper AFPs, and its accompanying 2014 study by Xuyang Zhang and Nan Singhasemanon, entitled *Modeling to determine the maximum allowable leach rate for copper-based antifouling products in California marinas* (Zhang and Singhasemanon, 2014). The average wetted area of a single vessel was assumed to be 35 square meters, and SIYB was assumed to contain 2,263 vessels. These leach rates also were adjusted to account for the effects of hull cleaning.

*** The MAMPEC model was rerun to reflect current environmental data collected during the Special Study.

Scenario 3 was presented as the best estimate of the average leach rate of hull paints used on vessels in SIYB in 2014. This average leach rate was calculated to be 8.8 micrograms per square centimeter per day (µg/cm²/day). The results of the updated MAMPEC model run for Scenario 3 estimated the average dissolved copper concentrations in SIYB to be 6.8 µg/L. This value is lower than the basin-wide concentrations measured during this Special Study using the two averaging methods (7.6 to 7.9 µg/L), although the difference between the predicted and actual averaged concentrations is within 1.5 times their standard error ranges. The PEC for this scenario is also in agreement with the 2016 TMDL average concentration of 7.1 µg/L. These results indicate that the MAMPEC model appears to be an adequate tool to predict the relative

changes of dissolved copper within SIYB as the average leach rate of hull paints used within SIYB changes. However, the discrepancy between the measured concentrations during the Special Study and the predicted concentrations of the MAMPEC model results identifies that there is a gap between the model predictions and actual measurements. Although there are certain limitations with nearly all predictive models and water quality studies (see Section 6 for discussion on limitations), part of the discrepancy between the predicted and actual results may be contributed to other sources of dissolved copper. The PEC using Scenario 3¹⁰ does not reflect any dissolved copper source other than the contribution from hull paints; therefore, an investigation of other potential copper sources may be needed. For example, hull cleaning is a known dissolved copper contributor; however, the extent and variability of the contribution to SIYB is not well defined. Contributions of other sources of dissolved copper, including hull cleaning, may need to be further evaluated in order to better compare the measured concentrations of dissolved copper and the MAMPEC model output.

¹⁰ The MAMPEC model has no input for hull cleaning. For the 2016 MAMPEC study, Scenarios 1-4 were presented as actual leach rates derived from the 2014 TMDL hull census data. Scenarios 5-7 present leach rates derived from the Zhang and Singhasemanon study. This study used an adjustment factor for the loading of hull cleaning, and applied the factor to the leach rates calculated from the model. Therefore, the leach rates presented in Scenarios 5-7 account for cleaning effects.

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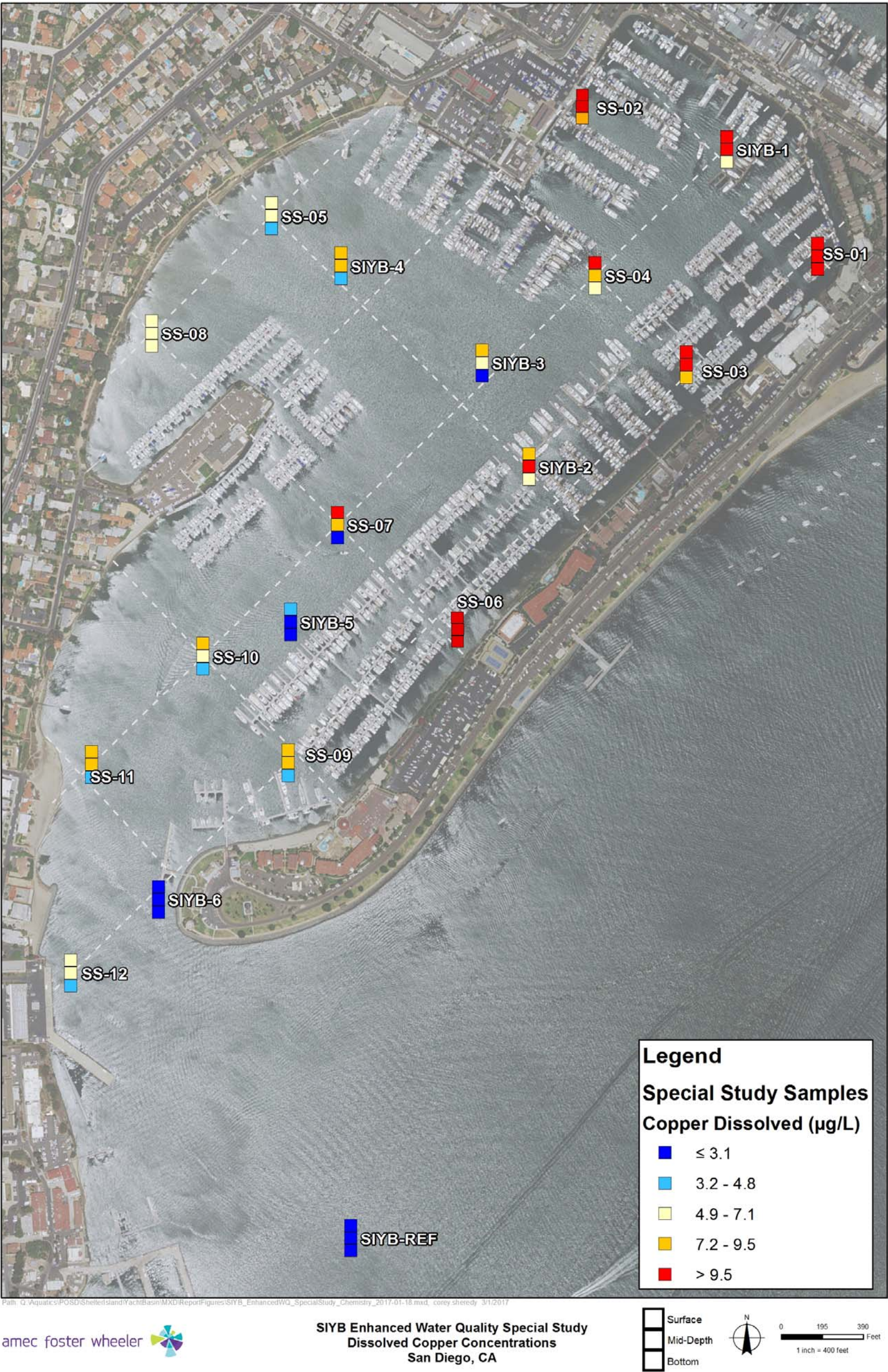


Figure 5-1. Spatial Distribution of Dissolved Copper Concentrations in SIYB

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6.0 STUDY LIMITATIONS AND ASSUMPTIONS

This Special Study was designed to provide information pertaining to two primary study objectives: (1) develop an enhanced understanding of the SIYB-wide water quality characteristics and dissolved copper concentrations, and (2) compare the observed concentrations with the PEC outputs of the MAMPEC model study, completed in 2016 by Amec Foster Wheeler and Chemetrics. The Special Study provides valuable information in the context of the study goals; however, it is important to note data limitations. Any inference made from this study should consider the following:

Limitations in Study Design

- The study design provided a systematic sampling regime to establish adequate spatial coverage throughout the basin. For logistical reasons, sampling occurred over three consecutive days, and most sample collections occurred during similar tidal cycles (i.e., on an incoming tide). Collection methodologies may not allow for temporal effects to be fully captured. Therefore, the study represents a limited snapshot effort (or series of three daily snapshots), and any temporal effects (such as tidal or wind-driven currents) cannot be fully established with the existing datasets. However, it is important to recognize that comparisons of dissolved copper concentrations to previous studies (of which were collected at various times within the tidal cycle) resulted in overall similar dissolved copper concentrations. This may indicate that although tidal influence may affect the gradient of copper concentrations throughout the basin at any particular time, it may not play a meaningful factor in the overall observed dissolved copper concentrations when averaged over time.

Model Limitations

- The MAMPEC model was chosen for its wide acceptance, usage, and adaptability to generic marine environments. However, as with any model, limitations may affect the ability to directly compare model results with the measured ambient conditions (Amec Foster Wheeler 2016b). Specific model limitations are outlined in Section 5 of the MAMPEC model study.
- In-water hull cleaning of copper-containing AFPs is a known contributor of dissolved copper to the water column (Earley et al., 2013). A limitation of using the MAMPEC model is that it does not have an input parameter to account for the dissolved copper contribution as a consequence of in-water hull cleaning. Therefore, dissolved copper contributions from hull cleaning are not directly accounted for in the calculated PEC. In the 2016 MAMPEC Model Study, leach rate Scenarios 1-4 were derived using actual SIYB hull paint data¹¹. Since the PECs for Scenarios 1-4 do not include a hull cleaning component, the model results may be an underestimate of actual dissolved copper concentrations. In contrast, Scenarios 5-7, which were derived directly from the Zhang and Singhasemanon (2014) study, included an adjustment factor for in-water hull cleaning within the leach rates. Therefore, while the dissolved copper leach rates used in Scenarios 5-7 were adjusted for in-water hull cleaning, they do not reflect actual SIYB-specific conditions (i.e., Scenarios 5-7 were based on conceptual information rather than SIYB-specific information).

¹¹ Calculated using a subset of data from the 2014 SIYB TMDL vessel hull census.

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7.0 QA/QC SUMMARY

All samples were submitted to the analytical laboratory on either the same day or the day following collection. All samples were received in good condition at Weck, at or below 4°C and on ice. For the six samples from SIYB TMDL monitoring stations (i.e., surface SIYB-1 through SIYB-6 and SIYB-REF) and reference sample (surface SIYB-REF), samples for dissolved metals analyses were filtered by the laboratory immediately upon receipt. For the remaining Special Study stations (including mid-depth and bottom depth collections at the SIYB TMDL monitoring stations), samples for dissolved metals were filtered in the field using a 0.45-µm acid-rinse bottle top filtration system. Holding time requirements for analysis were met for all samples.

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

The following information summarizes the relevant data QA/QC-related findings associated with the 2016 Special Study.

Metals Data

Dissolved Metals Fraction Exceeded Total Metals

- **Issue** – The dissolved fraction of copper and zinc notably exceeded the levels of total copper and zinc at four stations (SS-06-B, SS-08-B, SS-10-B, and SS-12-B).
- **Explanation and Resolution** – Amec Foster Wheeler acted upon receiving these results from Weck. Field methods were immediately reviewed, and no obvious issue was identified. Amec Foster Wheeler reviewed the COC forms, and Weck provided photographic proof of the sample bottles to confirm that no erroneous switch of dissolved and total analysis labels occurred. Amec Foster Wheeler requested and reviewed the sample check-in log provided by the analytical laboratory. The dissolved metals samples for these four stations were digested and analyzed at a separate time than the remaining Special Study samples. Regardless, the analytical QA/QCs for these four Special Study samples were within the acceptable criteria limits. The reanalysis of these four samples was requested on October 5, 2016, and Amec Foster Wheeler received the results electronically from Weck on October 20, 2016. The dissolved fraction of the samples remained consistent, while the total metals concentrations were overall lower, indicating a larger discrepancy between the dissolved and total metals results. Amec Foster Wheeler exhausted the QA procedures and concluded that the issue is likely due to laboratory contamination, although the issue cannot be confirmed. This QA issue does not affect the remaining Special Study samples, and therefore the remaining data may be used without any further qualifications. The dissolved and total metal results of these four samples have been flagged, but data are used without further qualifications.

Contamination in the Equipment Rinsate Blank

- **Issue** – Elevated levels of total copper and total zinc were observed in the equipment rinsate blank. The level of metals in this QA sample should be very low or non-detect.
- **Explanation and Resolution** – In an initial review of the chemistry results, detectable levels of total metals were noticed in the equipment rinsate blank. This finding was reported to the analytical laboratory. The Niskin bottle used for sample collection was the same piece of equipment that has been used for previous SIYB TMDL monitoring events. Furthermore, prior to the Special Study event, the Niskin bottle was scrubbed with Alconox, thoroughly rinsed deionized water, and sealed in a plastic bag. Prior to the equipment rinsate collection, the Niskin bottle was rinsed again with deionized water. The levels of total copper and total zinc detected in the rinsate were significant enough to justify reanalysis of the sample. Amec Foster Wheeler requested reanalysis of the equipment rinsate blank on August 31, 2016. Weck provided the reanalysis results on September 14, 2016. The total copper concentration in the reanalyzed sample was 0.082 µg/L, and the total zinc concentration was 3.0 µg/L. The Analytical QA Officer determined that the levels of total copper and total zinc had a negligible impact on the study results and conclusions.

8.0 REFERENCES

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Appendix A
2016 SIYB Enhanced Water
Quality Special Study
SAP/QAPP

FINAL

**SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY MONITORING SPECIAL STUDY**

**SAMPLING AND ANALYSIS PLAN AND
QUALITY ASSURANCE PROJECT PLAN**



**Prepared for:
San Diego Unified Port District**



Prepared by:



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

August 2016

TABLE OF CONTENTS

	Page
ACRONYMS AND ABBREVIATIONS	III
UNITS OF MEASURE.....	IV
1.0 INTRODUCTION.....	1-1
2.0 PROJECT MANAGEMENT	2-1
2.1 SAP/QAPP Distribution.....	2-1
2.2 Project Organization	2-1
2.3 Quality Assurance Officers' Roles.....	2-6
3.0 PROJECT BACKGROUND	3-1
3.1 Previous Studies in SIYB	3-1
3.1.1 Bosse et al., 2014	3-1
3.1.2 Neira et al., 2009.....	3-1
3.2 Comparison to the MAMPEC Model Study.....	3-1
3.3 SIYB Dissolved Copper Levels	3-2
4.0 SAMPLING AND ANALYSIS PLAN.....	4-1
4.1 Sampling Design.....	4-1
4.1.1 Sample Collection Stations.....	4-1
4.2 Collection Schedule and Phasing.....	4-5
4.2.1 Annual TMDL Monitoring Stations.....	4-5
4.2.2 Special Study Stations	4-5
4.3 Collection Station Positioning.....	4-7
4.4 Field Collection Procedures	4-7
4.5 Equipment Decontamination and Cleaning	4-10
4.6 Sample Processing, Handling, and Custody	4-10
4.7 Field Sampling Preservation, Packaging, and Shipment	4-10
4.8 Field and Analytical QA/QC Procedures	4-10
4.8.1 Chain-of-Custody Records	4-13
4.9 Analytical Methods.....	4-13
4.10 Data Analysis.....	4-13
4.11 Data Review	4-14
4.12 Data Management	4-15
4.13 Laboratory Quality Assurance and Quality Control.....	4-15
4.14 Health and Safety	4-15
4.14.1 Use of Boats and Working Over Water.....	4-15
5.0 DATA QUALITY	5-1
5.1 Assessments and Response Actions	5-1
5.1.1 Corrective Action Plans	5-1
5.1.2 Criteria Used for Determination of an Out-of-Control Event.....	5-1
5.1.3 Procedures for Stopping Analyses	5-2
5.1.4 Corrective Action.....	5-2
5.2 Data Validation and Usability	5-2
5.3 Verification and Validation Methods	5-3
5.3.1 Database Generation	5-3
5.3.2 Error Checking and Verification.....	5-3
5.4 Reconciliation with User Requirements.....	5-4
5.5 Quality Objectives for Criteria for Measurement of Data.....	5-4

TABLE OF CONTENTS (CONTINUED)

	Page
5.6 Special Training Needs/Certifications.....	5-7
5.6.1 Specialized Training or Certifications	5-7
5.6.2 Training and Certification Documentation.....	5-7
5.6.3 Field Sampling	5-7
5.6.4 Analytical Laboratory.....	5-7
5.6.5 Training Personnel.....	5-7
5.7 Documents and Records.....	5-8
6.0 REPORT PREPARATION	6-1
7.0 REFERENCES.....	7-1

LIST OF TABLES

Table 2-1. SAP/QAPP Distribution List.....	2-1
Table 2-2. Project Personnel Roles and Contact Information	2-3
Table 4-1. Annual TMDL Monitoring Station Coordinates.....	4-2
Table 4-2. Special Study Proposed Sample Collection Locations	4-2
Table 4-3. Sample Collection Schedule Matrix	4-6
Table 4-4. Sample Holding Times	4-11
Table 4-5. Laboratory Analytical Methods and Detection Limits	4-14
Table 5-1. Summary of Data Quality Objectives.....	5-5
Table 5-2. Data Quality Objectives for Laboratory and Field Measurements	5-6

LIST OF FIGURES

Figure 2-1. Project Organization for the Analytical Component	2-4
Figure 2-2. Project Organization for the Field Component.....	2-5
Figure 3-1. SIYB TMDL Annual Monitoring Program Sample Collection Stations.....	3-3
Figure 3-2. Mean Surface Water Basin-wide Dissolved Copper Levels in SIYB TMDL Monitoring Events (2011 – 2015).....	3-5
Figure 3-3. Surface Water Dissolved Copper Levels at SIYB TMDL Monitoring Stations (2011 – 2015).....	3-5
Figure 4-1. Shelter Island Yacht Basin TMDL/Systematic Collection Stations Sampling Network.....	4-3
Figure 4-2. Workflow of Sample Collection Methods	4-9

LIST OF ATTACHMENTS

ATTACHMENT A CHAIN-OF-CUSTODY FORMS

ACRONYMS AND ABBREVIATIONS

Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
APHA	American Public Health Association
Avg.	Average
CD	compact disk
COC	chain-of-custody
CRM	Certified Reference Material
CTD	conductivity, temperature, and depth
Cu	Copper
DI	de-ionized
DO	dissolved oxygen
DOC	dissolved organic carbon
DQO	data quality objective
ELAP	California Environmental Laboratory Accreditation Program
FD	field duplicate
H ₂ SO ₄	sulfuric acid
ID	identification
LCS	laboratory control standard
LD	laboratory duplicate
MAMPEC	Marine Antifoulant Model for Predicting Environmental Concentrations
Merkel	Merkel & Associates
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NIST	National Institute of Standards and Technology
NTU	nephelometric turbidity unit
PEC	Predicted Environmental Concentration
pH	hydrogen ion concentration
PM	Project Manager
Port	Port of San Diego
ppt	parts per thousand
QA	quality assurance
QA/QC	quality assurance and quality control
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QC	quality control
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SBE	SeaBird Electronics
SIYB	Shelter Island Yacht Basin
SM	Standard Methods
SOP	Standard Operating Procedure
SRM	Standard Reference Material
Special Study	Enhanced Water Quality Monitoring Special Study
SWAMP	Surface Water Ambient Monitoring Program
State Board	State Water Resources Control Board
TBD	to be determined
TMDL	total maximum daily load

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TOC	total organic carbon
TSS	total suspended solids
USEPA	U.S. Environmental Protection Agency
Weck	Weck Laboratories, Inc.
WQO	water quality objective
YSI	YSI Incorporated
Zn	zinc

UNITS OF MEASURE

<	less than
±	plus or minus
%	percent
°C	degrees Celsius
µg	microgram(s)
µg/L	micrograms per liter
µm	micrometer(s)
cm	centimeter(s)
mg/L	milligrams per liter
mL	milliliter(s)
m/sec	meters per second
nm	nanometer(s)
ppt	parts per thousand

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) describes a special water quality study, called the Enhanced Water Quality Monitoring Special Study (or Special Study), to be conducted in Shelter Island Yacht Basin (SIYB). The plan was prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) for the Port of San Diego (Port).

The Special Study will be an enhanced basin-wide investigation of the copper observed in the water column in SIYB. This Special Study is referred to as an “enhanced investigation” because the scope of this one-time monitoring effort is broader than the annual dissolved copper Total Maximum Daily Load (TMDL) compliance monitoring that is performed in the basin.

The main objectives for the Special Study are:

1. Develop an enhanced understanding of the basin-wide characteristics of dissolved copper in SIYB that complements existing water quality information generated by the annual TMDL monitoring and other studies (e.g., Neira et al., 2009; Bosse et al., 2014). The study results may help to determine whether the existing TMDL monitoring program is sufficient to provide an accurate assessment of basin-wide conditions, or whether modifications should be considered.
2. Provide an enhanced understanding of the basin-wide dissolved copper levels in SIYB that can be compared with the predicted environmental concentration (PEC) output of the Marine Antifoulant Model for Predicting Environmental Concentrations (MAMPEC) model (Amec Foster Wheeler, 2016a).

The scope of work for the Special Study is presented in detail in this SAP. In general, the study will include:

- Collecting water quality samples at 19 locations within SIYB, including the 6 existing TMDL monitoring stations, one TMDL reference station, and 12 additional Special Study stations chosen using a systematic sampling grid design. Collection will include a surface sample (1 meter from the surface), a mid-depth sample, and a deep sample (1 meter from the bottom) at each station, including the TMDL monitoring stations.
- Measuring pH, temperature, dissolved oxygen (DO), and salinity at all stations using portable field meters.
- Performing a top-to-bottom vertical water quality profile (using a conductivity, temperature, and depth [CTD] profiler) at each station to evaluate pH, temperature, light transmittance, and salinity with depth in the water column.
- Analyzing all samples for concentrations of total and dissolved copper and zinc.
- Analyzing all grab samples for total organic carbon (TOC), dissolved organic carbon (DOC), and total suspended solids (TSS).

This SAP/QAPP provides detailed information on the design and implementation of the Special Study. It is organized as follows:

- Section 2, Project Management, provides an overview of the project personnel, roles and responsibilities of the key team members, and lines of communication.
- Section 3, Project Background, briefly describes the goals and objectives of the Special Study.
- Section 4, Sampling and Analysis Plan, provides detailed information on the design of the Special Study, collection locations and timing, sample collection techniques, sample handling and chain of custody, field measurements and analytical tests to be conducted, data analysis techniques, and project schedules.
- Section 5, Quality Assurance Project Plan, describes the procedures to ensure that collection and handling of water samples, collection of field data, and analytical analysis of water samples are conducted with a high degree of quality assurance and quality control (QA/QC).
- Section 6, Report Preparation, describes the information that will be compiled and submitted to the Port at the conclusion of the Special Study.
- Section 7, References, includes literature sources and reports cited in this document.

2.0 PROJECT MANAGEMENT

This section presents the project team, team organization, the roles and responsibilities of key team members, and the lines of communication for field and laboratory activities.

2.1 SAP/QAPP Distribution

Table 2-1 identifies those individuals who will receive one copy of the approved SAP/QAPP.

Table 2-1.
SAP/QAPP Distribution List

Title	Name (Affiliation)	Signature/Date
Project Manager	Karen Holman (Port of San Diego)	
Project Manager and Field Quality Assurance (QA) Officer	Barry Snyder (Amec Foster Wheeler)	
Field Project Manager	Chris Stransky (Amec Foster Wheeler)	
Analytical QA Officer	Rolf Schottle (Amec Foster Wheeler)	
Senior Reviewer	Brock Bernstein. Ph.D. (Independent Consultant)	
Analytical Laboratory Project Manager	Hai Van Nguyen (Weck Laboratory)	
Vessel Operations	Lawrence Honma (Merkel & Associates)	

2.2 Project Organization

Project Personnel and Roles

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) will organize field sampling logistics and equipment, provide sample collection and laboratory analysis of samples, perform data analysis, and provide a report of the SIYB monitoring results. Individual roles of project personnel are outlined in Table 2-2 and in Figures 2-1 and 2-2.

Karen Holman is the Project Manager (PM) for the Port. Ms. Holman will be responsible for project administration and will serve as the lead contact at the Port.

Barry Snyder is the PM and Field Quality Assurance (QA) Officer for Amec Foster Wheeler. Mr. Snyder will be responsible for overall project management, organization, contracts, and oversight. In addition, he will serve as the Field QA Officer and will oversee of field-related QA and quality control (QC) procedures.

Chris Stransky is the Field PM for Amec Foster Wheeler. Mr. Stransky will oversee coordination and execution of the field effort, including organization of field staff and scheduling

of sampling days, and will be responsible for overseeing data analysis and finalizing the project report.

Rolf Schottle is the Analytical QA Officer for analytical chemistry for Amec Foster Wheeler. Mr. Schottle will be responsible for guaranteeing the overall QA and QC procedures and will ensure that analytical chemistry data reported by the analytical laboratory and Amec Foster Wheeler have been generated in compliance with the appropriate protocols. Mr. Schottle will also be responsible for coordination with the analytical laboratory and will work with the Analytical Laboratory PM to ensure that proper QC procedures are followed.

Brock Bernstein Ph.D. is the Senior Reviewer for the Special Study. His expertise is in designing large water and sediment quality investigations that are compliant with California guidelines (e.g., Surface Water Ambient Monitoring Program [SWAMP] guidelines), and has considerable experience designing and implementing TMDL programs. He will participate in the design of the collection program and will provide data review and validation of all study conclusions. He will also provide TMDL-related technical assistance.

Corey Sheredy will provide field support for Amec Foster Wheeler. Ms. Sheredy will assist with data collection and equipment operation, and will support QA/QC, data analysis, and reporting efforts.

Tyler Huff will serve as the Field Health and Safety Officer. Mr. Huff will ensure that all health and safety protocols are followed during field activities. Mr. Huff will also provide as-needed field support.

Hai Van Nguyen is the Analytical Laboratory PM for Weck Laboratories (Weck). Ms. Nguyen will be responsible for providing chemistry analytical data in an approved and quality-controlled format.

Lawrence Honma is the Vessel Operations Manager for Merkel & Associates (Merkel). Mr. Honma will be responsible for providing the vessel for the project and coordinating equipment use with field personnel.

**Table 2-2.
Project Personnel Roles and Contact Information**

Name (Affiliation)	Project Role(s)	Contact Information
Karen Holman (Port of San Diego)	Port Project Manager	(619) 686-6254 (office) (619) 686-6467 (fax) kholman@portofsandiego.org
Barry Snyder (Amec Foster Wheeler)	Project Manager and Field QA Officer	(858) 300-4320 (office) (858) 354-8340 (mobile) (858) 300-4321 (fax) barry.snyder@amecfw.com
Chris Stransky (Amec Foster Wheeler)	Field Project Manager	(858) 300-4350 (office) (858) 775-5547 (mobile) (858) 300-4321 (fax) chris.stransky@amecfw.com
Rolf Schottle (Amec Foster Wheeler)	Analytical QA Officer	(858) 300-4323 (office) (619) 985-2405 (mobile) (858) 300-4321 (fax) rolf.schottle@amecfw.com
Brock Bernstein, Ph.D. (Independent Consultant)	Senior Project Reviewer	(805) 646-8369 (office) (805) 746-6165 (mobile) brockbernstein@sbcglobal.net
Tyler Huff (Amec Foster Wheeler)	Field Support and Field Health and Safety Officer	(858) 300-4322 (office) (858) 449-2334 (mobile) (858) 300-4321 (fax) tyler.huff@amecfw.com
Corey Sheredy (Amec Foster Wheeler)	Field Support and Data Analysis	(858) 300-4316 (office) (831) 359-7761 (mobile) (858) 300-4321 (fax) corey.sheredy@amecfw.com
Hai Van Nguyen (Weck Laboratories)	Analytical Laboratory Project Manager	(626) 336-2139 ext. 102 (office) (626) 336-2634 (fax) haivan.nguyen@wecklabs.com
Lawrence Honma (Merkel & Associates)	Vessel Operations	(858) 560-5465 (office) (858) 229-1444 (mobile) lhonma@merkelinc.com

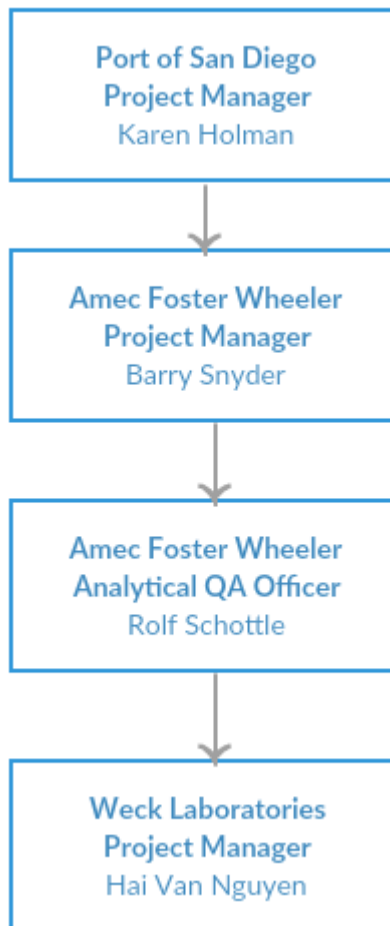


Figure 2-1. Project Organization for the Analytical Component

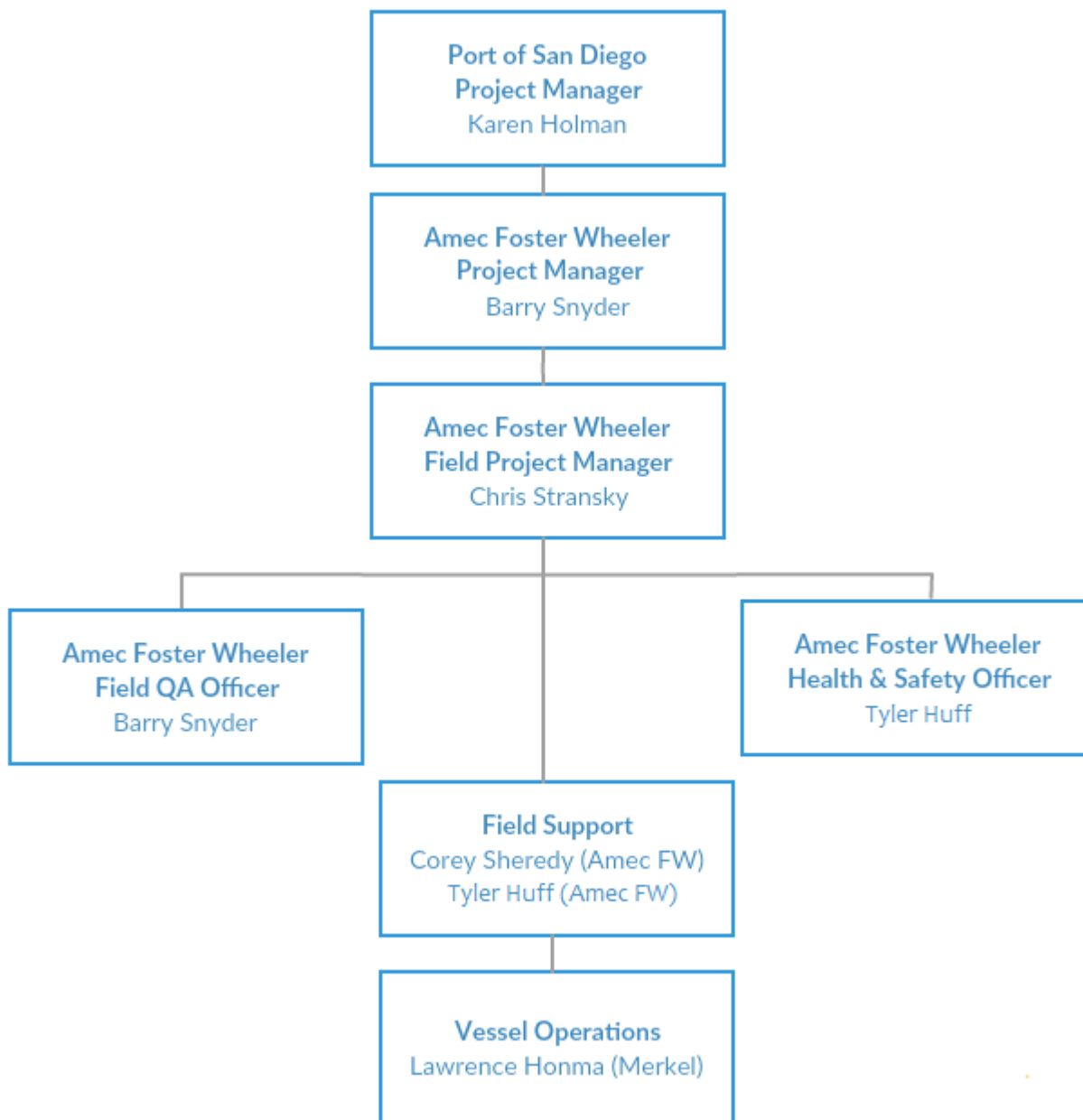


Figure 2-2. Project Organization for the Field Component

2.3 Quality Assurance Officers' Roles

The QA Officers are responsible for guaranteeing the overall quality of the data produced and reported throughout the project. Specific duties of the QA Officers include:

- Conducting audits of ongoing tests, data packages, and completed reports;
- Conducting audits of the routine QC documentation of field and laboratory procedures;
- Communicating potential QC problems to the staff; and
- Ensuring that all problems are resolved.

The QA Officers are also responsible for issuing QA reports to management, maintaining a current Quality Assurance Manual (QAM), and issuing QAPPs as required. The QA Officers also ensure that data reported have been generated in compliance with the QAM and the appropriate protocols. The QA Officers are knowledgeable in the quality system standard defined under the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP).

Barry Snyder and Rolf Schottle are the project QA Officers. Mr. Snyder, in the role of Field QA Officer, will be onboard the vessel during all sample collection activities to ensure that proper sampling procedures are employed. Mr. Snyder will record details of every sample collected on a sampling QA checklist. As Analytical QA Officer, Mr. Schottle will work directly with the Analytical Laboratory PM, Ms. Nguyen, to ensure that proper QC procedures are followed.

Mr. Snyder and Mr. Schottle will also review and assess procedures against plan requirements during the life of the project and will evaluate the need for any corrective actions. Mr. Snyder or Mr. Schottle may stop actions conducted by Amec Foster Wheeler if there are significant deviations from required practices or if there is evidence of a systematic failure. Ms. Nguyen will also have the same authority for laboratory-related operations.

3.0 PROJECT BACKGROUND

Background information related to these objectives is discussed in more detail in Sections 3.1 and 3.2.

3.1 Previous Studies in SIYB

This section describes two studies that have direct relevance for the monitoring program described in this SAP/QAPP. Similar to the proposed Special Study, they both evaluated dissolved copper concentrations at multiple locations throughout SIYB; however, the goals of all three studies are different.

3.1.1 Bosse et al., 2014

Bosse et al. (2014) conducted a water column assessment to examine the toxicological effects and bioavailability of copper in SIYB, or to determine whether or not copper poses a threat to sensitive organisms inhabiting the site. In this study, seawater samples were collected from 1 meter below the surface (surface water) and 1 meter above the bottom (bottom water) from 16 stations located mostly out of marina leaseholds. Samples were collected during one wet season (collected on March 22, 2011) and one dry season (collected on July 5, 2011). In general, the study showed significantly higher levels of dissolved copper in the surface waters than in the deeper waters for both the wet and dry seasons.

3.1.2 Neira et al., 2009

Neira et al. (2009) conducted a water column and sediment assessment to test the hypothesis that the presence of “hotspots” of copper concentrations in SIYB are linked to boat distribution (number of boats and distance from the boats) and to basin environmental characteristics. In this study, 32 stations were evenly distributed throughout SIYB using a spatial grid design. Study results showed a definite horizontal gradient in copper levels from the head of the basin to the mouth. Higher copper levels were observed in water and sediment samples at the head of the basin; decreasing levels were observed moving toward the mouth of the basin at San Diego Bay. The researchers noted that the observed dissolved copper concentrations tended to be larger in surface waters than in near-bottom waters, and that, despite the shallowness of the basin (approximately 5 meters), a clear, statistically significant, depth-related difference in copper concentrations was observed across the entire basin (Neira et al., 2009). The researchers also noted that the results provided strong evidence that dissolved copper concentrations in surface waters of SIYB are associated with the presence of boats in the basin.

3.2 MAMPEC Model Study

In 2015, Amec Foster Wheeler completed a modeling effort using the MAMPEC model (Deltares, 2010) to evaluate the PECs of dissolved copper in SIYB waters using varying hull paint copper leach rate scenarios. The model was set up using realistic SIYB-specific input parameters (e.g., physical and hydrodynamics characteristics of the basin). The results of the MAMPEC model runs are in Appendix E of the *2015 Shelter Island Yacht Basin (SIYB) Total Maximum Daily Load (TMDL) Annual Report* (Amec Foster Wheeler, 2016a).

As noted in the 2015 SIYB TMDL Annual Report, the actual surface water concentrations of dissolved copper at the TMDL monitoring stations could not be compared with the basin-wide PECs generated by MAMPEC. The report also states that developing a better understanding of the full water column conditions and current vessel tracking results could build confidence in the model's ability to accurately predict basin-wide PECs.

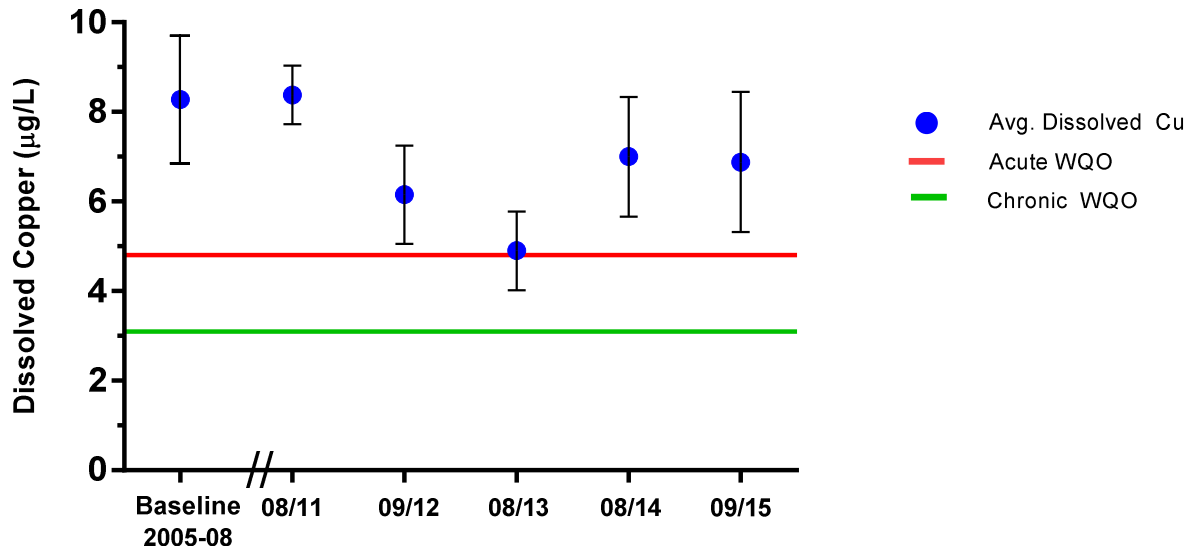
3.3 SIYB Dissolved Copper Levels

Since 2011, dissolved copper levels in SIYB have been evaluated on an annual basis at six specific locations in the basin. Sample collection locations are depicted on Figure 3-1 (which also displays the San Diego Bay reference location used for the annual TMDL monitoring program). The results of these analyses are shown on Figures 3-2 (basin-wide average) and 3-3 (dissolved copper ranges by station). The basin-wide average of surface water shown on Figure 3-2 is determined by averaging the dissolved copper concentrations for the six surface samples collected as part of the annual SIYB TMDL monitoring program. Figure 3-3 shows the range of the yearly surface water dissolved copper levels at each station.

In 2018, the SIYB Dissolved Copper TMDL will move into its final five-year compliance period. One of the objectives of this Special Study is to provide additional basin-wide dissolved copper information (in addition to the annual TMDL monitoring results) that may help determine whether the existing contingent of TMDL monitoring stations is sufficient to provide an accurate assessment of basin-wide conditions, or whether modifications to the current monitoring program should be considered.

Figure 3-1. SIYB TMDL Annual Monitoring Program Sample Collection Stations

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Notes: Avg. = average; Cu = copper; WQO = water quality objective

Figure 3-2. Mean Surface Water Basin-wide Dissolved Copper Levels in SIYB TMDL Monitoring Events (2011 – 2015)

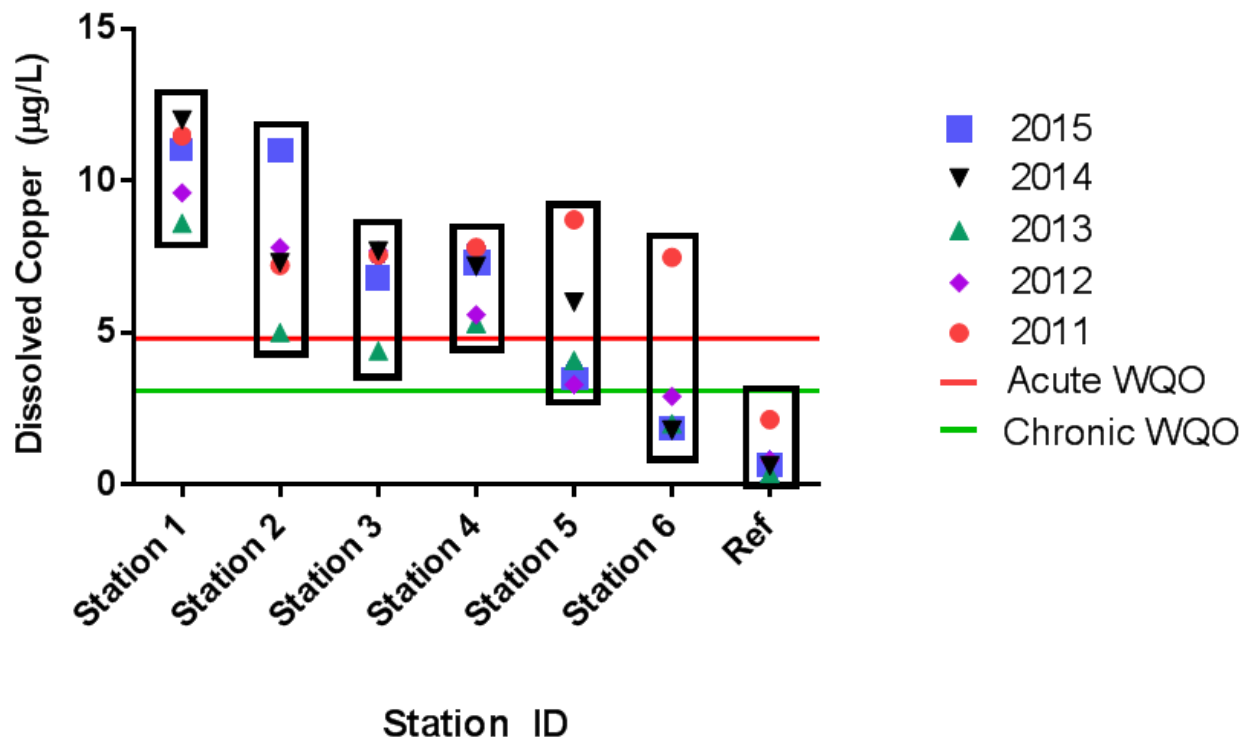


Figure 3-3. Surface Water Dissolved Copper Levels at SIYB TMDL Monitoring Stations (2011 – 2015)

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4.0 SAMPLING AND ANALYSIS PLAN

This section describes the study design to be employed for the Special Study. Sample collection, sampling handling, and analytical test methods to be employed by the field and laboratory teams are also discussed in this section.

4.1 Sampling Design

To meet the study goals, water quality samples will be collected from multiple depths at 18 stations within the basin and one reference station in San Diego Bay. Station locations were chosen using a rectangular systematic grid design. This 250-meter by 200-meter grid was designed to incorporate the existing TMDL monitoring stations into the Special Study, and to identify additional Special Study collection locations to ensure that SIYB areas were equally sampled and represented. The Special Study stations were assigned by identifying the grid nodes that either did not intersect or were not within close proximity¹ to a TMDL monitoring station (Figure 4-1). This sampling strategy was chosen because it provides sufficient spatial coverage, representation of basin use, and resolution to address the study questions.

4.1.1 Sample Collection Stations

As discussed in Section 4.1, a rectangular systematic grid design was used to incorporate the SIYB TMDL monitoring stations and supplement coverage of the basin by the additional 12 Special Study stations.

The scope of work for the annual TMDL monitoring program includes collecting surface samples only. For this Special Study, surface sample collection at TMDL monitoring stations (including the reference station) will be supplemented by collection of one mid-depth and one deep sample² (collected at the mid-column depth and approximately 1 meter from the bottom, respectively) at each station. A vertical profile of water quality characteristics will also be obtained at each site by deploying a CTD profiler. The TMDL monitoring stations are depicted as green triangles on Figure 4-1. Target coordinates for the TMDL monitoring stations are provided in Table 4-1.

The addition of the 12 Special Study stations systematically placed throughout SIYB allows for a heterogeneous spatial assessment of dissolved copper levels throughout the basin. As with the TMDL monitoring stations, water collection at each station will include samples from surface, mid-depth, and bottom water. A vertical profile of water quality characteristics will also be obtained at each site by deploying a CTD profiler. Target locations for the Special Study stations are identified as the node of the spatial grid. The 12 Special Study station locations are not a part of the TMDL monitoring program; therefore, Amec Foster Wheeler developed a set of sampling rules for each of these stations to best meet the study goals. Ideally, Special Study

¹ TMDL stations farther than 200 feet away from the spatial grid node were not incorporated into the grid scheme. This applied only to Station SIYB-5.

² In addition to the chemical tests conducted on the surface water samples, the TMDL monitoring program also includes the conduct of toxicity tests. Please note: no toxicity analyses will be conducted on the mid-depth or deep water samples.

samples will be collected within 30 feet of the grid node (target location). However, because of obstructions or restrictions (such as boats, docks, proximity to shore), Amec Foster Wheeler repositioned the sampling location using ArcGIS to meet the following rules:

1. Each Special Study station must be at least 12 feet in depth so that a top, mid-depth, and bottom sample can be collected.
2. Each Special Study station must be at least 20 feet from the nearest vessel.

Proposed station coordinates are provided in Table 4-2; however, if the proposed location does not meet both of these requirements once the sampling team is onsite, the Special Study station may be relocated to the nearest point that fulfills these requirements. This relocation should be as close to the grid node as possible.

**Table 4-1.
Annual TMDL Monitoring Station Coordinates**

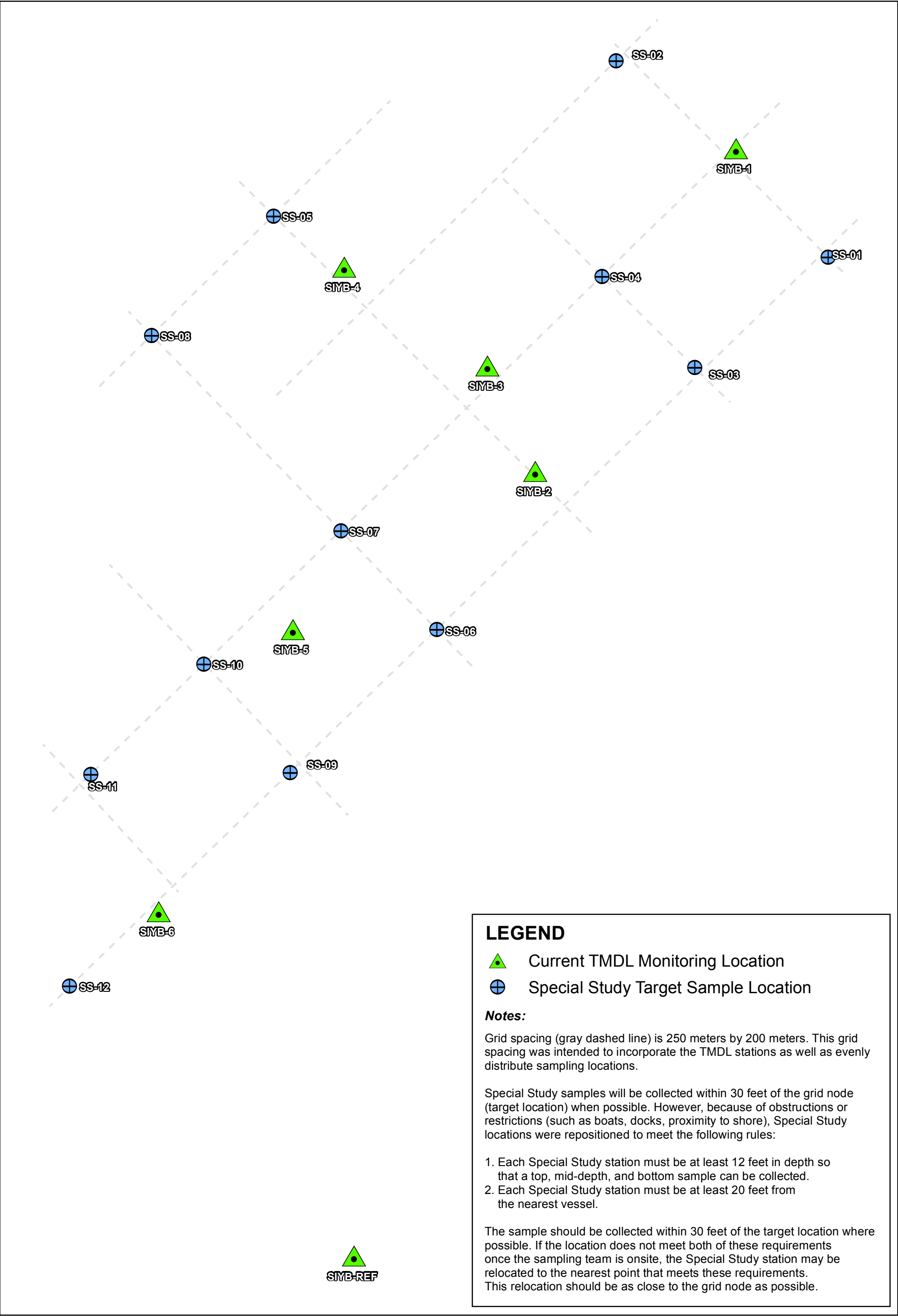
Station ID	Target Coordinate	
	Latitude	Longitude
SIYB-1	32.71821	-117.22601
SIYB-2	32.71412	-117.22921
SIYB-3	32.71550	-117.22989
SIYB-4	32.71683	-117.23203
SIYB-5	32.71217	-117.23297
SIYB-6	32.70858	-117.23514
SIYB-REF	32.70406	-117.23232

**Table 4-2.
Special Study Proposed Sample Collection Locations**

Station ID	Proposed Station Coordinate	
	Latitude	Longitude
SS-01	32.716774	-117.224655
SS-02	32.719391	-117.227794
SS-03	32.715399	-117.226736
SS-04	32.716609	-117.228107
SS-05	32.717512	-117.233080
SS-06	32.712115	-117.230775
SS-07	32.713426	-117.232196
SS-08	32.716017	-117.234989
SS-09	32.710326	-117.233074
SS-10	32.711757	-117.23434
SS-11	32.710374	-117.23611
SS-12	32.707651	-117.236527

Notes:

ID = identification; Latitude/Longitude provided in decimal degrees.



Path: Q:\Aquatics\POSD\ShelterIsland\YachtBasin\MXD\WorkingMaps\SIYB_EnhancedMonitoring_SiteSelection_v8_systematicgrid_vertical.mxd, corey.sheredy 8/15/2016

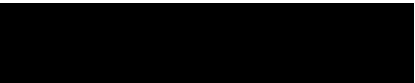
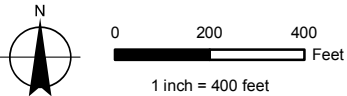


Figure 4-1. Shelter Island Yacht Basin
TMDL Monitoring Locations /
Systematic Collection Locations
San Diego, CA



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4.2 Collection Schedule and Phasing

Sampling will be conducted in two phases, as described in Sections 4.2.1 and 4.2.2.

4.2.1 Annual TMDL Monitoring Stations

Collection at the six TMDL monitoring stations and reference station will be performed in the same manner as in previous years and according to the most recent TMDL Monitoring Plan and QAPP (Amec Foster Wheeler, 2016b and 2015, respectively) with the addition of the mid-depth and bottom sample collection and a CTD profile, as described in Section 4.1.1. According to the TMDL Monitoring Plan, sampling at the TMDL monitoring stations must be completed in the summer (i.e., in August or September). By sampling in the summer, dissolved copper concentrations are expected to be at their annual peak in the water column because rates of copper release from antifoulant paints are higher at warmer sea surface temperatures and during periods with a greater frequency of hull cleaning. Daily sampling will begin at stations near the mouth and will move toward the head of SIYB, approximately bracketing the high tide.

For the 2016 TMDL monitoring stations, collection is tentatively set for August 23, 2016, with a backup date of September 20, 2016. As in previous years, the collection will be completed in one day.

4.2.2 Special Study Stations

Collection at the 12 Special Study stations may take up to three days. For continuity purposes, collection at the Special Study stations will be conducted on the three consecutive days following the TMDL monitoring (i.e., August 24–26, 2016), with backup dates of September 21–23, 2016.

To prevent the introduction of sampling bias and to maintain consistency with the TMDL sampling methods, collection at the Special Study stations will follow the same sampling sequence used in the TMDL monitoring (i.e., daily sampling will begin at stations near the mouth and move toward the head of SIYB, approximately bracketing the high tide). Table 4-3 presents the sample collection schedule for the Special Study stations, as well as the TMDL monitoring stations.

Table 4-3.
Sample Collection Schedule Matrix

Station ID	Collection Day			
	Day 1 (TMDL)	Day 2 (Special Study)	Day 3 (Special Study)	Day 4 (Special Study)
SIYB-1	X			Contingency day
SIYB-2	X			
SIYB-3	X			
SIYB-4	X			
SIYB-5	X			
SIYB-6	X			
SIYB-REF	X			
SS-01		X		
SS-02			X	
SS-03		X		
SS-04			X	
SS-05		X		
SS-06			X	
SS-07		X		
SS-08			X	
SS-09		X		
SS-10			X	
SS-11		X		
SS-12			X	

4.3 Collection Station Positioning

All stations will be located using a differential Global Positioning System. Per the TMDL Monitoring Plan (Amec Foster Wheeler, 2016b), the collection location for the TMDL monitoring stations will be done within approximately ± 3 meters of the target coordinate listed in Table 4-1. The collection location for the Special Study stations will follow the procedures described in Section 4.1.1. The proposed locations for the Special Study stations are provided in Table 4-2.

4.4 Field Collection Procedures

Figure 4-2 depicts the sample collection workflow for each station. Collections details are presented below.

Upon anchoring on station, the boat engine will be turned off and a period of at least 5 minutes will pass before collection activities can commence. During the cooldown period, the field team will scan the area for any nearby ongoing vessel maintenance activities. The field crew will record notes and take photographs of these activities (and other factors of note near the collection site), if warranted.

Special care will be taken during the anchoring process to ensure that the anchor does not cause excessive sediment resuspension that may contaminate the near bottom-collected water sample. Steps include noting the wind and tidal current direction in the field log, waiting at least 20 minutes from the time of anchoring to the time that the bottom sample is collected, and performing a visual inspection of the collected sample for excessive sediment. If excessive sediment is observed in the sample, the sample will be discarded and recollected.

Following the engine cooldown period, the field team will start collecting field. Field measurements of pH, temperature, and salinity of the surface water at each station (i.e., within 1 meter of the surface) will be made using a YSI meter according to the manufacturer's specifications. A measuring tape will be used to record the depth, and a Secchi disk will be used to record the visual clarity of the water column. Water depth will be determined at the collection site using a lead line. The lead line depth will be used to determine the collection depth for the mid-water and bottom samples.

Discrete water samples will be collected at each station using a Niskin bottle deployed from the sampling vessel at three depths in the water column. Surface samples at each station will be collected within 1 meter of the surface; midwater samples will be collected at mid-depth, depending upon the lead line depth; and deep samples will be collected within 1 meter of the bottom. The line on the Niskin bottle will be marked in 0.5-meter increments. The lead line depth will be used to determine where the bottom sample will be collected. This depth will be used to calibrate the length of line used on the Niskin bottle to ensure that the bottle does not contact the bottom sediments. Deep-water samples will be collected by slowly lowering the collection bottle to a depth approximately 1 meter from the bottom. Careful attention will be taken to prevent disturbing the bottom sediments during the collection process.

The water depth at the station and collection depth of the deep samples will be recorded in the field log.

All sampling steps will follow SWAMP-defined “clean hands” techniques (State Water Resources Control Board [State Board], 2014).

Collected samples will be dispensed to appropriate and correctly labeled sample containers, and then transferred to a cooler containing ice. All water samples will be logged on a chain-of-custody (COC) form (Attachment A), and the form will be placed in the cooler for transport to Weck Laboratory. Samples will be stored at 4 degrees Celsius (°C) during the transportation process.

Once all the water samples are collected and preserved (see below), a CTD cast will be performed to characterize physical water qualities of the full water column. The CTD deployment will be the final operation in the sample collection regime at each station to ensure that there is no potential for sediment contamination if the CTD inadvertently comes into contact with the basin bottom.

Amec Foster Wheeler will use a Seabird Electronics SBE-19 Plus CTD instrument equipped with a YSI dissolved oxygen sensor (model SBE 43), a pH meter (model SBE 18 with Innovative pH Sensor), and a WET Labs C-Star laser transmissometer (25-centimeter [cm], 660-nanometer [nm]). The CTD instrument is certified to 58 meters and records data for all parameters at 0.5-second intervals. The instrument begins data acquisition 30 seconds after deployment. A minimum 1-minute delay at the surface will be employed to ensure instrument equilibration in the seawater. The CTD will be deployed with a data cable that will allow real-time water quality information to be displayed on the field laptop computer, enabling real-time observations of any turbidity plumes and other physical attributes of the station, and providing verification that the CTD was turned on properly, the depth was accurate, and all water quality measurements were recorded throughout a cast. The instrument will be lowered to the basin bottom in a controlled fashion at 0.5 meter per second (m/sec), and then held at the bottom depth for approximately 15 seconds to allow an appropriate amount of time to populate the bottom data bin. After the CTD is raised to the surface, an additional 15-second delay prior to hoisting the instrument back onto the vessel will be employed to ensure that the surface data bin is well populated.

Field Filtration for Dissolved Metals

All samples collected for dissolved copper and zinc analyses will be filtered in the field (in agreement with United States Environmental Protection Agency (USEPA) 1640 protocol. A 500-milliliter (mL) subsample of water from the same grab in the Niskin bottle will be filtered in the field through a 0.45-micrometer (µm) glass fiber filter. Filtration will be conducted immediately following collection using a Whatman brand Klari-flex bottle top vacuum filtration system. The entire filtration apparatus will be acid-washed and rinsed thoroughly with de-ionized (DI) water prior to sample collection. The first 500 mL of filtered sample will be discarded and the remaining 500 mL retained unpreserved in the labeled plastic disposable container.

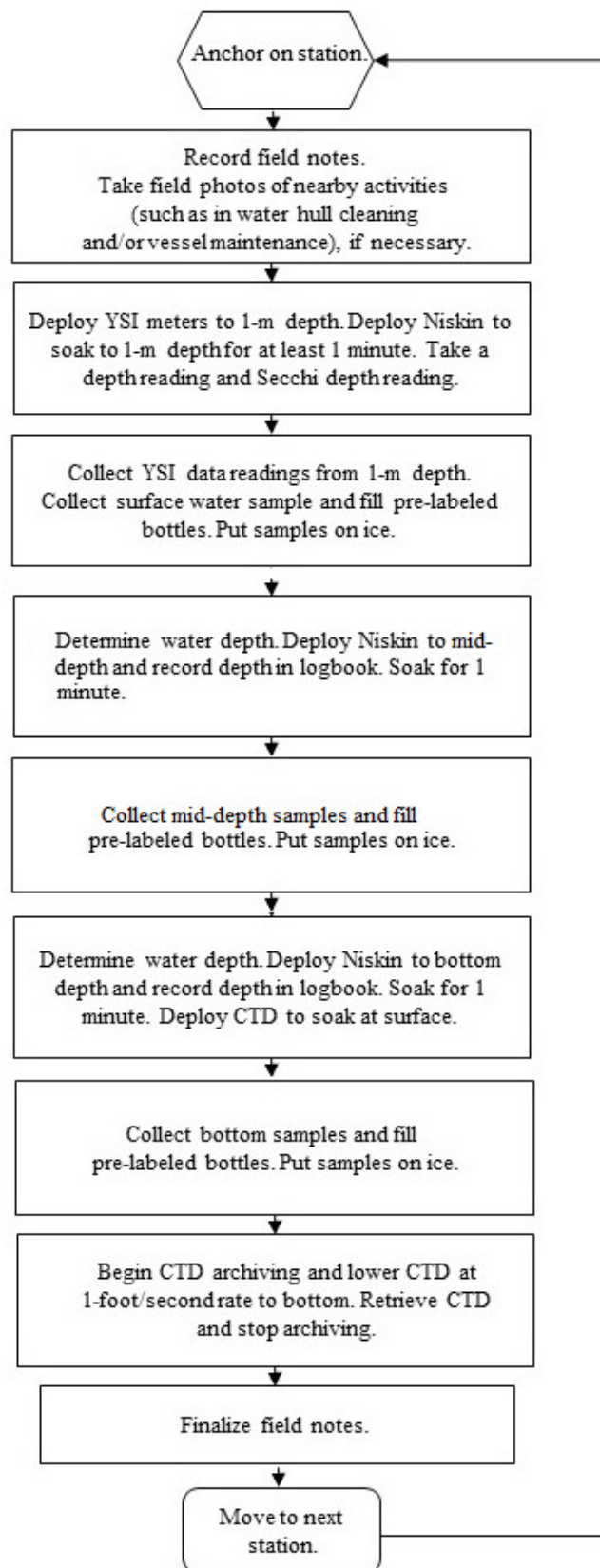


Figure 4-2. Workflow of Sample Collection Methods

4.5 Equipment Decontamination and Cleaning

The Niskin bottle will be cleaned prior to sampling using soapy water followed by a thorough rinse with deionized water. Upon deployment, the Niskin bottle will also be rinsed thoroughly with site water and soaked for at least for one minute at each sampling depth as appropriate 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.

4.6 Sample Processing, Handling, and Custody

Water samples will be uniquely identified with sample labels in indelible ink. All sample containers are identified with the project title, appropriate identification number, date and time of sample collection, and preservation method. The Field QA Officer will inspect the sample collection bottles before and after they are filled to ensure that each sample bottle is correctly labeled with station location and analysis type. Bottle verification information will be recorded in the field QA log. This practice will be performed at every sample collection station prior to moving on to the next station.

Samples will be kept on ice from the time of sample collection until delivery to the analytical laboratory. All samples will be transferred to the appropriate laboratory and analyses initiated within the method specified holding time (Table 4-4). Additionally, enough of each sample (unfiltered and filtered) will be archived at Weck, and preserved as appropriate in case any analyses need to be repeated for confirmation. If possible, samples will be delivered to the analytical laboratory on the same day as collection. All analyses will be conducted by Weck, which is accredited by California ELAP for all the specific tests required for this program.

4.7 Field Sampling Preservation, Packaging, and Shipment

During each sampling day, completed samples will be preserved by placing the sample bottles in wet-iced coolers immediately after collection. At the end of each sampling day, all field samples will be shipped via courier with appropriate COC forms. Sample bottles will be stored upright.

4.8 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 will follow, field sampling standard operating procedures (SOPs), as described in this document. A QA/QC reviewer representing the field contractor will be onboard the sampling vessel at all times to review each step of the sample and data collection process. Field and QA/QC checklists will be used throughout the sampling event to ensure that collection procedures are consistent from station to station and that all required field data are recorded correctly and completely.

Table 4-4. Sample Holding Times

Analyte	Holding Time
Field Measurements	
Water Clarity	Field Collected
pH	Field Collected
Salinity	Field Collected
Temperature	Field Collected
Dissolved Oxygen	Field Collected
Light Transmittance	Field Collected
Water	
Total Organic Carbon	28 days
Dissolved Organic Carbon	28 days ¹
Total Suspended Solids	7 days
Total Copper	180 days
Dissolved Copper	180 days ²
Total Zinc	180 days
Dissolved Zinc	180 days ²

Notes:

¹ The holding time is applicable to the preserved sample. The sample will be filtered in the field into a bottle with sulfuric acid (H₂SO₄) preservative for DOC analysis.

² 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.

Field team 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 hull paint containing no copper or zinc. 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 SOPs to ensure that all sampling personnel are trained accordingly. Additionally, the field team members will be made aware of the significance of the project's detection limits and the requirement to avoid contamination of samples at all times. Field measurement equipment will be checked and calibrated for operation in accordance with the manufacturer's specifications (calibration records will be recorded and maintained), and will be inspected for damage prior to 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, boat washing, etc.). Photographs will also be taken, if necessary.

As required by SWAMP protocols, the Special Study will include the addition of field replicates. The field replicate samples will consist of a second complete set of samples collected at one of the TMDL monitoring stations (Amec Foster Wheeler, 2016b) and one of the Special Study stations. These samples will be analyzed for the same suite of chemicals as the test samples (except the toxicity analyses conducted on the surface sample collected at the TMDL monitoring stations). The purpose of field replicates is to assess variability in sampling procedures as well

as ambient conditions. In addition to the field replicates, the study will also include one equipment rinse blank and one field blank, as specified by SWAMP protocols.

The SIYB Special Study will include the following QA/QC elements:

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

For this Special Study, the analytical laboratory chosen to conduct the analyses is required to (1) be certified to conduct the analyses for the constituents of concern for the Special Study, (2) be certified for the specific analysis methods required for this program, and (3) hold a valid ELAP certificate at the time the Special Study is initiated and the samples are analyzed. The QA objectives for chemical analysis to be followed by the analytical laboratory are detailed in its laboratory QA manual and this QAPP. The objectives for accuracy and precision involve all aspects of the testing process, including the following:

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

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

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

4.8.1 Chain-of-Custody Records

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

Documentation of sample handling and 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 SIYB 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 and will ensure that all holding times are met. Upon delivery of the samples to the analytical laboratory, the COC form will be signed by the person receiving the samples. Copies of the COC records will be included in the final reports prepared by the analytical laboratory.

4.9 Analytical Methods

Water samples will be analyzed for total and dissolved copper, total and dissolved zinc, TOC, DOC, TSS, salinity, temperature, conductivity, dissolved oxygen, and pH (Table 4-5). All analytical methods will follow USEPA or Standard Methods (SM) of the American Public Health Association (APHA, 1998). Analytical methods, detection, and reporting limits are presented in Table 4-5.

4.10 Data Analysis

Summary data tables and figures will be created only after the raw data have passed through the QA/QC criteria, as described in Section 4.8. Finalized data will be summarized in a report in tables, and dissolved copper concentrations will be displayed graphically as a horizontal distribution of the three depth components (i.e., surface, mid-depth, and bottom). The report will also present the arithmetic mean of dissolved copper concentrations, both basin-wide and for each of the three depth components. These results will help to address the study objectives described in Section 1.0.

**Table 4-5.
Laboratory Analytical Methods and Detection Limits**

Water Quality Measurement	Method	Method Detection Limit	Reporting Limit
Total Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Dissolved Copper	USEPA 1640	0.0038 µg/L	0.010 µg/L
Total Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
Dissolved Zinc	USEPA 1640	0.036 µg/L	0.20 µg/L
TOC	SM 5310 B	0.016 mg/L	0.10 mg/L
DOC	SM 5310 B	0.016 mg/L	0.10 mg/L
TSS	SM 2540 D	1.0 mg/L	5.0 mg/L
Salinity	SBE CTD and YSI Pro Plus	NA	± 0.1 ppt
Temperature	SBE CTD and YSI Pro Plus	NA	± 0.1 °C
pH	SBE CTD and YSI Pro Plus	NA	± 0.1 pH unit
Dissolved Oxygen	SBE CTD	NA	± 0.1 mg/L
Light Transmittance	SBE CTD	NA	± 0.1 %

Notes:

°C = degrees Celsius; % = percent; ± = plus or minus; µg/L = microgram(s) per liter; CTD = conductivity, temperature, depth; DOC = dissolved organic carbon; mg/L = milligram(s) per liter; ; NA = not applicable; pH = hydrogen ion concentration; ppt = part(s) per thousand; SBE = SeaBird Electronics; SM = Standard Methods; TOC = total organic carbon; TSS = total suspended solids; USEPA = United States Environmental Protection Agency; YSI = YSI Incorporated.

4.11 Data Review

After each survey, field data sheets and checklists will be checked for completeness and accuracy by the field crew and the Field QA Officer (Mr. Snyder). In addition, all sample COCs will be checked against sample labels 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.

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

Each technician will review the data to ensure the following:

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

- Documentation is complete

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

4.12 Data Management

The analytical laboratory will supply analytical results in both hard copy and electronic formats. Laboratories will be responsible for ensuring that both forms are accurate. After completion of the data review by the laboratory, hard copy results will be placed in the project files; results in electronic format will be imported into a database system.

4.13 Laboratory Quality Assurance and Quality Control

The analytical laboratory will provide a QA/QC narrative that describes the results of the standard QA/QC protocols that accompany analysis of field samples. All hard copies of results will be maintained in the project files. In addition, backup copies of results generated by the laboratory will be maintained at its 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 SAP/QAPP, and a case narrative of COC details.

4.14 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 field activities. During this meeting, site-specific hazards will be discussed and addressed appropriately.

4.14.1 Use of Boats and Working Over Water

Work will be conducted from a boat 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 United States Coast Guard small vessel training. Personnel working on the boat will be trained according to internal SOPs. The primary hazards associated with the operation and use of boats include drowning, heat stress, and injuries from falling. 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, field team members will be provided with adequate amounts of water and will be allowed to wear short pants. A float plan will be prepared for each trip and submitted to the safety officer or project manager. At a minimum, it will include the destination, expected time of return, personnel onboard, and a description of 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.

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5.0 DATA QUALITY

5.1 Assessments and Response Actions

The Analytical Laboratory PM at Weck, Hai Van Nguyen, will receive a copy of this QAPP prior to submission of samples and will be required to sign off that she has read and understands all of the expectations of Weck outlined in this QAPP. The Amec Foster Analytical QA Officer, Rolf Schottle, will be immediately notified by phone, with a follow-up in writing, of any incident that results in the need for corrective action as described in the following sections.

5.1.1 Corrective Action Plans

An out-of-control event is defined as any occurrence failing to meet pre-established criteria. A nonconformance is a deficiency in characteristic, documentation, or procedure sufficient to make the quality indeterminate or unacceptable. An out-of-control event is a subcategory of nonconformance. Any out-of-control events observed, whether in the field or in the laboratory, will be immediately communicated to the Amec Foster Wheeler PM and Analytical QA Officer to determine the appropriate course of action.

When either situation (out-of-control event or nonconformance) is identified, it will be categorized as follows:

- **Deficiency** – Recognition that a specific requirement (e.g., program, process, or procedure) has been violated.
- **Observation** – Recognition of an activity or action that might be improved, but is not in violation of a specific requirement. Left unaddressed, the activity or action might develop into a deficiency.

5.1.2 Criteria Used for Determination of an Out-of-Control Event

Factors that affect data quality (e.g., failure to meet calibration criteria, inadequate recordkeeping, improper storage, or preservation of samples) require investigation and corrective action.

When a nonconformance is recognized, each individual involved with the analysis in question has an interactive role and responsibility. This process is described in the following two paragraphs.

- **Analytical Laboratory PM** – The Analytical Laboratory PM, Ms. Nguyen, must review all analytical and QC data for reasonableness, accuracy, and clerical errors. In an out-of-control event, Ms. Nguyen will notify the Analytical QA Officer, Mr. Schottle, immediately (within 24–48 hours) by telephone and email. Ms. Nguyen and Mr. Schottle will work together to solve the problem. In this case, Mr. Schottle will notify the Amec Foster Wheeler PM, Barry Snyder, of the issue and the proposed remedy. This process will prevent the reporting of suspect data by stopping work on the analysis in question and ensuring that all results that are suspect are repeated, if possible, after the source of the error is determined and remedied.

- **Analytical QA Officer** – The Analytical QA Officer, Mr. Schottle, will report to the Amec Foster Wheeler PM, Mr. Snyder, on the status of the problem. Mr. Snyder will then notify the Port PM, Karen Holman, immediately (24–48 hours) by phone with a follow-up notification in writing if the work is affected by an out-of-control event or the results of an internal audit. In the event that a QC measure is out of control and the data are to be reported, qualifiers will be reported together with sampling results. Mr. Schottle is responsible for reviewing nonconformance report forms, recommending or approving proposed corrective actions, and verifying that corrective actions have been completed.

5.1.3 Procedures for Stopping Analyses

Whenever the analytical system is out of control, investigation and correction efforts are initiated by all concerned personnel. Best professional judgment will be used by the person(s) notified to rectify the problem in accordance with the QAPP.

If the problem is instrumental or specific only to preparation of a sample batch, samples will be reprocessed after the instrument is repaired and recalibrated.

5.1.4 Corrective Action

The need for corrective action may arise from various possible sources: equipment malfunction, failure of internal QA/QC checks, failure of follow up on performance or system audit findings, or noncompliance with QA requirements.

When measurement equipment or analytical methods fail QA/QC requirements, the problem(s) will immediately be brought to the attention of the appropriate Analytical Laboratory PM, who will notify the appropriate QA Officer immediately. Corrective measures will depend entirely on the type of analysis, the extent of the error, and whether the error is determinant or not. The corrective action is determined by the Analytical Laboratory PM and the QA Officer. However, final approval is the responsibility of the Amec Foster Wheeler PM, Mr. Snyder.

The Amec Foster Wheeler PM, Mr. Snyder, is responsible for preparing and submitting all project reports. Draft and final reports will summarize the data collected for this project.

5.2 Data Validation and Usability

Data validation is the process whereby data are filtered and accepted or rejected on the basis of a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of its validity prior to its intended use. Data are checked for accuracy and completeness. The data validation process consists of data generation, reduction, and review (Section 5.3). Requirements of the ELAP Standard and Good Automated Laboratory Practices (Document 2185) (USEPA, 1995) are followed for computer processing, manipulation, reporting, storage, and retrieval of data.

Data reduction, validation, and reporting are ongoing processes that involve the Analytical Laboratory PM, QA Officers, and Amec Foster Wheeler PM.

5.3 Verification and Validation Methods

5.3.1 Database Generation

Upon completion of the survey, the field data sheets will be removed from the field logbooks, and the sheets will be checked for completeness and accuracy by the applicable QA Officer or Amec Foster Wheeler PM, Mr. Snyder. Appropriate field sheets must be present and filled out completely. If there are any questions, clarification from field personnel will be obtained as soon as possible. Field data sheets and the field logbooks will be placed into folders by data type, labeled with the data type and survey name, and filed in the appropriate filing cabinet. Field sheets will also be scanned, and electronic copies stored in the project folder on Amec Foster Wheeler's San Diego server.

In the laboratory, technicians will document sample preparation activities in bound laboratory notebooks or on bench sheets. Data validation includes use of dated and signed entries by technicians on the data sheets and logbooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data.

The data for laboratory analyses will be entered directly onto data sheets. Data sheets must be filled out in ink and signed by the technician, who is responsible for checking the sheet to ensure completeness and accuracy.

The technician who generates the data has the prime responsibility for the accuracy and completeness of the data. Each technician reviews the data to ensure the following:

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

Data sheets are submitted to the Analytical Laboratory PM and Analytical QA Officer. A tracking sheet is initialed when the data are ready for transmittal to a data entry operator. Original data sheets are not allowed to leave laboratory facilities. If for any reason data entry is performed by an employee, but not at Amec Foster Wheeler's facilities, data sheets are copied, and the originals are kept with the Analytical Laboratory PM and Analytical QA Officer.

Data files are assigned a job number and are given a file name, which will be used when the file is put on compact disk (CD).

5.3.2 Error Checking and Verification

The raw data file is printed and 100 percent of the raw data is checked against the original data by the applicable QA Officer or designee. Any errors found are corrected on the raw data printout and on the data entry sheets. If no errors are found, the station checked is marked "OK." The process is continued until no errors are found in the check. After the raw data are

checked, each sheet is marked with the date the check was completed and the initials of the applicable QA Officer or designee. The raw data printout used for error checking is saved and filed with the data entry sheets. Any errors in the raw data file are corrected, and the establishment program is rerun.

After the database has been established, the data entry copies may be discarded, and the original data entry sheets and raw data printouts are filed.

Further data validation is performed by the Analytical Laboratory PM. Validation is accomplished by performing routine audits of the data collection and flow procedures and by monitoring QC sampling results.

Data validation includes use of dated and signed entries by the technicians and Analytical Laboratory PM on the bench sheets and notebooks used for samples, sample tracking and numbering systems to track the progress of samples through the laboratory, and QC criteria to reject or accept specific data.

In the data review process, the data are compared with information (e.g., sample history, sample preparation, and QC sample data) to evaluate the validity of the results. Corrective action is minimized by developing and implementing routine internal system controls. Analysts are provided specific criteria that must be met for each procedure, operation, or measurement system.

5.4 Reconciliation with User Requirements

The applicable Amec Foster Wheeler QA Officers (Barry Snyder and Rolf Schottle) will review data after each survey to determine whether data quality objectives (DQOs) have been met. If data do not meet the project's specifications, the applicable QA Officer will review the errors, communicate verbally and in writing with laboratory QA Officers as appropriate, and determine whether the problem is a result of calibration/maintenance, sampling techniques, or other factors. They will suggest corrective action. It is expected that the problem would be corrected by retraining, revision of techniques, or replacement of supplies/equipment. If the problem is not corrected by these methods, then the DQOs will be reviewed for feasibility. If specific DQOs are not achievable, the applicable QA Officer will recommend appropriate modifications. Any revisions need approval by the Amec Foster Wheeler PM, Barry Snyder, and the Port PM, Karen Holman.

5.5 Quality Objectives for Criteria for Measurement of Data

The laboratory will follow in-house QA/QC plans, and any deviations will be documented in the analytical reports. DQOs applicable to water samples collected for this project consist of accuracy, precision, recovery, and completeness for the following analysis types (Table 5-1):

- Field testing
- Chemistry analyses

Table 5-1.
Summary of Data Quality Objectives

Measurement or Analysis Type	Applicable Data Quality Objective
Field Testing Temperature Salinity/Conductivity pH Dissolved Oxygen Light Transmittance	Accuracy, Precision, Completeness
Analytical Chemistry Laboratory Analyses Total and Dissolved Copper Total and Dissolved Zinc Total Organic Carbon Dissolved Organic Carbon Total Suspended Solids	Accuracy, Precision, Recovery, Completeness
Chemical Reporting Limits	Accuracy, Precision

Specific DQOs are presented in Table 5-2, along with acceptability criteria for each measurement.

Acceptance criteria will be based on the implementation of acceptable and recognized QA/QC procedures. Acceptable data require proper sample collection and handling methods, sample preparation and analytical procedures, holding times, and QA protocols.

Accuracy is defined as the difference between the measured value of an indicator and its true or expected value, which is an estimate of systematic error or net bias. Accuracy will be ensured for trace metals and TOC/DOC through acceptable **Recovery** of laboratory control standard (LCS) and matrix spike (MS) recoveries using method specific performance-based control limits. Based upon previous results, the spike levels chosen for this project are as follows: 10 micrograms per liter (µg/L) for copper, 30 µg/L for zinc, and 2 milligrams per liter (mg/L) for TOC/DOC, and 5 mg/L for TSS.

Table 5-2. Data Quality Objectives for Laboratory and Field Measurements

Group	Parameter	Calibration	Accuracy ¹	Precision		Percent Complete
Field Testing	Temperature pH Salinity DO Light Transmittance	NIST (temp) three point calibration (pH) Salinity standard % Saturation calibration (DO)	± 0.1 °C ± 0.1 pH ± 0.1 ppt ± 0.1 µg/L ± 0.1 %	FD		100
Laboratory Analyses	TOC DOC	CRM/SRM, when available, or LCS and MS/MSD	80-120%	LD, FD, and MS/MSD	<25%	100
Laboratory Analyses	Metals	SRM/CRM or MS/MSD, LCS ²	83–109% (Cu) 80–118% (Zn)	LD, FD, and MS/MSD	<25%	100
Laboratory Analyses	TSS	CRM/SRM, when available, or LCS and MS/MSD	80–120%	LD, FD, and MS/MSD	<25%	100

Notes:

1 The objectives are applicable unless the method or manufacturer specifies more stringent requirements.

2 Reported LCS limits for copper and zinc were statistically derived by Weck Laboratories, Sept. 2012.

°C = degrees Celsius; < = less than; µg/L = micrograms per liter; % = percent; ± = plus or minus; CRM = Certified Reference Material; Cu = copper; FD = field duplicate; LCS = laboratory control sample; MS = matrix spike; MSD = matrix spike duplicate; NA = not applicable; ppt = part(s) per thousand; NIST = National Institute of Standards and Technology NTU = nephelometric turbidity unit; SRM = Standard Reference Material; Zn = zinc

Precision is defined as the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated either as a range or as a standard deviation. The precision of instrument-related field measurements will be assessed for field instruments by measuring three replicate readings for all three parameters at each station. At one randomly selected location, the replicated field measurements will be reported as the mean, and the precision will be calculated as the standard deviation of the measurements. The precision of chemistry laboratory measurements will be assessed by comparison of the sample result to that for a duplicate sample in addition to comparisons between the laboratory MS and matrix spike duplicate (MSD). Precision will be measured by the degree of agreement between the sample and the laboratory duplicate (LD) or the MS and MSD results. Samples within a ±25% relative percent difference (RPD) between the sample result and duplicate result will be accepted as unqualified results.

Completeness is a measure of the proportion of the expected, valid data (i.e., data not associated with some criterion of potential unacceptability) that is actually collected during a measurement process. The objective for completeness is 100 percent for each measurement process.

The analytical reporting limits for copper and zinc are below the relevant regulatory criteria for assessment of aquatic health, meeting this DQO, as presented in Table 5-2. The method detection limits are below the SWAMP reporting limits and preliminary benchmarks in accordance with the DQOs.

5.6 Special Training Needs/Certifications

5.6.1 Specialized Training or Certifications

All field personnel will be trained and will have experience in proper field sampling and sample handling techniques, including COC procedures, prior to sampling. These techniques will be reviewed prior to each sampling event and all field personnel will provide a signature to document the training.

Weck is accredited by the California Department of Public Health ELAP (National ELAP Certificate #04229CA) for the analysis of metals using USEPA Method 1640, the analysis of TOC/DOC using SM 5310B, and for the analysis of TSS using SM 2540D.

5.6.2 Training and Certification Documentation

All personnel are responsible for complying with the QA/QC requirements that pertain to their organizational/technical function. Technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular functions and a general knowledge of laboratory operations, test methods, QA/QC procedures, and records management. A training sign-in sheet will document that field personnel are trained and experienced in all handling techniques and procedures.

5.6.3 Field Sampling

Field personnel will be trained in proper sampling techniques, sample handling, sample preservation and storage, sample transport, COC, and standard operating procedures.

5.6.4 Analytical Laboratory

The training program for the analytical chemistry laboratory begins with reviewing the SOP for a new task. The Analytical Laboratory PM, Hai Van Nguyen, demonstrates the procedure to the trainee, shows the appropriate steps in the SOP, and explains the significance of each step. The trainee later performs the procedure under the supervision of Ms. Nguyen. At this time, questions are answered and parts of the procedure may be demonstrated again to the trainee. The trainee continues to work under the direct supervision until he/she can demonstrate the procedure with competence and full understanding. This process may be short or long, depending on the procedure. Once the trainee has demonstrated competence, Ms. Nguyen completes a training form. At this time, the employee can work without supervision. This documentation is kept in files organized by individual with a separate form for each task. On an annual basis, the analyst is requalified, and this requalification is documented on the training form as well.

5.6.5 Training Personnel

Amec Foster Wheeler's Field PM, Chris Stransky, and/or Field QA Officer, Barry Snyder, will verify that training is provided for field personnel in proper field sampling techniques prior to work initiation to ensure that consistent and appropriate sampling, sample handling/storage, and COC procedures are followed.

5.7 Documents and Records

Amec Foster Wheeler will document and track aspects of the sample collection process, including generating field logs at each site and COC forms for all samples collected. COC forms will accompany water samples to the analytical laboratory. The analytical laboratory will document and track all aspects of sample receipt and storage, analyses, and reporting.

Amec Foster Wheeler will maintain a database of information collected throughout this project. After verification and final database establishment, the raw data files and databases will be copied onto CD for storage onsite. All original data sheets, statistical worksheets, and reports produced will be accumulated into project-specific files maintained in file cabinets at the Amec Foster Wheeler office after the report has been submitted. Final report text and tables are also stored on disk and provided to the Port. After data submissions, directories are archived for storage offsite. All records will be maintained for at least five years or transferred according to agreement between the company and the client, should the laboratory transfer ownership. All records and analyses pertaining to accreditation are kept for a minimum of five years. If there is a change in company ownership, accreditation records for at least the previous five years must be transferred to the new owner.

Analytical results gathered at Weck will be stored in a database system at their main office and will be provided to Amec Foster Wheeler's PM, Barry Snyder, and Analytical QA Officer, Rolf Schottle, electronically. Data received from outside contractors will be kept exactly as received (electronically); data are error checked and processed into Amec Foster Wheeler's database system.

Persons responsible for maintaining records for this project are as follows: Mr. Snyder, Amec Foster Wheeler's PM, will oversee the operations of the project, including field QA, and will arbitrate any issues relative to records retention and any decisions to discard records. The Analytical Laboratory PM, Ms. Nguyen, will maintain all chemistry records; and the Field PM, Mr. Stransky, will maintain the data at Amec Foster Wheeler and will maintain all sample collection, sample transport, COC, and field analyses forms.

Copies of this QAPP will be distributed to the Port's PM, Karen Holman. Updates to this QAPP will be distributed in like manner, and all previous versions will be discarded from the project file.

Copies of the final report, including laboratory results and field records, will be maintained for a minimum of five years after project completion.

6.0 REPORT PREPARATION

This Special Study is being conducted in addition to the 2016 annual SIYB TMDL monitoring program. As such, the report for the Special Study will be limited to addressing the study objectives identified in Section 1 (Introduction). The annual TMDL monitoring program results will be presented in a separate report.

The Special Study report will provide a summary of water quality sampling results. In addition, the report will include a stand-alone QA/QC assessment of field and analytical data.

At a minimum, the following information will be included in the special study report:

1. *Introduction.* A presentation of the study objectives.
2. *Sampling collection methods.* This section will provide detailed information on collection locations, number of samples, and collection methods. Target and actual sampling locations will be depicted on a site map.
3. *Sample analyses.* Laboratory analytical methods, sample handling and transport, lab QA/QC results, and other pertinent information will be described.
4. *Results.* A presentation of the Special Study results in tabular and graphic form will be included in this section. This will include a table
5. *Discussion.* This section will include a discussion of the Special Study results in relation to the two study objectives.
6. *QA/QC Summary.* This section will discuss adherence to project-specific QAPP requirements, QA/QC issues to be addressed, and any necessary corrective actions.

The tables, figures, and report will be reviewed by at least two Amec Foster Wheeler staff, including, at a minimum, the PM and a QA Officer. The report will also be reviewed by a technical editor. The report will be returned to the office staff for any corrections, and the final draft will then be reviewed again by the Amec Foster Wheeler PM. The Amec Foster Wheeler PM will sign the letter of transmittal for delivery of the report to the Port PM.

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7.0 REFERENCES

- Amec Foster Wheeler. 2015. *Shelter Island Yacht Basin Dissolved Copper TMDL. Quality Assurance Project Plan*. August.
- Amec Foster Wheeler Environmental & Infrastructure, Inc. (Amec Foster Wheeler). 2016a. *2015 Shelter Island Yacht Basin Dissolved Copper TMDL Monitoring and Progress Report*.
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- Bosse, Casey Elaine-Capolupo; Rosen, Gunther; Colvin, Marienne; Earley, Patrick; Santore, Robert. (2014). Copper Bioavailability and Toxicity to *Mytilus galloprovincialis* in Shelter Island Yacht Basin, San Diego, CA. *Marine Pollution Bulletin*. 2014 Aug 15;85(1):225-34.
- California State Water Resources Control Board (State Board) (2014). *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*. Version 1.1. Updated March 2014.
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- Deltares. 2010. MAMPEC 3.0.1 AF Software. Available from: <https://www.deltares.nl/en/software/mampec/>
- Neira, C, Delgadillo-Hinojosa F, Zirino A, Mendoza G, Levin LA, Porrachia M, Deheyn DD. 2009. Spatial distribution of copper in relation to recreational boating in a California shallow-water basin. *Chemistry and Ecology*. 25:417-433.
- United States Environmental Protection Agency (USEPA). 1995. *Good Automated Laboratory Practices*. EPA/200/B-95/006. USEPA Resources Management. Triangle Park, NC.

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ATTACHMENT A

CHAIN-OF-CUSTODY FORMS

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Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

CHAIN OF CUSTODY RECORD

STANDARD

14859 East Clark Avenue : Industry : CA 91745

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

Page 1 Of 3

CLIENT NAME: <u>Amec Foster Wheeler E&I, Inc.</u>				PROJECT: <u>2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study</u>		ANALYSES REQUESTED										SPECIAL HANDLING																
ADDRESS: <u>9210 Sky Park Ct., Suite 200</u> <u>San Diego, CA 92123</u>				PHONE: <u>619-985-2405</u> FAX: <u>858-300-4301</u> EMAIL: <u>rolf.schottle@amecfw.com</u> <u>barry.snyder@amecfw.com</u>		Total Suspended Solids (TSS) Method USEPA 2540D															<input type="checkbox"/> Same Day Rush 150%											
PROJECT MANAGER <u>Rolf Schottle / Barry Snyder</u>				SAMPLER <u>Corey Sheredy (CCS) / Tyler Huff (TH)</u>																	<input type="checkbox"/> 24 Hour Rush 100%											
																					<input type="checkbox"/> 48-72 Hour Rush 75%											
																					<input type="checkbox"/> 4 - 5 Day Rush 30%											
																					<input type="checkbox"/> Rush Extractions 50%											
																					<input checked="" type="checkbox"/> 10 Business Days											
																					<input type="checkbox"/> QA/QC Data Package											
																					Charges will apply for weekends/holidays											
																					Method of Shipment:											
																					COMMENTS											
ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION		# OF CONT.																										
RELINQUISHED BY				DATE / TIME		RECEIVED BY				SAMPLE CONDITION:				SAMPLE TYPE CODE:																		
										Actual Temperature:				AQ=Aqueous NA= Non Aqueous SL = Sludge																		
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Received On Ice				Y / N																		
										Preserved				Y / N																		
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Evidence Seals Present				Y / N																		
										Container Intact				Y / N																		
										Preserved at Lab				Y / N																		

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) 10 day TAT
- 2) WECK will contact AMEC PM within 24 hours if any sample anomalies are found.
- 3) Select pages from AMEC QAPP included for reference

Appendix B
QA/QC
Completed Checklist Forms

FIELD SAMPLING QA CHECKLIST

Station Location:

Reference

Date/Time:

8/23/16

10:00

onsite

Mid sample

10:30

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined <i>* could not use at this station</i>	N
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
<u>Surface</u> , <u>middle</u> , and <u>bottom</u> samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	X
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	X
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	X
Staff avoided contaminating samples at all times	X
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD cast 11:05

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bernie J. Snyder

Date/Time 8/24/16

Print Name/Company: Amec FW

Kim Flaherty
Port

19:02
8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: 51YB-1

Date/Time: 8/23/16

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 1835

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	Y
Equipment rinsate blank and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. PPE properly removed and disposed of upon station completion _____

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bruny Snyder

Date/Time 8/24/16

Print Name/Company: Amec FW

18:50

Kim Hill
Port

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location:

51YB-01 Rep

Date/Time:

8/23/16

Mark each box with Y, N, or NA

18:55

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	<i>Y</i>
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	<i>X</i>
Tide recorded	<i>Y</i>
Weather conditions recorded	<i>Y</i>
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	<i>Y</i>
Time of sampling recorded	<i>Y</i>
Water depth at sample site recorded	<i>X</i>
Lead-line water depth determined	<i>Y</i>
General site observations recorded	<i>X</i>
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	<i>Y</i>

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	<i>Y</i>
Field staff wearing fresh, powder free nitrile gloves	<i>Y</i>
Sampling depth delineated on sampling instrument with a clear marking	<i>Y</i>
Sampling instrument given site water rinse prior to deployment	<i>Y</i>
Surface, middle, and bottom samples collected	<i>Y</i>
Sampling depths recorded	<i>Y</i>
Bottom sample collected at least 20 minutes after anchoring	<i>Y</i>
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	<i>Y</i>
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	<i>Y</i>
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	<i>Y</i>
Sample bottles correctly labeled and match the station identification	<i>Y</i>
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	<i>Y</i>
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	<i>Y</i>
Bottles filled in the following order: metals, DOC, TOC, and TSS	<i>Y</i>
COC seals have been placed over individual sample bottles	<i>Y</i>
Staff avoided contaminating samples at all times	<i>Y</i>
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	<i>Y</i>

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	X
Equipment rinsate blank and field blank have been collected (if applicable)	X
Site replicate (i.e., duplicate) collected (if applicable)	X

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bernie J. Smyth

Date/Time 8/24/16

Print Name/Company: Amec FW

18:52

Port

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: SIB-2

Date/Time: 8/23/16
1710

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	X
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 1130

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder

Date/Time 8/24/16

Print Name/Company: Amec FW

18:54

Kim t/d
Port

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location:

514B-3

Date/Time:

8/23/16

Mark each box with Y, N, or NA

1540

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	X
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	X
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	
Sampling depths recorded	X
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD = 1605

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Pranay J. Singh

Date/Time 8/24/16

Print Name/Company: Amec FW

18:55

Ann Hahn
P.O.A

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: S1YB-4

Date/Time: 8/23/16

Mark each box with Y, N, or NA

1425

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD 1455

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand/delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bronny J. Smyke

Date/Time 8/24/16

Print Name/Company: Amec Fu

18:57

Amec Fu
Port

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location:

SIB 5

Date/Time:

8/23/16

Mark each box with Y, N, or NA

1305

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
<u>Surface</u> , <u>middle</u> , and <u>bottom</u> samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD 140

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Berny J. Snyder

Date/Time 8/24/16

Print Name/Company: Amec FW

18:57

Kim Hall
B.A.

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: S14B6

Date/Time: 8/23/16
11:50

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	X
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	X
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	X
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	X
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

Construction at Nimitz facility, but

no in-water construction

CTD time 1225

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Barry J. Snyder

Date/Time 8/24/16

Print Name/Company: Amee FW

18:59

John Hall
B.I.T

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: Filter Blank Date/Time: 8/23/16
19:15

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	N/A
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	
Tide recorded	
Weather conditions recorded	
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	
Time of sampling recorded	
Water depth at sample site recorded	
Lead-line water depth determined	
General site observations recorded	
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	N/A
Field staff wearing fresh, powder free nitrile gloves	
Sampling depth delineated on sampling instrument with a clear marking	
Sampling instrument given site water rinse prior to deployment	
Surface, middle, and bottom samples collected	
Sampling depths recorded	
Bottom sample collected at least 20 minutes after anchoring	
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	
Sample bottles correctly labeled and match the station identification	
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	
Bottles filled in the following order: metals, DOC, TOC, and TSS	
COC seals have been placed over individual sample bottles	
Staff avoided contaminating samples at all times	
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	Y
Equipment rinsate blank and field blank have been collected (if applicable)	NA
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bonny J. Smyth

Date/Time 8/24/16

Print Name/Company: Amea PA

19:02

Am H
Port

8/25/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS-1 Date/Time: 8/24/16

Mark each box with Y, N, or NA *Note: Stations 1 + 3 done out*

Field Procedures *of order. Hull cleaner too close to SS-3.*

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	N*
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined <i>16' 8"</i>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	X
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

* need to moor in a more safe location nearby due to wind

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel:

Barry Guehl
Cory Sherry

Date/Time 8/25/2016 2:00

Print Name/Company:

Avec Fu
K. + I
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location:

SS-3

Date/Time:

8/24/16
15:15

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	N**
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	17' 6"
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y*

2. Sampling procedures:

A. Water Samples

* cleaner about 40-45 ft to sitting south
Waited 15 minutes after he was done to
collect. Diver said paint on boat is cleaned
+ 5 years old

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

** 80-90 from site. Side tied. Target site
not safe due to winds CTX@ 15:50

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	Y
Equipment rinsate blank and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable)	N

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

4. Data Recording:

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

SS - 3 last station

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Field Blank and Filter blank both done
at this station starting at 15:40

Signature of QA/QC Personnel: Benny Smith
Benny Smith
Print Name/Company: Ameri Pak

Date/Time 8/25/2016 2100

Tom Hall
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: **SS - 5**

Date/Time:

8/24/16
13:00

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined 15' 6" 15' 6"	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	X
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Benny Surfel

Signature of QA/QC Personnel: *[Signature]*

Date/Time 8/25/2016 2000

Print Name/Company: Ameri FW

[Signature]
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS-07

Date/Time: 8/24/16
11:00

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined <u>21.5'</u>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 11:35

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	Y/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Benny Singh
Signature of QA/QC Personnel: Cory Shredy
Print Name/Company: Amec FW
Amec FW
Port

Date/Time 8/25/2016 2:00

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS-07 Rep Date/Time: 8/24/16
1200

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. \pm 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	X
Lead-line water depth determined <u>22' 0"</u>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable) @ site 7	Y

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	X
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Benny Engel

Signature of QA/QC Personnel: *Cory Shundy*

Date/Time 8/25/2016 2:00

Print Name/Company: Amec FW

K. T. Hall
R.A.

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: **SS-9**

Date/Time: **8/24/16**
9:55

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined 22.3'	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y*

2. Sampling procedures: *** there was a cleaner about 180' SW. Left 10 minutes before first sample collection**

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	X
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	X
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
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 10:25

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Bruce Snyder

Signature of QA/QC Personnel: Corey Sherry

Date/Time 8/25/2016 2:00

Print Name/Company: Amer Fu

Kim Hahn
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: **SS - 11**

Date/Time: **8/24/16**

Mark each box with Y, N, or NA

0830

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded 19' 0"	Y
Lead-line water depth determined 19' 0"	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 9:05

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel: Bronny Smych
Cory Shredy

Date/Time 8/25/2016 2100

Print Name/Company: Ameri Fu

Kurt / al
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: **SS-2**

Date/Time: **8/25/16**

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	N*
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded 18' 6"	Y
Lead-line water depth determined 18' 6"	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

** needed to relocate due to direction of wind and narrow access channel. Relocated to more open area.*

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

C + D @ 16:18

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	Y*
Equipment rinsate blank and <u>field blank</u> have been collected (if applicable)	Y**
Site replicate (i.e., duplicate) collected (if applicable)	N

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or <u>courier</u> pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

* done at dock during demob
** done at dock during demob

Signature of QA/QC Personnel:

Corey Sherry
Bonny Sanchez

Date/Time 8/26/2016 1130

Print Name/Company:

Amee Fu

[Signature]
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location:

SS - 4

Date/Time:

8/25/16
14:30

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined 22' 3"	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	X
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 1525

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N
Site replicate (i.e., duplicate) collected (if applicable)	Y

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Barry J. Snyder

Signature of QA/QC Personnel: Cory Shureddy Date/Time 8/26/2016 1130

Print Name/Company: Amee Fu

Kim H. Lee
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS-4 Rep Date/Time: 8/25/16

Mark each box with Y, N, or NA

15:40

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	X
Lead-line water depth determined <u>23' 0"</u>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	X
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	X
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD 1615

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	Y
Site replicate (i.e., duplicate) collected (if applicable) at site SS-04	Y

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or courier pickup	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Barry J. Smyth

Signature of QA/QC Personnel: Cory Shucray Date/Time 8/26/2016 1130

Print Name/Company: Ameri Env

Jim Hall
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS - 06

Date/Time: 8/25/16 13:20

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	N**
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	X
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y

2. Sampling procedures:

** none visible*
*** about 100 ft East of site - wind (weather vaning)*
A. Water Samples *did not permit anchoring in access channel.*

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	X
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	X
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	X
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

C+D @ 1358

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	<u>Y</u>
Cooler and samples hand delivered to labs or <u>courier</u> pickup	<u>Y</u>
Completed COC included with courier to hand deliver to labs	<u>Y</u>

Additional Notes:

Signature of QA/QC Personnel:

*Long Sheng
Barney Snyder*
Ames PW

Date/Time 8/26/2016 1130

Print Name/Company:

Ames PW
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS-8

Date/Time: 8/25/16
12:00

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been anchored (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y*

2. Sampling procedures: * hull cleaning 300 ft SW of collection site at SW Yacht Club.

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	X
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
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

etD @ 1240

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	<u>Y</u>
Cooler and samples hand delivered to labs or <u>courier</u> pickup	<u>Y</u>
Completed COC included with courier to hand deliver to labs	<u>Y</u>

Additional Notes:

Signature of QA/QC Personnel: *Courtesy*
Brady Snyder

Date/Time 8/26/2016 1130

Print Name/Company: AMEC Fw

Ken Allen
Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS - 10

Date/Time: 8/25/16

Mark each box with Y, N, or NA

10:45

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. ± 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined <u>22' 3"</u>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area -- if active, evaluate moving to a new station	Y

2. Sampling procedures:

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	Y
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD@ 1140

FIELD SAMPLING QA CHECKLIST

0.45 μ m Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

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

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	<u>Y</u>
Cooler and samples hand delivered to labs or courier pickup	<u>Y</u>
Completed COC included with courier to hand deliver to labs	<u>Y</u>

Additional Notes:

Signature of QA/QC Personnel:

Barry Snyder

Date/Time 8/26/2016 1130

Print Name/Company:

Ameri Pu

Port

8/29/16

FIELD SAMPLING QA CHECKLIST

Station Location: SS -12 Date/Time: 8/25/16

Mark each box with Y, N, or NA

Field Procedures

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

Vessel has been <u>anchored</u> (or tied off)	Y
Station GPS coordinates (approx. \pm 10 m) and station identification verified and recorded	Y
Tide recorded	Y
Weather conditions recorded	Y
Surface water conditions (incl. currents) recorded (including H2O clarity by Secchi disk)	Y
Time of sampling recorded	Y
Water depth at sample site recorded	Y
Lead-line water depth determined <u>22' 6"</u>	Y
General site observations recorded	Y
Check for boat cleaning operations in the area – if active, evaluate moving to a new station	Y*

2. Sampling procedures: * land side activity going on. No in-water at Nimitz Facility.

A. Water Samples

Vessel engine has been shut off for 3-5 minutes prior to sampling	Y
Field staff wearing fresh, powder free nitrile gloves	Y
Sampling depth delineated on sampling instrument with a clear marking	Y
Sampling instrument given site water rinse prior to deployment	Y
Surface, middle, and bottom samples collected	X
Sampling depths recorded	Y
Bottom sample collected at least 20 minutes after anchoring	Y
SWAMP protocols utilized to avoid sample contamination (i.e., clean hands/dirty hands technique)	Y
Samples bottles and containers are the correct type in accordance with Table 10 in the QAPP	Y
Sample bottles contain correct preservative in accordance with Table 10 in the QAPP	Y
Sample bottles correctly labeled and match the station identification	Y
Sample bottles correctly labeled with date and time in accordance with Table 10 in the QAPP	Y
Field filter given 500 mL site water rinse prior to collecting dissolved metals samples	Y
Bottles filled in the following order: metals, DOC, TOC, and TSS	Y
COC seals have been placed over individual sample bottles	Y
Staff avoided contaminating samples at all times	Y
pH and salinity readings taken 2 times: when arriving on station and prior to leaving	Y

CTD @ 9:50

71' east of Sprawl

FIELD SAMPLING QA CHECKLIST

0.45 µm Filter blank collected (one per day)	N/A
Equipment rinsate blank and field blank have been collected (if applicable)	N/A
Site replicate (i.e., duplicate) collected (if applicable)	N/A

3. PPE properly removed and disposed of upon station completion

Y

4. Data Recording:

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

5. Sample Storage:

Water samples properly stored on ice in a cooler	Y
Cooler and samples hand delivered to labs or <u>courier pickup</u>	Y
Completed COC included with courier to hand deliver to labs	Y

Additional Notes:

Signature of QA/QC Personnel:

Louise Shuready
Bruce Snyder

Date/Time 8/26/2016 1130

Print Name/Company:

Ameri Pu

Jim Hild
Port

8/29/16

Appendix C

Chain-of-Custody Forms



Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

CHAIN OF CUSTODY RECORD

14859 East Clark Avenue : Industry : CA 91745

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

STANDARD

Page 1 Of 1

CLIENT NAME:		PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING									
ADDRESS:		PHONE:		FAX:		EMAIL:		SAMPLER		Total Copper		Dissolved Copper		Total Zinc		Dissolved Zinc		Total Organic Carbon (TOC)		Dissolved Organic Carbon (DOC)		Charges will apply for weekends/holidays	
ID#	DATE	TIME	SMPL	SAMPLE IDENTIFICATION/SITE LOCATION		# OF	Total Copper		Dissolved Copper		Total Zinc		Dissolved Zinc		Total Organic Carbon (TOC)		Dissolved Organic Carbon (DOC)		Method of Shipment:		COMMENTS		
(For Lab Use Only)	SAMPLED	SAMPLED	TYPE			CONT.	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L RL= 0.01 µg/L					
SIYB-1	08/23/16	1755	seawater			14	X	X	X	X	X	X	X	X	X	X	X	X	X			extra vol. analyze sample MS/MSD	
SIYB-1 (REP)	08/23/16	1840	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-2	08/23/16	1650	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-3	08/23/16	1525	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-4	08/23/16	1400	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-5	08/23/16	1240	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-6	08/23/16	1130	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-REF	08/23/16	1000	seawater			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-ER	08/23/16	0800	DI			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
SIYB-FB	08/23/16	1710	DI			8	X	X	X	X	X	X	X	X	X	X	X	X	X				
RELINQUISHED BY		DATE / TIME		RECEIVED BY		SAMPLE CONDITION:		SAMPLE TYPE CODE:															
Barry J. Snyder		2235 8/23/16		[Signature]		Actual Temperature: 4.5°C		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															
RELINQUISHED BY		DATE / TIME		RECEIVED BY		Received On Ice		Y / N															
						Preserved		Y / N															
RELINQUISHED BY		DATE / TIME		RECEIVED BY		Evidence Seals Present		Y / N															
						Container Intact		Y / N															
						Preserved at Lab		Y / N															

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) DOC samples were field filtered through 0.45 um Nylon 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.



Weck Laboratories, Inc.

Analytical Laboratory Services - Since 1964

CHAIN OF CUSTODY RECORD

STANDARD

8/24/2014

Page 1 Of 3

14859 East Clark Avenue : Industry : CA 91745

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

CLIENT NAME: Amec Foster Wheeler E&I, Inc.				PROJECT: 2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study				ANALYSES REQUESTED										SPECIAL HANDLING		
ADDRESS: 9210 Sky Park Ct., Suite 200 San Diego, CA 92123				PHONE: 619-985-2405 FAX: 858-300-4301 EMAIL: rolf.schottle@amecfw.com barry.snyder@amecfw.com				<div><div>Total Copper 1 Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Dissolved Copper 1,2 Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Total Zinc 1 Method EPA 1640 MDL 0.035 µg/L, RL = 0.20 µg/L</div><div>Dissolved Zinc 1,2 Method EPA 1640 MDL 0.035 µg/L, RL = 0.20 µg/L</div><div>Total Organic Carbon (TOC) Method USEPA 8310B MDL = 0.016 mg/L, RL = 0.10 mg/L</div><div>Dissolved Organic Carbon (DOC) 3 Method USEPA 8310B MDL = 0.016 mg/L, RL = 0.10 mg/L</div><div>Total Suspended Solids (TSS) Method USEPA 2540D</div></div>										<div><input type="checkbox"/> Same Day Rush 150% <input type="checkbox"/> 24 Hour Rush 100% <input type="checkbox"/> 48-72 Hour Rush 75% <input type="checkbox"/> 4 - 5 Day Rush 30% <input type="checkbox"/> Rush Extractions 50% <input checked="" type="checkbox"/> 10 Business Days <input type="checkbox"/> QA/QC Data Package</div>		
PROJECT MANAGER Barry Snyder				SAMPLER Corey Sheredy (CCS) / Tyler Huff (TH)														Charges will apply for weekends/holidays		
ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION				# OF CONT.											Method of Shipment:	
																COMMENTS				
SS-01-T	08/24/16	1420	seawater					9	X	X	X	X	X	X	X					
SS-03-T	08/24/16	155	seawater					9	X	X	X	X	X	X	X					
SS-05-T	08/24/16	1300	seawater					9	X	X	X	X	X	X	X					
SS-07-T	08/24/16	1100	seawater					15	X	X	X	X	X	X	X				extra vol. analyze sample MS/MSD	
SS-07-T (REP)	08/24/16	1200	seawater					9	X	X	X	X	X	X	X					
SS-09-T	08/24/16	0955	seawater					9	X	X	X	X	X	X	X					
SS-11-T	08/24/16	0830	seawater					9	X	X	X	X	X	X	X					
SS-FB-01	08/24/16	1600	DI					9	X	X	X	X	X	X	X					
SS-Filter Rinse-01	08/24/16	1620	DI					1		X		X								
RELINQUISHED BY <i>Kumone Gobbie</i>				DATE / TIME 8.25.16 1230				RECEIVED BY <i>Albert Silva</i>				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				
RELINQUISHED BY <i>Albert Silva</i>				DATE / TIME 8/25/16 12:30				RECEIVED BY												
RELINQUISHED BY				DATE / TIME				RECEIVED BY												

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) LAB ACTION: PRESERVE Cu/Zn IMMEDIATELY; 2) Diss. metals were field filtered using 0.45 um bottle top filt. system; 3) DOC samples were field filtered through 0.45 um Nylon filters.
- 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
- 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
- 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L



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Page 2 Of 3

CLIENT NAME:				PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
ADDRESS:				PHONE:													
PROJECT MANAGER				SAMPLER													
ID# (For Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION		# OF CONT.	Total Copper 1 Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	Dissolved Copper 1.2 Method EPA 1640 MDL 0.004 µg/L, RL= 0.01 µg/L	Total Zinc 1 Method EPA 1640 MDL 0.006 µg/L, RL= 0.20 µg/L	Dissolved Zinc 1.2 Method EPA 1640 MDL 0.006 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) 3 Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Total Suspended Solids (TSS) Method USEPA 2540D				
SS-01-M	08/24/16	1430	seawater			9	X	X	X	X	X	X	X				
SS-03-M	08/24/16	1530	seawater			9	X	X	X	X	X	X	X				
SS-05-M	08/24/16	1310	seawater			9	X	X	X	X	X	X	X				
SS-07-M	08/24/16	1115	seawater			9	X	X	X	X	X	X	X				
SS-07-M (REP)	08/24/16	1210	seawater			9	X	X	X	X	X	X	X				
SS-09-M	08/24/16	1005	seawater			9	X	X	X	X	X	X	X				
SS-11-M	08/24/16	0845	seawater			9	X	X	X	X	X	X	X				
RELINQUISHED BY				DATE / TIME		RECEIVED BY				SAMPLE CONDITION:				SAMPLE TYPE CODE:			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Actual Temperature:				AQ=Aqueous			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Received On Ice				Y / N DW = Drinking Water			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Preserved				Y / N WW = Waste Water			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Evidence Seals Present				Y / N RW = Rain Water			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Container Intact				Y / N GW = Ground Water			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Preserved at Lab				Y / N SO = Soil			
RELINQUISHED BY				DATE / TIME		RECEIVED BY								SW = Solid Waste			
RELINQUISHED BY				DATE / TIME		RECEIVED BY								OL = Oil			
RELINQUISHED BY				DATE / TIME		RECEIVED BY								OT = Other Matrix			

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) **LAB ACTION:** PRESERVE Cu/Zn IMMEDIATELY; 2) Diss. metals were field filtered using 0.45 um bottle top filt. system; 3) DOC samples were field filtered through 0.45 um Nylon filters.
- 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
- 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
- 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L



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Page 3 Of 3

CLIENT NAME: Amec Foster Wheeler E&I, Inc.				PROJECT: 2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study		ANALYSES REQUESTED										SPECIAL HANDLING	
ADDRESS: 9210 Sky Park Ct., Suite 200 San Diego, CA 92123				PHONE: 619-985-2405 FAX: 858-300-4301 EMAIL: rolf.schottle@amecfw.com barry.snyder@amecfw.com		Total Copper 1 Method EPA 1640 MDL = 0.004 µg/L, RL = 0.01 µg/L	Dissolved Copper 1,2 Method EPA 1640 MDL = 0.004 µg/L, RL = 0.01 µg/L	Total Zinc 1 Method EPA 1640 MDL = 0.036 µg/L, RL = 0.20 µg/L	Dissolved Zinc 1,2 Method EPA 1640 MDL = 0.036 µg/L, RL = 0.20 µg/L	Total Organic Carbon (TOC) Method EPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Dissolved Organic Carbon (DOC) 3 Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Total Suspended Solids (TSS) Method USEPA 2540D				<input type="checkbox"/> Same Day Rush 150% <input type="checkbox"/> 24 Hour Rush 100% <input type="checkbox"/> 48-72 Hour Rush 75% <input type="checkbox"/> 4 - 5 Day Rush 30% <input checked="" type="checkbox"/> Rush Extractions 50% <input type="checkbox"/> 10 Business Days <input type="checkbox"/> QA/QC Data Package	
PROJECT MANAGER Barry Snyder				SAMPLER Corey Sheredy (CCS) / Tyler Huff (TH)													Charges will apply for weekends/holidays
ID# (For Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.											Method of Shipment:	
SS-01-B	08/24/16	1440	seawater		9	X	X	X	X	X	X					COMMENTS	
SS-03-B	08/24/16	1540	seawater		9	X	X	X	X	X	X						
SS-05-B	08/24/16	1325	seawater		9	X	X	X	X	X	X						
SS-07-B	08/24/16	1125	seawater		9	X	X	X	X	X	X						
SS-07-B (REP)	08/24/16	1225	seawater		9	X	X	X	X	X	X						
SS-09-B	08/24/16	1015	seawater		9	X	X	X	X	X	X						
SS-11-B	08/24/16	0855	seawater		9	X	X	X	X	X	X						
RELINQUISHED BY <i>Rumone Gabbri</i>				DATE / TIME 8-25-16 1230		RECEIVED BY <i>Tyler Huff</i> 8/25/16 12:30						SAMPLE CONDITION: Actual Temperature:			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		
RELINQUISHED BY				DATE / TIME		RECEIVED BY						Received On Ice Y / N Preserved Y / N Evidence Seals Present Y / N Container Intact Y / N Preserved at Lab Y / N					
RELINQUISHED BY				DATE / TIME		RECEIVED BY											

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) LAB ACTION: PRESERVE Cu/Zn IMMEDIATELY; 2) Diss. metals were field filtered using 0.45 µm bottle-top filt. system; 3) DOC samples were field filtered through 0.45 µm Nylon filters.
 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 µg/L; Zinc = 30 µg/L; TOC/DOC = 2.0 mg/L

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CLIENT NAME:	PROJECT:	ANALYSES REQUESTED										SPECIAL HANDLING	
Amec Foster Wheeler E&I, Inc.	2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study	er 1 6640 MDL 0.004 µg/L, RL = 0.01 µg/L Copper 1,2 6640 MDL 0.004 µg/L, RL = 0.01 µg/L 1 6640 MDL 0.036 µg/L, RL = 0.20 µg/L Zinc 1,2 6640 MDL 0.036 µg/L, RL = 0.20 µg/L Inic Carbon (TOC) YA 53105 MDL = 0.016 mg/L, RL = 0.10 mg/L Organic Carbon (DOC) 3 YA 53105 MDL = 0.016 mg/L, RL = 0.10 mg/L ended Solids (TSS) YA 254QD	<input type="checkbox"/>	Same Day Rush 150%									
ADDRESS:	PHONE: 619-985-2405		<input type="checkbox"/>	24 Hour Rush 100%									
9210 Sky Park Ct., Suite 200	FAX: 858-300-4301		<input type="checkbox"/>	48-72 Hour Rush 75%									
San Diego, CA 92123	EMAIL: rolf.schottle@amecfw.com barry.snyder@amecfw.com		<input type="checkbox"/>	4 - 5 Day Rush 30%									
PROJECT MANAGER	SAMPLER		<input checked="" type="checkbox"/>	Rush Extractions 50%									
Rolf Schottle / Barry Snyder	Corey Sheredy (CCS) / Tyler Huff (TH)		<input type="checkbox"/>	10 Business Days									
			<input type="checkbox"/>	QA/QC Data Package									
		Charges will apply for weekends/holidays											

[illegible]

RELINQUISHED BY <i>Kumbur & Gobbi</i>	DATE / TIME <i>8.26.16 1130</i>	RECEIVED BY <i>Hector Sanchez</i>	SAMPLE CONDITION: Actual Temperature:	SAMPLE TYPE CODE: AQ=Aqueous NA= Non Aqueous SL = Sludge
RELINQUISHED BY	DATE / TIME	RECEIVED BY	Received On Ice Y / N Preserved Y / N Evidence Seals Present Container Intact Y / N	DW = Drinking Water WW = Waste Water RW = Rain Water GW = Ground Water
RELINQUISHED BY	DATE / TIME	RECEIVED BY	Preserved at Lab Y / N	SO = Soil SW = Solid Waste OL = Oil OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) **LAB ACTION:** PRESERVE Cu/Zn IMMEDIATELY; 2) Diss. metals were field filtered using 0.45 um bottle top filt. system; 3) DOC samples were field filtered through 0.45 um Nylon filters.
4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L
9) Select pages from AMEC QAPP included for reference



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CLIENT NAME:				PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
Amec Foster Wheeler E&I, Inc.				2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study												Same Day Rush 150%	
ADDRESS:				PHONE: 619-985-2405												24 Hour Rush 100%	
9210 Sky Park Ct., Suite 200				FAX: 858-300-4301												48-72 Hour Rush 75%	
San Diego, CA 92123				EMAIL: rolf.schottle@amecfw.com												4 - 5 Day Rush 30%	
				EMAIL: barry.snyder@amecfw.com												Rush Extractions 50%	
PROJECT MANAGER				SAMPLER												10 Business Days	
Rolf Schottle / Barry Snyder				Corey Sheredy (CCS) / Tyler Huff (TH)												QA/QC Data Package	
ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Total Copper 1 Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L	Dissolved Copper 12 Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L	Total Zinc 1 Method EPA 1640 MDL 0.036 µg/L, RL = 0.20 µg/L	Dissolved Zinc 12 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) 3 Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Total Suspended Solids (TSS) Method USEPA 2540D					
SS-02-B	08/25/16	1710	seawater		9	X	X	X	X	X	X	X					
SS-04-B	08/25/16	1510	seawater		9	X	X	X	X	X	X	X					
SS-04-B (REP)	08/25/16	1610	seawater		9	X	X	X	X	X	X	X					
SS-06-B	08/25/16	1340	seawater		9	X	X	X	X	X	X	X					
SS-08-B	08/25/16	1220	seawater		9	X	X	X	X	X	X	X					
SS-10-B	08/25/16	1105	seawater		9	X	X	X	X	X	X	X					
SS-12-B	08/25/16	0940	seawater		9	X	X	X	X	X	X	X					
RELINQUISHED BY				DATE / TIME		RECEIVED BY				SAMPLE CONDITION:				SAMPLE TYPE CODE:			
<i>Rumbone Gabor</i>				8-26-16 1130		<i>Heck Sanchez</i>				Actual Temperature:				AQ=Aqueous			
RELINQUISHED BY				DATE / TIME		RECEIVED BY				Received On Ice				Y / N			
										Preserved				Y / N			
										Evidence Seals Present				Y / N			
										Container Intact				Y / N			
										Preserved at Lab				Y / N			
RELINQUISHED BY				DATE / TIME		RECEIVED BY								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) LAB ACTION: PRESERVE Cu/Zn IMMEDIATELY; 2) Diss. metals were field filtered using 0.45 um bottletop filt. system; 3) DOC samples were field filtered through 0.45 um Nylon filters.
- 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
- 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
- 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L
- 9) Select pages from AMEC QAPP included for reference



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Page 1 Of 1

CLIENT NAME:				PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
ADDRESS:				PHONE:		<div><div>Total Copper Method EPA 1631 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Dissolved Copper² Method EPA 1631 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Total Zinc Method EPA 1631 MDL 0.036 µg/L, RL = 0.20 µg/L</div><div>Dissolved Zinc² Method EPA 1631 MDL 0.036 µg/L, RL = 0.20 µg/L</div><div>Total Organic Carbon (TOC) Method USEPA 8100 MDL = 0.016 mg/L, RL = 0.10 mg/L</div><div>Dissolved Organic Carbon (DOC)¹ Method USEPA 8100 MDL = 0.016 mg/L, RL = 0.10 mg/L</div></div>										<div><input type="checkbox"/> Same Day Rush 150%</div> <div><input type="checkbox"/> 24 Hour Rush 100%</div> <div><input type="checkbox"/> 48-72 Hour Rush 75%</div> <div><input type="checkbox"/> 4 - 5 Day Rush 30%</div> <div><input type="checkbox"/> Rush Extractions 50%</div> <div><input checked="" type="checkbox"/> 10 Business Days</div> <div><input type="checkbox"/> QA/QC Data Package</div>	
PROJECT MANAGER				SAMPLER												Charges will apply for weekends/holidays	
ID# (For Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.											COMMENTS	
SIYB-1	08/23/16	1755	seawater		14	X	X	X	X	X	X				extra vol. analyze sample MS/MSD		
SIYB-1 (REP)	08/23/16	1840	seawater		8	X	X	X	X	X	X						
SIYB-2	08/23/16	1650	seawater		8	X	X	X	X	X	X						
SIYB-3	08/23/16	1525	seawater		8	X	X	X	X	X	X						
SIYB-4	08/23/16	1400	seawater		8	X	X	X	X	X	X						
SIYB-5	08/23/16	1240	seawater		8	X	X	X	X	X	X						
SIYB-6	08/23/16	1130	seawater		8	X	X	X	X	X	X						
SIYB-REF	08/23/16	1000	seawater		8	X	X	X	X	X	X						
SIYB-ER	08/23/16	0800	DI		8	X	X	X	X	X	X						
SIYB-FB	08/23/16	1710	DI		8	X	X	X	X	X	X						

RELINQUISHED BY	DATE / TIME	RECEIVED BY	SAMPLE CONDITION:	SAMPLE TYPE CODE:
<i>Barry J. Snyder</i>	2235 8/23/16	<i>[Signature]</i>	Actual Temperature: 4.5°C	AQ=Aqueous NA= Non Aqueous SL = Sludge
RELINQUISHED BY	DATE / TIME	RECEIVED BY	Received On Ice Preserved Evidence Seals Present Container Intact Preserved at Lab	DW = Drinking Water WW = Waste Water RW = Rain Water GW = Ground Water SO = Soil SW = Solid Waste OL = Oil OT = Other Matrix
RELINQUISHED BY	DATE / TIME	RECEIVED BY		

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) DOC samples were field filtered through 0.45 um Nylon 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.



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Page 3 Of 3

CLIENT NAME:		PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
ADDRESS:		PHONE:												<input type="checkbox"/> Same Day Rush 150%	
PROJECT MANAGER		SAMPLER												<input type="checkbox"/> 24 Hour Rush 100%	
ID#	DATE	TIME	SMPL	SAMPLE IDENTIFICATION/SITE LOCATION	# OF	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc	Total Organic Carbon (TOC)	Dissolved Organic Carbon (DOC)	Total Suspended Solids (TSS)	<input type="checkbox"/> 48-72 Hour Rush 75%		
(For lab Use Only)	SAMPLED	SAMPLED	TYPE		CONT.	Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L	Method EPA 1640 MDL 0.004 µg/L, RL = 0.01 µg/L	Method EPA 1640 MDL 0.038 µg/L, RL = 0.20 µg/L	Method EPA 1640 MDL 0.038 µg/L, RL = 0.20 µg/L	Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Method USEPA 5310B MDL = 0.016 mg/L, RL = 0.10 mg/L	Method USEPA 2540D	<input type="checkbox"/> 4 - 5 Day Rush 30%		
SIYB-1-B	08/23/16	1830	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> Rush Extractions 50%	
SIYB-1-B (REP)	08/23/16	1905	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> 10 Business Days	
SIYB-2-B	08/23/16	1720	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> QA/QC Data Package	
SIYB-3-B	08/23/16	1555	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> Charges will apply for weekends/holidays	
SIYB-4-B	08/23/16	1445	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> Method of Shipment:	
SIYB-5-B	08/23/16	1305	seawater		9	X	X	X	X	X	X	X		<input type="checkbox"/> COMMENTS	
SIYB-6-B	08/23/16	1210	seawater		9	X	X	X	X	X	X	X			
SIYB-REF-B	08/23/16	1050	seawater		9	X	X	X	X	X	X	X			
RELINQUISHED BY		DATE / TIME		RECEIVED BY		SAMPLE CONDITION:		SAMPLE TYPE CODE:							
Barry J. Snyder		2235 8/23/16		[Signature]		Actual Temperature: 4.5°C		AQ=Aqueous NA= Non Aqueous SL = Sludge							
RELINQUISHED BY		DATE / TIME		RECEIVED BY		Received On Ice		DW = Drinking Water							
						Preserved		WW = Waste Water							
						Evidence Seals Present		RW = Rain Water							
						Container Intact		GW = Ground Water							
						Preserved at Lab		SO = Soil							
								SW = Solid Waste							
								OL = Oil							
								OT = Other Matrix							

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) LAB ACTION: PRESERVE Cu/Zn IMMEDIATELY; 2) DOC samples were field filtered through 0.45 um Nylon filters; 3) Diss. metals were field filtered using 0.45 um bottle top filt. system.
- 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
- 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
- 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L
- 9) Select pages from AMEC QAPP included for reference



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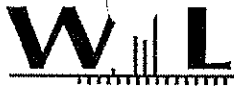
Page 2 Of 3

CLIENT NAME:				PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
Amec Foster Wheeler E&I, Inc.				2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study												<input type="checkbox"/> Same Day Rush 150%	
ADDRESS:				PHONE: 619-985-2405												<input type="checkbox"/> 24 Hour Rush 100%	
9210 Sky Park Ct., Suite 200				FAX: 858-300-4301												<input type="checkbox"/> 48-72 Hour Rush 75%	
San Diego, CA 92123				EMAIL: rolf.schottle@amecfw.com												<input type="checkbox"/> 4 - 5 Day Rush 30%	
PROJECT MANAGER				SAMPLER												<input type="checkbox"/> Rush Extractions 50%	
Rolf Schottle / Barry Snyder				Corey Sheredy (CCS) / Tyler Huff (TH)												<input checked="" type="checkbox"/> 10 Business Days	
																<input type="checkbox"/> QA/QC Data Package	
																Charges will apply for weekends/holidays	
																Method of Shipment:	
																COMMENTS	
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 Method EPA 1640 MDL 0.004 µg/L RL = 0.01 µg/L	Total Zinc Method EPA 1640 MDL 0.035 µg/L RL = 0.20 µg/L	Dissolved Zinc Method EPA 1640 MDL 0.035 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) Method USEPA 5310B MDL = 0.016 mg/L RL = 0.10 mg/L	Total Suspended Solids (TSS) Method USEPA 2540D					
SIYB-1-M	08/23/16	1815	seawater		15	X	X	X	X	X	X	X					extra vol. analyze sample MS/MSD
SIYB-1-M (REP)	08/23/16	1855	seawater		9	X	X	X	X	X	X	X					
SIYB-2-M	08/23/16	1710	seawater		9	X	X	X	X	X	X	X					
SIYB-3-M	08/23/16	1540	seawater		9	X	X	X	X	X	X	X					
SIYB-4-M	08/23/16	1425	seawater		9	X	X	X	X	X	X	X					
SIYB-5-M	08/23/16	1305	seawater		9	X	X	X	X	X	X	X					
SIYB-6-M	08/23/16	1150	seawater		9	X	X	X	X	X	X	X					
SIYB-REF-M	08/23/16	1030	seawater		9	X	X	X	X	X	X	X					
SIYB-Filter Blank	08/23/16	1920	DI		1		X		X								

RELINQUISHED BY	DATE / TIME	RECEIVED BY	SAMPLE CONDITION:	SAMPLE TYPE CODE:
<i>Barry J. Snyder</i>	2235 8/23/16	<i>[Signature]</i>	Actual Temperature: 4.5°C	AQ=Aqueous
RELINQUISHED BY	DATE / TIME	RECEIVED BY	Received On Ice	NA= Non Aqueous
			Preserved	SL = Sludge
			Evidence Seals Present	DW = Drinking Water
			Container Intact	WW = Waste Water
			Preserved at Lab	RW = Rain Water
				GW = Ground Water
				SO = Soil
				SW = Solid Waste
				OL = Oil
				OT = Other Matrix

SPECIAL REQUIREMENTS / BILLING INFORMATION:

- 1) LAB ACTION: PRESERVE Cu/Zn IMMEDIATELY; 2) DOC samples were field filtered through 0.45 um Nylon filters; 3) Diss. metals were field filtered using 0.45 um bottletop filt. system.
- 4) 10 day TAT; 5) Organic carbon will be measured by Weck using High Temperature Combustion Method (SM 5310 B)
- 6) Preserve extra of each sample for total copper and zinc AND filter and preserve extra for dissolved metals to archive
- 7) WECK will contact AMEC PM within 24 hours if any sample anomalies are found. 8) SPIKE level at the following amounts = Copper = 10 ug/L; Zinc = 30 ug/L; TOC/DOC = 2.0 mg/L
- 9) Select pages from AMEC QAPP included for reference



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Page 1 Of 3

CLIENT NAME: Amec Foster Wheeler E&I, Inc.				PROJECT: 2016 Shelter Island Yacht Basin Enhanced Water Quality Special Study				ANALYSES REQUESTED												SPECIAL HANDLING	
ADDRESS: 9210 Sky Park Ct., Suite 200 San Diego, CA 92123				PHONE: 619-985-2405 FAX: 858-300-4301 EMAIL: rolf.schottle@amecfw.com barry.snyder@amecfw.com				Total Suspended Solids (TSS) Method USEPA 2540D													<input type="checkbox"/> Same Day Rush 150%
PROJECT MANAGER Rolf Schottle / Barry Snyder				SAMPLER Corey Sheredy (CCS) / Tyler Huff (TH)																<input type="checkbox"/> 24 Hour Rush 100%	
																			<input type="checkbox"/> 48-72 Hour Rush 75%		
																			<input type="checkbox"/> 4 - 5 Day Rush 30%		
																			<input type="checkbox"/> Rush Extractions 50%		
																			<input checked="" type="checkbox"/> 10 Business Days		
																			<input type="checkbox"/> QA/QC Data Package		
																			Charges will apply for weekends/holidays		
																				Method of Shipment:	
																				COMMENTS	
ID# (For Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION			# OF CONT.													extra vol. analyze sample MS/MSD	
SIYB-1-T	08/23/16	1755	seawater				1	X													
SIYB-1-T (REP)	08/23/16	1846	seawater				1	X													
SIYB-2-T	08/23/16	1650	seawater				1	X													
SIYB-3-T	08/23/16	1525	seawater				1	X													
SIYB-4-T	08/23/16	1400	seawater				1	X													
SIYB-5-T	08/23/16	1246	seawater				1	X													
SIYB-6-T	08/23/16	1130	seawater				1	X													
SIYB-REF-T	08/23/16	1000	seawater				1	X													
RELINQUISHED BY <i>Barry J. Snyder</i>				DATE / TIME 2235 8/23/16			RECEIVED BY <i>AS</i>				SAMPLE CONDITION: Actual Temperature: 4.5°C				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						
RELINQUISHED BY				DATE / TIME			RECEIVED BY				Received On Ice Preserved Y/N Evidence Seals Present Y/N Container Intact Y/N Preserved at Lab Y/N										
RELINQUISHED BY				DATE / TIME			RECEIVED BY														

SPECIAL REQUIREMENTS / BILLING INFORMATION

- 1) 10 day TAT
- 2) WECK will contact AMEC PM within 24 hours if any sample anomalies are found.
- 3) Select pages from AMEC QAPP included for reference



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Page 1 Of 1

CLIENT NAME:				PROJECT:		ANALYSES REQUESTED										SPECIAL HANDLING	
ADDRESS:				PHONE:		<div><div>Total Copper Method EPA 1631 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Dissolved Copper² Method EPA 1631 MDL 0.004 µg/L, RL = 0.01 µg/L</div><div>Total Zinc Method EPA 1631 MDL 0.036 µg/L, RL = 0.20 µg/L</div><div>Dissolved Zinc² Method EPA 1631 MDL 0.036 µg/L, RL = 0.20 µg/L</div><div>Total Organic Carbon (TOC) Method USEPA 8100 MDL = 0.016 mg/L, RL = 0.10 mg/L</div><div>Dissolved Organic Carbon (DOC)¹ Method USEPA 8100 MDL = 0.016 mg/L, RL = 0.10 mg/L</div></div>										<div><input type="checkbox"/> Same Day Rush 150%</div> <div><input type="checkbox"/> 24 Hour Rush 100%</div> <div><input type="checkbox"/> 48-72 Hour Rush 75%</div> <div><input type="checkbox"/> 4 - 5 Day Rush 30%</div> <div><input type="checkbox"/> Rush Extractions 50%</div> <div><input checked="" type="checkbox"/> 10 Business Days</div> <div><input type="checkbox"/> QA/QC Data Package</div>	
PROJECT MANAGER				SAMPLER												Charges will apply for weekends/holidays	
ID# (For Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.											COMMENTS	
SIYB-1	08/23/16	1755	seawater		14	X	X	X	X	X	X				extra vol. analyze sample MS/MSD		
SIYB-1 (REP)	08/23/16	1840	seawater		8	X	X	X	X	X	X						
SIYB-2	08/23/16	1650	seawater		8	X	X	X	X	X	X						
SIYB-3	08/23/16	1525	seawater		8	X	X	X	X	X	X						
SIYB-4	08/23/16	1400	seawater		8	X	X	X	X	X	X						
SIYB-5	08/23/16	1240	seawater		8	X	X	X	X	X	X						
SIYB-6	08/23/16	1130	seawater		8	X	X	X	X	X	X						
SIYB-REF	08/23/16	1000	seawater		8	X	X	X	X	X	X						
SIYB-ER	08/23/16	0800	DI		8	X	X	X	X	X	X						
SIYB-FB	08/23/16	1710	DI		8	X	X	X	X	X	X						
RELINQUISHED BY <i>Barry J. Snyder</i>		DATE / TIME 2235 8/23/16		RECEIVED BY <i>[Signature]</i>		SAMPLE CONDITION: Actual Temperature: 4.5°C						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					
RELINQUISHED BY		DATE / TIME		RECEIVED BY		Received On Ice Preserved Evidence Seals Present Container Intact Preserved at Lab						<div><div>Y</div><div>N</div><div>Y</div><div>N</div><div>Y</div><div>N</div><div>Y</div><div>N</div></div>					
RELINQUISHED BY		DATE / TIME		RECEIVED BY													

SPECIAL REQUIREMENTS / BILLING INFORMATION

- DOC samples were field filtered through 0.45 um Nylon filters; 2) LAB ACTION: FILTER/PRESERVE DISSOLVED Cu/Zn IMMEDIATELY- within same period; not split days 3) 10 day TAT;
- 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)
- 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
- 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
- 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.

Appendix D

Analytical Laboratory Reports

SIYB Analytical Reports

Day 1

Work Orders: 6H24008

Report Date: 9/09/2016

Received Date: 8/23/2016

Project: 2016 Shelter Island Yacht Basin (Special Study)

Turnaround Time: Normal

Phones: (858) 300-4323

Fax: (858) 300-4301

P.O. #:

Attn: Rolf Schottle

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

DoD-ELAP #L15-366 • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO 17025 #L15-365 • NELAP-OR #4047 • NJ-DEP
#CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Rolf Schottle,

Enclosed are the results of analyses for samples received 8/23/16 with the Chain-of-Custody document. The samples were received in good condition, at 4.5 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Hai Van Nguyen
Senior Project Manager



Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Reported:
09/09/2016 09:29

Sample Summary

Sample ID	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SIYB-1-T	Corey Sheredy/Tyler Huff	6H24008-01	Water	08/23/16 17:55	
SIYB-1-T (REP)	Corey Sheredy/Tyler Huff	6H24008-02	Water	08/23/16 18:40	
SIYB-2-T	Corey Sheredy/Tyler Huff	6H24008-03	Water	08/23/16 16:50	
SIYB-3-T	Corey Sheredy/Tyler Huff	6H24008-04	Water	08/23/16 15:25	
SIYB-4-T	Corey Sheredy/Tyler Huff	6H24008-05	Water	08/23/16 14:00	
SIYB-5-T	Corey Sheredy/Tyler Huff	6H24008-06	Water	08/23/16 12:40	
SIYB-6-T	Corey Sheredy/Tyler Huff	6H24008-07	Water	08/23/16 11:30	
SIYB-REF-T	Corey Sheredy/Tyler Huff	6H24008-08	Water	08/23/16 10:00	
SIYB-1-M	Corey Sheredy/Tyler Huff	6H24008-09	Water	08/23/16 18:15	
SIYB-1-M (REP)	Corey Sheredy/Tyler Huff	6H24008-10	Water	08/23/16 18:55	
SIYB-2-M	Corey Sheredy/Tyler Huff	6H24008-11	Water	08/23/16 17:10	
SIYB-3-M	Corey Sheredy/Tyler Huff	6H24008-12	Water	08/23/16 15:40	
SIYB-4-M	Corey Sheredy/Tyler Huff	6H24008-13	Water	08/23/16 14:25	
SIYB-5-M	Corey Sheredy/Tyler Huff	6H24008-14	Water	08/23/16 13:05	
SIYB-6-M	Corey Sheredy/Tyler Huff	6H24008-15	Water	08/23/16 11:50	
SIYB-REF-M	Corey Sheredy/Tyler Huff	6H24008-16	Water	08/23/16 10:30	
SIYB-Filter Blank	Corey Sheredy/Tyler Huff	6H24008-17	Water	08/23/16 19:20	
SIYB-1-B	Corey Sheredy/Tyler Huff	6H24008-18	Water	08/23/16 18:30	
SIYB-1-B (REP)	Corey Sheredy/Tyler Huff	6H24008-19	Water	08/23/16 19:05	
SIYB-2-B	Corey Sheredy/Tyler Huff	6H24008-20	Water	08/23/16 17:20	
SIYB-3-B	Corey Sheredy/Tyler Huff	6H24008-21	Water	08/23/16 15:55	
SIYB-4-B	Corey Sheredy/Tyler Huff	6H24008-22	Water	08/23/16 14:45	
SIYB-5-B	Corey Sheredy/Tyler Huff	6H24008-23	Water	08/23/16 13:05	
SIYB-6-B	Corey Sheredy/Tyler Huff	6H24008-24	Water	08/23/16 12:10	
SIYB-REF-B	Corey Sheredy/Tyler Huff	6H24008-25	Water	08/23/16 10:50	



WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

Sample: SIYB-1-T

Sampled: 08/23/16 17:55 by Corey Sheredy/Tyler Huff

6H24008-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1444

Prepared: 08/24/16 12:32

Analyst: ajw

Total Suspended Solids	12	5	mg/l	1	08/24/16 16:35
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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-1-T (REP) Sampled: 08/23/16 18:40 by Corey Sheredy/Tyler Huff
6H24008-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D	Batch ID: W6H1444	Prepared: 08/24/16 12:32	Analyst: ajw
Total Suspended Solids	14	5 mg/l	1 08/24/16 16:35



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-2-T

Sampled: 08/23/16 16:50 by Corey Sheredy/Tyler Huff

6H24008-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1444

Prepared: 08/24/16 12:32

Analyst: ajw

Total Suspended Solids	21	5	mg/l	1	08/24/16 16:35
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Project Manager: Rolf Schottle

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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-3-T

Sampled: 08/23/16 15:25 by Corey Sheredy/Tyler Huff

6H24008-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1444

Prepared: 08/24/16 12:32

Analyst: ajw

Total Suspended Solids	7	5	mg/l	1	08/24/16 16:35
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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

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FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-4-T

Sampled: 08/23/16 14:00 by Corey Sheredy/Tyler Huff

6H24008-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1527

Prepared: 08/25/16 13:44

Analyst: ajw

Total Suspended Solids	10	5	mg/l	1	08/25/16 16:30
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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-5-T

Sampled: 08/23/16 12:40 by Corey Sheredy/Tyler Huff

6H24008-06 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1527

Prepared: 08/25/16 13:44

Analyst: ajw

Total Suspended Solids	13	5	mg/l	1	08/25/16 16:30
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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-6-T

Sampled: 08/23/16 11:30 by Corey Sheredy/Tyler Huff

6H24008-07 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1527

Prepared: 08/25/16 13:44

Analyst: ajw

Total Suspended Solids	14	5	mg/l	1	08/25/16 16:30
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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-REF-T

Sampled: 08/23/16 10:00 by Corey Sheredy/Tyler Huff

6H24008-08 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W6H1527

Prepared: 08/25/16 13:44

Analyst: ajw

Total Suspended Solids	14	5	mg/l	1	08/25/16 16:30
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WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-1-M
6H24008-09 (Water) Sampled: 08/23/16 18:15 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/26/16 10:38

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 11:28

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/02/16 21:18
Zinc, Total **25** 0.036 0.20 ug/l 1 09/02/16 21:18

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **10** 0.0038 0.010 ug/l 1 08/30/16 22:25
Zinc, Dissolved **24** 0.036 0.20 ug/l 1 08/30/16 22:25



WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Certificate of Analysis

FINAL REPORT

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Reported:
09/09/2016 09:29

Project Manager: Rolf Schottle

Sample Results

(Continued)

Sample: SIYB-1-M (REP) Sampled: 08/23/16 18:55 by Corey Sheredy/Tyler Huff
6H24008-10 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **12** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/26/16 10:57

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 11:43

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/02/16 21:32
Zinc, Total **25** 0.036 0.20 ug/l 1 09/02/16 21:32

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **9.7** 0.0038 0.010 ug/l 1 08/30/16 22:39
Zinc, Dissolved **24** 0.036 0.20 ug/l 1 08/30/16 22:39



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-2-M

Sampled: 08/23/16 17:10 by Corey Sheredy/Tyler Huff

6H24008-11 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/26/16 11:11

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 11:57

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/02/16 21:46
Zinc, Total **24** 0.036 0.20 ug/l 1 09/02/16 21:46

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **9.7** 0.0038 0.010 ug/l 1 08/30/16 22:53
Zinc, Dissolved **22** 0.036 0.20 ug/l 1 08/30/16 22:53



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-3-M

Sampled: 08/23/16 15:40 by Corey Sheredy/Tyler Huff

6H24008-12 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/26/16 11:26

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 08/29/16 12:16

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **7.6** 0.0038 0.010 ug/l 1 09/02/16 21:59
Zinc, Total **17** 0.036 0.20 ug/l 1 09/02/16 21:59

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **6.7** 0.0038 0.010 ug/l 1 08/30/16 23:06
Zinc, Dissolved **16** 0.036 0.20 ug/l 1 08/30/16 23:06



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-4-M

Sampled: 08/23/16 14:25 by Corey Sheredy/Tyler Huff

6H24008-13 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **15** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/26/16 12:30

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 13:23

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **8.0** 0.0038 0.010 ug/l 1 09/02/16 22:55
Zinc, Total **18** 0.036 0.20 ug/l 1 09/02/16 22:55

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **7.2** 0.0038 0.010 ug/l 1 08/31/16 00:02
Zinc, Dissolved **17** 0.036 0.20 ug/l 1 08/31/16 00:02



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-5-M

Sampled: 08/23/16 13:05 by Corey Sheredy/Tyler Huff

6H24008-14 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/26/16 12:44

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 13:42

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **3.7** 0.0038 0.010 ug/l 1 09/02/16 23:08
Zinc, Total **8.8** 0.036 0.20 ug/l 1 09/02/16 23:08

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **3.1** 0.0038 0.010 ug/l 1 08/31/16 00:15
Zinc, Dissolved **7.8** 0.036 0.20 ug/l 1 08/31/16 00:15



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09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-6-M

Sampled: 08/23/16 11:50 by Corey Sheredy/Tyler Huff

6H24008-15 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/26/16 13:02

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 14:01

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **2.3** 0.0038 0.010 ug/l 1 09/02/16 23:22
Zinc, Total **5.9** 0.036 0.20 ug/l 1 09/02/16 23:22

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **1.9** 0.0038 0.010 ug/l 1 08/31/16 00:29
Zinc, Dissolved **4.6** 0.036 0.20 ug/l 1 08/31/16 00:29



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09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-REF-M

Sampled: 08/23/16 10:30 by Corey Sheredy/Tyler Huff

6H24008-16 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/26/16 13:17

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 14:16

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **1.4** 0.0038 0.010 ug/l 1 09/02/16 23:36
Zinc, Total **4.2** 0.036 0.20 ug/l 1 09/02/16 23:36

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **1.1** 0.0038 0.010 ug/l 1 08/31/16 00:43
Zinc, Dissolved **3.1** 0.036 0.20 ug/l 1 08/31/16 00:43



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-Filter Blank
6H24008-17 (Water)

Sampled: 08/23/16 19:20 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Metals - Low Level by 1600 Series Methods

Method: EPA 1640

Batch ID: W6H1779

Prepared: 08/30/16 16:44

Analyst: gza

Copper, Dissolved

0.025

0.0038

0.010

ug/l

1

08/31/16 00:57

Zinc, Dissolved

ND

0.036

0.20

ug/l

1

08/31/16 00:57



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-1-B
6H24008-18 (Water) Sampled: 08/23/16 18:30 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.7** 0.016 0.10 mg/l 1 08/26/16 13:36

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 08/29/16 14:34

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **7.6** 0.0038 0.010 ug/l 1 09/02/16 23:50
Zinc, Total **17** 0.036 0.20 ug/l 1 09/02/16 23:50

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **6.4** 0.0038 0.010 ug/l 1 08/31/16 01:11
Zinc, Dissolved **15** 0.036 0.20 ug/l 1 08/31/16 01:11



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-1-B (REP) Sampled: 08/23/16 19:05 by Corey Sheredy/Tyler Huff
6H24008-19 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1527		Prepared: 08/25/16 13:44				Analyst: ajw
Total Suspended Solids	18		5	mg/l	1	08/25/16 16:30	
Method: SM 5310B	Batch ID: W6H1581		Prepared: 08/26/16 09:04				Analyst: jlp
Total Organic Carbon (TOC)	1.7	0.016	0.10	mg/l	1	08/26/16 13:54	
Method: SM 5310B	Batch ID: W6H1650		Prepared: 08/29/16 10:10				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	08/29/16 14:52	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1753		Prepared: 08/30/16 16:03				Analyst: gza
Copper, Total	6.0	0.0038	0.010	ug/l	1	09/03/16 00:04	
Zinc, Total	12	0.036	0.20	ug/l	1	09/03/16 00:04	
Method: EPA 1640	Batch ID: W6H1779		Prepared: 08/30/16 16:44				Analyst: gza
Copper, Dissolved	4.4	0.0038	0.010	ug/l	1	08/31/16 01:24	
Zinc, Dissolved	10	0.036	0.20	ug/l	1	08/31/16 01:24	



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-2-B

Sampled: 08/23/16 17:20 by Corey Sheredy/Tyler Huff

6H24008-20 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/26/16 15:04

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 15:50

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **8.3** 0.0038 0.010 ug/l 1 09/03/16 00:17
Zinc, Total **19** 0.036 0.20 ug/l 1 09/03/16 00:17

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **7.0** 0.0038 0.010 ug/l 1 08/31/16 01:38
Zinc, Dissolved **17** 0.036 0.20 ug/l 1 08/31/16 01:38



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-3-B

Sampled: 08/23/16 15:55 by Corey Sheredy/Tyler Huff

6H24008-21 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/26/16 15:22

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/29/16 16:05

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **3.8** 0.0038 0.010 ug/l 1 09/03/16 00:31
Zinc, Total **8.8** 0.036 0.20 ug/l 1 09/03/16 00:31

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **3.1** 0.0038 0.010 ug/l 1 08/31/16 01:52
Zinc, Dissolved **7.6** 0.036 0.20 ug/l 1 08/31/16 01:52



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-4-B

Sampled: 08/23/16 14:45 by Corey Sheredy/Tyler Huff

6H24008-22 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **7** **5** **mg/l** **1** **08/25/16 16:30**

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** **0.016** **0.10** **mg/l** **1** **08/26/16 15:42**

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.2** **0.016** **0.10** **mg/l** **1** **08/29/16 16:19**

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **5.0** **0.0038** **0.010** **ug/l** **1** **09/03/16 00:45**
Zinc, Total **11** **0.036** **0.20** **ug/l** **1** **09/03/16 00:45**

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **4.3** **0.0038** **0.010** **ug/l** **1** **08/31/16 02:06**
Zinc, Dissolved **9.9** **0.036** **0.20** **ug/l** **1** **08/31/16 02:06**



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-5-B

Sampled: 08/23/16 13:05 by Corey Sheredy/Tyler Huff

6H24008-23 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/26/16 15:55

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.1** 0.016 0.10 mg/l 1 08/29/16 16:33

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **2.5** 0.0038 0.010 ug/l 1 09/03/16 00:59
Zinc, Total **5.8** 0.036 0.20 ug/l 1 09/03/16 00:59

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **1.9** 0.0038 0.010 ug/l 1 08/31/16 03:01
Zinc, Dissolved **4.6** 0.036 0.20 ug/l 1 08/31/16 03:01



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Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-6-B

Sampled: 08/23/16 12:10 by Corey Sheredy/Tyler Huff

6H24008-24 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1527 **Prepared:** 08/25/16 13:44 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/25/16 16:30

Method: SM 5310B **Batch ID:** W6H1581 **Prepared:** 08/26/16 09:04 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/26/16 16:14

Method: SM 5310B **Batch ID:** W6H1650 **Prepared:** 08/29/16 10:10 **Analyst:** jlp
Dissolved Organic Carbon **1.1** 0.016 0.10 mg/l 1 08/29/16 16:51

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1753 **Prepared:** 08/30/16 16:03 **Analyst:** gza
Copper, Total **2.1** 0.0038 0.010 ug/l 1 09/03/16 01:54
Zinc, Total **5.3** 0.036 0.20 ug/l 1 09/03/16 01:54

Method: EPA 1640 **Batch ID:** W6H1779 **Prepared:** 08/30/16 16:44 **Analyst:** gza
Copper, Dissolved **1.7** 0.0038 0.010 ug/l 1 08/31/16 03:15
Zinc, Dissolved **4.4** 0.036 0.20 ug/l 1 08/31/16 03:15



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Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:29

Sample Results

(Continued)

Sample: SIYB-REF-B
6H24008-25 (Water) Sampled: 08/23/16 10:50 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1527		Prepared: 08/25/16 13:44				Analyst: ajw
Total Suspended Solids	8		5	mg/l	1	08/25/16 16:30	
Method: SM 5310B	Batch ID: W6H1581		Prepared: 08/26/16 09:04				Analyst: jlp
Total Organic Carbon (TOC)	1.4	0.016	0.10	mg/l	1	08/26/16 16:33	
Method: SM 5310B	Batch ID: W6H1650		Prepared: 08/29/16 10:10				Analyst: jlp
Dissolved Organic Carbon	1.1	0.016	0.10	mg/l	1	08/29/16 17:05	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1753		Prepared: 08/30/16 16:03				Analyst: gza
Copper, Total	1.0	0.0038	0.010	ug/l	1	09/03/16 02:08	
Zinc, Total	2.8	0.036	0.20	ug/l	1	09/03/16 02:08	
Method: EPA 1640	Batch ID: W6H1779		Prepared: 08/30/16 16:44				Analyst: gza
Copper, Dissolved	1.1	0.0038	0.010	ug/l	1	08/31/16 03:28	
Zinc, Dissolved	1.7	0.036	0.20	ug/l	1	08/31/16 03:28	



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FINAL REPORT

Reported:
09/09/2016 09:29

Quality Control Results

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

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
Batch: W6H1444 - General Preparation										
Blank (W6H1444-BLK1)				Prepared & Analyzed: 08/24/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1444-B51)				Prepared & Analyzed: 08/24/16						
Total Suspended Solids	62.0		mg/l	57.6		108	90-110			
Duplicate (W6H1444-DUP1)				Source: 6H23097-02						
Total Suspended Solids	ND		mg/l		1.00			200	20	R-03
Duplicate (W6H1444-DUP2)				Source: 6H24008-03						
Total Suspended Solids	22.0		mg/l		21.0			5	20	
Batch: W6H1527 - General Preparation										
Blank (W6H1527-BLK1)				Prepared & Analyzed: 08/25/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1527-B51)				Prepared & Analyzed: 08/25/16						
Total Suspended Solids	61.0		mg/l	57.3		106	90-110			
Duplicate (W6H1527-DUP1)				Source: 6H24008-06						
Total Suspended Solids	24.0		mg/l		13.0			59	20	A-01
Duplicate (W6H1527-DUP2)				Source: 6H24008-08						
Total Suspended Solids	26.0		mg/l		14.0			60	20	A-01
Batch: W6H1581 - SM 5310B_comb										
Blank (W6H1581-BLK1)				Prepared & Analyzed: 08/26/16						
Total Organic Carbon (TOC)	0.0461	0.0090	mg/l							J



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Reported:
09/09/2016 09:29

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6H1581 - SM 5310B_comb (Continued)										
Blank (W6H1581-BLK2)				Prepared & Analyzed: 08/26/16						
Total Organic Carbon (TOC)	0.0489	0.0090	mg/l							J
LCS (W6H1581-BS1)				Prepared & Analyzed: 08/26/16						
Total Organic Carbon (TOC)	1.06	0.0090	mg/l	1.00		106	80-120		10	
LCS (W6H1581-BS2)				Prepared & Analyzed: 08/26/16						
Total Organic Carbon (TOC)	2.14	0.0090	mg/l	2.00		107	80-120		10	
Matrix Spike (W6H1581-MS1)				Source: 6H24008-12		Prepared & Analyzed: 08/26/16				
Total Organic Carbon (TOC)	6.47	0.0090	mg/l	5.00	1.46	100	80-120		10	
Matrix Spike Dup (W6H1581-MSD1)				Source: 6H24008-12		Prepared & Analyzed: 08/26/16				
Total Organic Carbon (TOC)	6.42	0.0090	mg/l	5.00	1.46	99	80-120	0.9	10	
Batch: W6H1650 - SM 5310B_comb										
Blank (W6H1650-BLK1)				Prepared & Analyzed: 08/29/16						
Dissolved Organic Carbon	ND	0.013	mg/l							
Blank (W6H1650-BLK2)				Prepared & Analyzed: 08/29/16						
Dissolved Organic Carbon	0.0668	0.013	mg/l							J
LCS (W6H1650-BS1)				Prepared & Analyzed: 08/29/16						
Dissolved Organic Carbon	1.04	0.013	mg/l	1.00		104	80-120		20	
LCS (W6H1650-BS2)				Prepared & Analyzed: 08/29/16						
Dissolved Organic Carbon	1.92	0.013	mg/l	2.00		96	80-120		20	



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09/09/2016 09:29

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Batch: W6H1650 - SM 5310B_comb (Continued)

Matrix Spike (W6H1650-MS1)

Source: 6H24008-12

Prepared & Analyzed: 08/29/16

Dissolved Organic Carbon	5.92	0.013	mg/l	5.00	1.28	93	80-120		20	
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Matrix Spike Dup (W6H1650-MSD1)

Source: 6H24008-12

Prepared & Analyzed: 08/29/16

Dissolved Organic Carbon	6.07	0.013	mg/l	5.00	1.28	96	80-120	3	20	
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Reported:
09/09/2016 09:29

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1753 - Preconcentration with IC Column										
Blank (W6H1753-BLK1)				Prepared: 08/30/16 Analyzed: 09/02/16						
Copper, Total	ND	0.0038	ug/l							
Zinc, Total	ND	0.036	ug/l							
LCS (W6H1753-BS1)				Prepared: 08/30/16 Analyzed: 09/02/16						
Copper, Total	10.1	0.0038	ug/l	10.0		101	73-122			
Zinc, Total	30.8	0.036	ug/l	30.0		103	75-127			
Matrix Spike (W6H1753-MS1)				Source: 6H24008-09		Prepared: 08/30/16 Analyzed: 09/02/16				
Copper, Total	21.3	0.0038	ug/l	10.0	11.1	101	60-138			
Zinc, Total	55.5	0.036	ug/l	30.0	25.0	102	68-132			
Matrix Spike (W6H1753-MS2)				Source: 6H24008-10		Prepared: 08/30/16 Analyzed: 09/02/16				
Copper, Total	20.6	0.0038	ug/l	10.0	10.9	96	60-138			
Zinc, Total	54.6	0.036	ug/l	30.0	24.7	100	68-132			
Matrix Spike Dup (W6H1753-MSD1)				Source: 6H24008-09		Prepared: 08/30/16 Analyzed: 09/02/16				
Copper, Total	20.9	0.0038	ug/l	10.0	11.1	97	60-138	2	30	
Zinc, Total	54.9	0.036	ug/l	30.0	25.0	100	68-132	1	30	
Matrix Spike Dup (W6H1753-MSD2)				Source: 6H24008-10		Prepared: 08/30/16 Analyzed: 09/02/16				
Copper, Total	20.6	0.0038	ug/l	10.0	10.9	96	60-138	0.08	30	
Zinc, Total	55.6	0.036	ug/l	30.0	24.7	103	68-132	2	30	
Batch: W6H1779 - Preconcentration with IC Column										
Blank (W6H1779-BLK1)				Prepared & Analyzed: 08/30/16						
Copper, Dissolved	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							



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Reported:
09/09/2016 09:29

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1779 - Preconcentration with IC Column (Continued)										
LCS (W6H1779-BS1)				Prepared & Analyzed: 08/30/16						
Copper, Dissolved	10.1	0.0038	ug/l	10.0		101	70-130			
Zinc, Dissolved	30.8	0.036	ug/l	30.0		103	75-127			
Matrix Spike (W6H1779-MS1)				Source: 6H24008-09 Prepared & Analyzed: 08/30/16						
Copper, Dissolved	20.4	0.0038	ug/l	10.0	10.1	102	70-130			
Zinc, Dissolved	55.0	0.036	ug/l	30.0	23.8	104	68-132			
Matrix Spike (W6H1779-MS2)				Source: 6H24008-10 Prepared & Analyzed: 08/30/16						
Copper, Dissolved	19.5	0.0038	ug/l	10.0	9.66	98	70-130			
Zinc, Dissolved	55.0	0.036	ug/l	30.0	24.2	102	68-132			
Matrix Spike Dup (W6H1779-MSD1)				Source: 6H24008-09 Prepared & Analyzed: 08/30/16						
Copper, Dissolved	20.0	0.0038	ug/l	10.0	10.1	99	70-130	2	30	
Zinc, Dissolved	54.1	0.036	ug/l	30.0	23.8	101	68-132	2	30	
Matrix Spike Dup (W6H1779-MSD2)				Source: 6H24008-10 Prepared & Analyzed: 08/30/16						
Copper, Dissolved	19.5	0.0038	ug/l	10.0	9.66	99	70-130	0.2	30	
Zinc, Dissolved	54.6	0.036	ug/l	30.0	24.2	101	68-132	0.8	30	

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Reported:
09/09/2016 09:29



Notes and Definitions

Item	Definition
A-01	The RPD is not applicable for result near the reporting limit or J value.
J	Estimated conc. detected <MRL and >MDL.
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Work Orders: 6H24016

Report Date: 10/11/2016

Received Date: 8/23/2016

Project: Port of San Diego Shelter Island Yacht Basin

Turnaround Time: Normal

Phones: (858) 300-4323

Fax: (858) 300-4301

P.O. #:

Attn: Rolf Schottle

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

DoD-ELAP #L15-366 • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO 17025 #L15-365 • LACSD #10143 • NELAP-OR #4047 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Rolf Schottle,

Enclosed are the results of analyses for samples received 8/23/16 with the Chain-of-Custody document. The samples were received in good condition, at 4.5 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Hai Van Nguyen
Senior Project Manager



Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: Port of San Diego Shelter Island Yacht Basin

Reported:

10/11/2016 15:55

Project Manager: Rolf Schottle

Case Narrative

This is a Supplement to the Certificate of Analysis previously issued 9/9/16 for the above referenced Project to report re-analysis results for SIYB-ER.

Sample Summary

Sample ID	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SIYB-1	Corey Sheredy/Chris Stransky	6H24016-01	Water	08/23/16 17:55	
SIYB-1 (REP)	Corey Sheredy/Chris Stransky	6H24016-02	Water	08/23/16 18:40	
SIYB-2	Corey Sheredy/Chris Stransky	6H24016-03	Water	08/23/16 16:50	
SIYB-3	Corey Sheredy/Chris Stransky	6H24016-04	Water	08/23/16 15:25	
SIYB-4	Corey Sheredy/Chris Stransky	6H24016-05	Water	08/23/16 14:00	
SIYB-5	Corey Sheredy/Chris Stransky	6H24016-06	Water	08/23/16 12:40	
SIYB-6	Corey Sheredy/Chris Stransky	6H24016-07	Water	08/23/16 11:30	
SIYB-REF	Corey Sheredy/Chris Stransky	6H24016-08	Water	08/23/16 10:00	
SIYB-ER	Corey Sheredy/Chris Stransky	6H24016-09	Water	08/23/16 08:00	
SIYB-ER	Corey Sheredy/Chris Stransky	6H24016-09RE1	Water	08/23/16 08:00	
SIYB-FB	Corey Sheredy/Chris Stransky	6H24016-10	Water	08/23/16 17:10	
SIYB-FB	Corey Sheredy/Chris Stransky	6H24016-10RE1	Water	08/23/16 17:10	



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Certificate of Analysis

FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

Sample: SIYB-1

Sampled: 08/23/16 17:55 by Corey Sheredy/Chris Stransky

6H24016-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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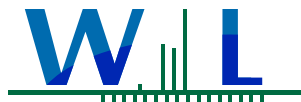
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/25/16 12:26

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/25/16 16:55

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **11** 0.0038 0.010 ug/l 1 08/30/16 00:42
Copper, Total **13** 0.0038 0.010 ug/l 1 08/30/16 03:42
Zinc, Dissolved **30** 0.036 0.20 ug/l 1 08/30/16 00:42
Zinc, Total **30** 0.036 0.20 ug/l 1 08/30/16 03:42



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FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-1 (REP)

Sampled: 08/23/16 18:40 by Corey Sheredy/Chris Stransky

6H24016-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/25/16 12:41

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/25/16 17:09

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **12** 0.0038 0.010 ug/l 1 08/30/16 00:56
Copper, Total **13** 0.0038 0.010 ug/l 1 08/30/16 03:56
Zinc, Dissolved **31** 0.036 0.20 ug/l 1 08/30/16 00:56
Zinc, Total **31** 0.036 0.20 ug/l 1 08/30/16 03:56



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FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-2

Sampled: 08/23/16 16:50 by Corey Sheredy/Chris Stransky

6H24016-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/25/16 13:01

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 08/25/16 17:23

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **8.9** 0.0038 0.010 ug/l 1 08/30/16 01:10
Copper, Total **10** 0.0038 0.010 ug/l 1 08/30/16 04:09
Zinc, Dissolved **23** 0.036 0.20 ug/l 1 08/30/16 01:10
Zinc, Total **24** 0.036 0.20 ug/l 1 08/30/16 04:09



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Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-3

Sampled: 08/23/16 15:25 by Corey Sheredy/Chris Stransky

6H24016-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.6** 0.016 0.10 mg/l 1 08/25/16 13:17

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 08/25/16 17:42

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **9.2** 0.0038 0.010 ug/l 1 08/30/16 01:24
Copper, Total **11** 0.0038 0.010 ug/l 1 08/30/16 04:23
Zinc, Dissolved **24** 0.036 0.20 ug/l 1 08/30/16 01:24
Zinc, Total **24** 0.036 0.20 ug/l 1 08/30/16 04:23



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Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-4

Sampled: 08/23/16 14:00 by Corey Sheredy/Chris Stransky

6H24016-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.6** 0.016 0.10 mg/l 1 08/25/16 14:22

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/25/16 18:38

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **8.5** 0.0038 0.010 ug/l 1 08/30/16 01:38
Copper, Total **9.7** 0.0038 0.010 ug/l 1 08/30/16 04:37
Zinc, Dissolved **22** 0.036 0.20 ug/l 1 08/30/16 01:38
Zinc, Total **23** 0.036 0.20 ug/l 1 08/30/16 04:37



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Project Manager: Rolf Schottle

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FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-5

Sampled: 08/23/16 12:40 by Corey Sheredy/Chris Stransky

6H24016-06 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/25/16 14:41

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/25/16 18:52

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **3.3** 0.0038 0.010 ug/l 1 08/30/16 01:51
Copper, Total **4.0** 0.0038 0.010 ug/l 1 08/30/16 04:51
Zinc, Dissolved **9.5** 0.036 0.20 ug/l 1 08/30/16 01:51
Zinc, Total **10** 0.036 0.20 ug/l 1 08/30/16 04:51



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Project Manager: Rolf Schottle

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FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-6

Sampled: 08/23/16 11:30 by Corey Sheredy/Chris Stransky

6H24016-07 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/25/16 14:59

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 08/25/16 19:07

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **1.7** 0.0038 0.010 ug/l 1 08/30/16 02:05
Copper, Total **2.3** 0.0038 0.010 ug/l 1 08/30/16 05:04
Zinc, Dissolved **5.3** 0.036 0.20 ug/l 1 08/30/16 02:05
Zinc, Total **5.6** 0.036 0.20 ug/l 1 08/30/16 05:04



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FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-REF

Sampled: 08/23/16 10:00 by Corey Sheredy/Chris Stransky

6H24016-08 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/25/16 15:15

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 08/25/16 19:26

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **1.5** 0.0038 0.010 ug/l 1 08/30/16 02:19
Copper, Total **2.2** 0.0038 0.010 ug/l 1 08/30/16 05:18
Zinc, Dissolved **5.7** 0.036 0.20 ug/l 1 08/30/16 02:19
Zinc, Total **6.5** 0.036 0.20 ug/l 1 08/30/16 05:18



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Project Number: Port of San Diego Shelter Island Yacht Basin

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-ER

Sampled: 08/23/16 8:00 by Corey Sheredy/Chris Stransky

6H24016-09 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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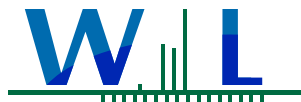
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B **Batch ID:** W6H1514 **Prepared:** 08/25/16 10:44 **Analyst:** jlp
Total Organic Carbon (TOC) **0.25** 0.016 0.10 mg/l 1 08/25/16 15:32

Method: SM 5310B **Batch ID:** W6H1526 **Prepared:** 08/25/16 11:08 **Analyst:** jlp
Dissolved Organic Carbon **0.26** 0.016 0.10 mg/l 1 08/25/16 19:39

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1574 **Prepared:** 08/26/16 10:41 **Analyst:** gza
Copper, Dissolved **0.056** 0.0038 0.010 ug/l 1 08/30/16 02:33
Copper, Total **0.13** 0.0038 0.010 ug/l 1 08/30/16 05:32
Zinc, Dissolved **1.3** 0.036 0.20 ug/l 1 08/30/16 02:33
Zinc, Total **8.5** 0.036 0.20 ug/l 1 08/30/16 05:32



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FINAL REPORT

Project Number: Port of San Diego Shelter Island Yacht Basin

Reported:

10/11/2016 15:55

Project Manager: Rolf Schottle

Sample Results

(Continued)

Sample: SIYB-ER

Sampled: 08/23/16 8:00 by Corey Sheredy/Chris Stransky

6H24016-09RE1 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Metals - Low Level by 1600 Series Methods

Method: EPA 1640

Batch ID: W610870

Prepared: 09/16/16 11:45

Analyst: gza

Copper, Dissolved	0.014	0.0038	0.010	ug/l	1	09/20/16 02:14	
Copper, Total	0.082	0.0038	0.010	ug/l	1	09/20/16 02:00	
Zinc, Dissolved	1.2	0.036	0.20	ug/l	1	09/20/16 02:14	
Zinc, Total	3.0	0.036	0.20	ug/l	1	09/20/16 02:00	

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Project Manager: Rolf Schottle

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-FB
6H24016-10 (Water) Sampled: 08/23/16 17:10 by Corey Sheredy/Chris Stransky

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 5310B		Batch ID: W6H1514		Prepared: 08/25/16 10:44			Analyst: jlp
Total Organic Carbon (TOC)	0.12	0.016	0.10	mg/l	1	08/25/16 15:49	
Method: SM 5310B		Batch ID: W6H1526		Prepared: 08/25/16 11:08			Analyst: jlp
Dissolved Organic Carbon	0.20	0.016	0.10	mg/l	1	08/25/16 19:53	

Metals - Low Level by 1600 Series Methods

Method: EPA 1640		Batch ID: W6H1574		Prepared: 08/26/16 10:41		Analyst: gza	
Copper, Dissolved	0.0093	0.0038	0.010	ug/l	1	08/30/16 03:28	J
Copper, Total	0.034	0.0038	0.010	ug/l	1	08/30/16 06:27	
Zinc, Dissolved	0.45	0.036	0.20	ug/l	1	08/30/16 03:28	
Zinc, Total	ND	0.036	0.20	ug/l	1	08/30/16 06:27	



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Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
10/11/2016 15:55

Sample Results

(Continued)

Sample: SIYB-FB

Sampled: 08/23/16 17:10 by Corey Sheredy/Chris Stransky

6H24016-10RE1 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Metals - Low Level by 1600 Series Methods

Method: EPA 1640

Batch ID: W610285

Prepared: 09/07/16 16:47

Analyst: gza

Zinc, Dissolved

0.16

0.036

0.20

ug/l

1

09/09/16 04:18

A-01, J



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FINAL REPORT

Reported:
10/11/2016 15:55

Quality Control Results

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

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
Batch: W6H1514 - SM 5310B										
Blank (W6H1514-BLK1)				Prepared & Analyzed: 08/25/16						
Total Organic Carbon (TOC)	0.0126	0.0090	mg/l							J
LCS (W6H1514-BS1)				Prepared & Analyzed: 08/25/16						
Total Organic Carbon (TOC)	0.977	0.0090	mg/l	1.00		98	80-120		10	
Matrix Spike (W6H1514-MS1)				Source: 6H24016-04						
Total Organic Carbon (TOC)	5.90	0.0090	mg/l	5.00	1.55	87	80-120		10	
Matrix Spike Dup (W6H1514-MSD1)				Source: 6H24016-04						
Total Organic Carbon (TOC)	5.90	0.0090	mg/l	5.00	1.55	87	80-120	0.03	10	
Batch: W6H1526 - SM 5310B										
Blank (W6H1526-BLK1)				Prepared & Analyzed: 08/25/16						
Dissolved Organic Carbon	ND	0.013	mg/l							
LCS (W6H1526-BS1)				Prepared & Analyzed: 08/25/16						
Dissolved Organic Carbon	0.957	0.013	mg/l	1.00		96	80-120		20	
Matrix Spike (W6H1526-MS1)				Source: 6H24016-04						
Dissolved Organic Carbon	6.04	0.013	mg/l	5.00	1.32	94	80-120		20	
Matrix Spike Dup (W6H1526-MSD1)				Source: 6H24016-04						
Dissolved Organic Carbon	5.74	0.013	mg/l	5.00	1.32	88	80-120	5	20	



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FINAL REPORT

Project Number: Port of San Diego Shelter Island Yacht Basin

Reported:

10/11/2016 15:55

Project Manager: Rolf Schottle

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1574 - EPA 1640										
Blank (W6H1574-BLK1)				Prepared: 08/26/16 Analyzed: 08/29/16						
Copper, Dissolved	0.00687	0.0038	ug/l							J
Copper, Total	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							
Zinc, Total	ND	0.036	ug/l							
LCS (W6H1574-BS1)				Prepared: 08/26/16 Analyzed: 08/29/16						
Copper, Dissolved	10.2	0.0038	ug/l	10.0		102	70-130			
Copper, Total	10.2	0.0038	ug/l	10.0		102	73-122			
Zinc, Dissolved	30.9	0.036	ug/l	30.0		103	75-127			
Zinc, Total	30.9	0.036	ug/l	30.0		103	75-127			
Matrix Spike (W6H1574-MS1)				Source: 6H24016-01		Prepared: 08/26/16 Analyzed: 08/29/16				
Copper, Dissolved	20.9	0.0038	ug/l	10.0	11.4	95	70-130			
Copper, Total	22.7	0.0038	ug/l	10.0	12.6	101	60-138			
Zinc, Dissolved	58.5	0.036	ug/l	30.0	29.7	96	68-132			
Zinc, Total	60.3	0.036	ug/l	30.0	29.9	101	68-132			
Matrix Spike (W6H1574-MS2)				Source: 6H24016-03		Prepared: 08/26/16 Analyzed: 08/29/16				
Copper, Dissolved	19.2	0.0038	ug/l	10.0	8.95	103	70-130			
Copper, Total	20.0	0.0038	ug/l	10.0	10.2	98	60-138			
Zinc, Dissolved	54.9	0.036	ug/l	30.0	22.8	107	68-132			
Zinc, Total	54.1	0.036	ug/l	30.0	23.8	101	68-132			
Matrix Spike Dup (W6H1574-MSD1)				Source: 6H24016-01		Prepared: 08/26/16 Analyzed: 08/29/16				
Copper, Dissolved	21.2	0.0038	ug/l	10.0	11.4	98	70-130	1	30	
Copper, Total	22.0	0.0038	ug/l	10.0	12.6	94	60-138	3	30	
Zinc, Dissolved	60.3	0.036	ug/l	30.0	29.7	102	68-132	3	30	
Zinc, Total	58.9	0.036	ug/l	30.0	29.9	97	68-132	2	30	



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Project Number: Port of San Diego Shelter Island Yacht Basin

Project Manager: Rolf Schottle

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FINAL REPORT

Reported:

10/11/2016 15:55

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	Limit	Qualifier
Batch: W6H1574 - EPA 1640 (Continued)										
Matrix Spike Dup (W6H1574-MSD2)			Source: 6H24016-03		Prepared: 08/26/16 Analyzed: 08/30/16					
Copper, Dissolved	19.7	0.0038	ug/l	10.0	8.95	108	70-130	2	30	
Copper, Total	20.4	0.0038	ug/l	10.0	10.2	102	60-138	2	30	
Zinc, Dissolved	57.2	0.036	ug/l	30.0	22.8	115	68-132	4	30	
Zinc, Total	54.2	0.036	ug/l	30.0	23.8	101	68-132	0.2	30	
Batch: W6I0285 - EPA 1640										
Blank (W6I0285-BLK1)			Prepared: 09/07/16 Analyzed: 09/09/16							
Zinc, Dissolved	0.153	0.036	ug/l							J
LCS (W6I0285-BS1)			Prepared: 09/07/16 Analyzed: 09/09/16							
Zinc, Dissolved	33.3	0.036	ug/l	30.0		111	75-127			
Matrix Spike (W6I0285-MS1)			Source: 6H24016-10RE1		Prepared: 09/07/16 Analyzed: 09/09/16					
Zinc, Dissolved	33.5	0.036	ug/l	30.0	0.157	111	68-132			
Matrix Spike Dup (W6I0285-MSD1)			Source: 6H24016-10RE1		Prepared: 09/07/16 Analyzed: 09/09/16					
Zinc, Dissolved	33.6	0.036	ug/l	30.0	0.157	111	68-132	0.3	30	
Batch: W6I0870 - EPA 1640										
Blank (W6I0870-BLK1)			Prepared: 09/16/16 Analyzed: 09/20/16							
Copper, Dissolved	ND	0.0038	ug/l							
Copper, Total	ND	0.0038	ug/l							
Zinc, Dissolved	0.0409	0.036	ug/l							J
Zinc, Total	ND	0.036	ug/l							



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FINAL REPORT

Project Number: Port of San Diego Shelter Island Yacht Basin

Reported:

10/11/2016 15:55

Project Manager: Rolf Schottle

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6I0870 - EPA 1640 (Continued)										
LCS (W6I0870-BS1)				Prepared: 09/16/16 Analyzed: 09/20/16						
Copper, Dissolved	10.2	0.0038	ug/l	10.0		102	70-130			
Copper, Total	10.2	0.0038	ug/l	10.0		102	73-122			
Zinc, Dissolved	30.9	0.036	ug/l	30.0		103	75-127			
Zinc, Total	30.9	0.036	ug/l	30.0		103	75-127			
Matrix Spike (W6I0870-MS1)				Source: 6H24016-09RE1 Prepared: 09/16/16 Analyzed: 09/20/16						
Copper, Total	10.2	0.0038	ug/l	10.0	0.0824	101	60-138			
Zinc, Total	34.0	0.036	ug/l	30.0	2.97	104	68-132			
Matrix Spike Dup (W6I0870-MSD1)				Source: 6H24016-09RE1 Prepared: 09/16/16 Analyzed: 09/20/16						
Copper, Total	10.0	0.0038	ug/l	10.0	0.0824	100	60-138	2	30	
Zinc, Total	33.5	0.036	ug/l	30.0	2.97	102	68-132	2	30	

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San Diego, CA 92123

Project Number: Port of San Diego Shelter Island Yacht Basin

Project Manager: Rolf Schottle

Reported:
10/11/2016 15:55

Notes and Definitions

Item	Definition
A-01	Sample was filtered and preserved on 08/30/16 @ 1045am.
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Work Orders: 6H24008

Report Date: 9/09/2016

Received Date: 8/23/2016

Project: 2016 Shelter Island Yacht Basin (Special Study)

Turnaround Time: Normal

Phones: (858) 300-4323

Fax: (858) 300-4301

P.O. #:

Attn: Rolf Schottle

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

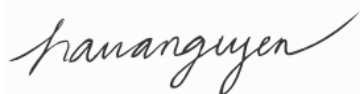
DoD-ELAP #L15-366 • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO 17025 #L15-365 • NELAP-OR #4047 • NJ-DEP
#CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Rolf Schottle,

Enclosed are the results of analyses for samples received 8/23/16 with the Chain-of-Custody document. The samples were received in good condition, at 4.5 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Hai Van Nguyen
Senior Project Manager





WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
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Certificate of Analysis

FINAL REPORT

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Reported:
09/09/2016 09:57

Sample Summary

Sample ID	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SIYB-ER	Corey Sheredy/Tyler Huff	6H24008-26	Water	08/23/16 00:00	
SIYB-FB	Corey Sheredy/Tyler Huff	6H24008-27	Water	08/23/16 00:00	



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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:57

Sample Results

Sample: SIYB-ER

Sampled: 08/23/16 0:00 by Corey Sheredy/Tyler Huff

6H24008-26 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W610340

Prepared: 09/08/16 12:58

Analyst: ymt

Total Suspended Solids

ND

5

mg/l

1

09/08/16 13:45

O-04



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:57

Sample Results

(Continued)

Sample: SIYB-FB

Sampled: 08/23/16 0:00 by Corey Sheredy/Tyler Huff

6H24008-27 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D

Batch ID: W610340

Prepared: 09/08/16 12:58

Analyst: ymt

Total Suspended Solids

ND

5

mg/l

1

09/08/16 13:45

O-04



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San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:57

Quality Control Results

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

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6I0340 - General Preparation										
Blank (W6I0340-BLK1)				Prepared & Analyzed: 09/08/16						
Total Suspended Solids	1.00		mg/l							J
LCS (W6I0340-BS1)				Prepared & Analyzed: 09/08/16						
Total Suspended Solids	58.0		mg/l	55.4		105	90-110			
Duplicate (W6I0340-DUP1)				Prepared & Analyzed: 09/08/16						
Total Suspended Solids	1.00		mg/l		1.00			0	20	J
Source: 6I07106-02										



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Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/09/2016 09:57



Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
O-04	This analysis was performed outside the EPA recommended holding time.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

SIYB Analytical Reports

Day 2

Work Orders: 6H25063

Report Date: 9/16/2016

Received Date: 8/25/2016

Project: 2016 Shelter Island Yacht Basin (Special Study)

Turnaround Time: Normal

Phones: (858) 300-4323

Fax: (858) 300-4301

P.O. #:

Attn: Rolf Schottle

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

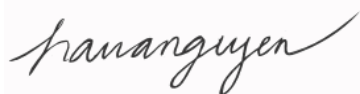
DoD-ELAP #L15-366 • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO 17025 #L15-365 • NELAP-OR #4047 • NJ-DEP
#CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Rolf Schottle,

Enclosed are the results of analyses for samples received 8/25/16 with the Chain-of-Custody document. The samples were received in good condition, at 2.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Hai Van Nguyen
Senior Project Manager





WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Certificate of Analysis

FINAL REPORT

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Reported:
09/16/2016 14:27

Sample Summary

Sample ID	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SS-01-T	Corey Sheredy/Tyler Huff	6H25063-01	Water	08/24/16 14:20	
SS-03-T	Corey Sheredy/Tyler Huff	6H25063-02	Water	08/24/16 15:15	
SS-05-T	Corey Sheredy/Tyler Huff	6H25063-03	Water	08/24/16 13:00	
SS-07-T	Corey Sheredy/Tyler Huff	6H25063-04	Water	08/24/16 11:00	
SS-07-T (REP)	Corey Sheredy/Tyler Huff	6H25063-05	Water	08/24/16 12:00	
SS-09-T	Corey Sheredy/Tyler Huff	6H25063-06	Water	08/24/16 09:55	
SS-11-T	Corey Sheredy/Tyler Huff	6H25063-07	Water	08/24/16 08:30	
SS-FB-01	Corey Sheredy/Tyler Huff	6H25063-08	Water	08/24/16 16:00	
SS-Filter Rinse-01	Corey Sheredy/Tyler Huff	6H25063-09	Water	08/24/16 16:20	
SS-01-M	Corey Sheredy/Tyler Huff	6H25063-10	Water	08/24/16 14:30	
SS-03-M	Corey Sheredy/Tyler Huff	6H25063-11	Water	08/24/16 15:30	
SS-05-M	Corey Sheredy/Tyler Huff	6H25063-12	Water	08/24/16 13:10	
SS-07-M	Corey Sheredy/Tyler Huff	6H25063-13	Water	08/24/16 11:15	
SS-07-M (REP)	Corey Sheredy/Tyler Huff	6H25063-14	Water	08/24/16 12:10	
SS-09-M	Corey Sheredy/Tyler Huff	6H25063-15	Water	08/24/16 10:05	
SS-11-M	Corey Sheredy/Tyler Huff	6H25063-16	Water	08/24/16 08:45	
SS-01-B	Corey Sheredy/Tyler Huff	6H25063-17	Water	08/24/16 14:40	
SS-03-B	Corey Sheredy/Tyler Huff	6H25063-18	Water	08/24/16 15:40	
SS-05-B	Corey Sheredy/Tyler Huff	6H25063-19	Water	08/24/16 13:25	
SS-07-B	Corey Sheredy/Tyler Huff	6H25063-20	Water	08/24/16 11:25	
SS-07-B (REP)	Corey Sheredy/Tyler Huff	6H25063-21	Water	08/24/16 12:25	
SS-09-B	Corey Sheredy/Tyler Huff	6H25063-22	Water	08/24/16 10:15	
SS-11-B	Corey Sheredy/Tyler Huff	6H25063-23	Water	08/24/16 08:55	



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Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

Sample: SS-01-T

Sampled: 08/24/16 14:20 by Corey Sheredy/Tyler Huff

6H25063-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw

Total Suspended Solids **11** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp

Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/30/16 10:27

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp

Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 09:00

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza

Copper, Total **16** 0.0038 0.010 ug/l 1 09/13/16 21:10

Zinc, Total **34** 0.036 0.20 ug/l 1 09/13/16 21:10

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza

Copper, Dissolved **15** 0.0038 0.010 ug/l 1 08/31/16 21:45

Zinc, Dissolved **34** 0.036 0.20 ug/l 1 08/31/16 21:45



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-03-T
6H25063-02 (Water)

Sampled: 08/24/16 15:15 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1564		Prepared: 08/26/16 09:43				Analyst: ajw
Total Suspended Solids	11		5	mg/l	1	08/26/16 13:00	
Method: SM 5310B	Batch ID: W6H1725		Prepared: 08/30/16 08:11				Analyst: jlp
Total Organic Carbon (TOC)	1.2	0.016	0.10	mg/l	1	08/30/16 10:45	
Method: SM 5310B	Batch ID: W6I0037		Prepared: 09/01/16 07:00				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	09/01/16 09:14	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1764		Prepared: 08/30/16 16:05				Analyst: gza
Copper, Total	17	0.0038	0.010	ug/l	1	09/13/16 21:24	
Zinc, Total	30	0.036	0.20	ug/l	1	09/13/16 21:24	
Method: EPA 1640	Batch ID: W6H1780		Prepared: 08/30/16 16:53				Analyst: gza
Copper, Dissolved	15	0.0038	0.010	ug/l	1	08/31/16 21:59	
Zinc, Dissolved	30	0.036	0.20	ug/l	1	08/31/16 21:59	



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-05-T

Sampled: 08/24/16 13:00 by Corey Sheredy/Tyler Huff

6H25063-03 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **15** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/30/16 11:04

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/01/16 09:28

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **7.9** 0.0038 0.010 ug/l 1 09/13/16 21:38
Zinc, Total **17** 0.036 0.20 ug/l 1 09/13/16 21:38

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **6.9** 0.0038 0.010 ug/l 1 08/31/16 22:12
Zinc, Dissolved **16** 0.036 0.20 ug/l 1 08/31/16 22:12



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-T

Sampled: 08/24/16 11:00 by Corey Sheredy/Tyler Huff

6H25063-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **15** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 11:19

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 09:41

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/13/16 21:52
Zinc, Total **23** 0.036 0.20 ug/l 1 09/13/16 21:52

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **10** 0.0038 0.010 ug/l 1 08/31/16 22:26
Zinc, Dissolved **23** 0.036 0.20 ug/l 1 08/31/16 22:26



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-T (REP) Sampled: 08/24/16 12:00 by Corey Sheredy/Tyler Huff
6H25063-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 11:38

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/01/16 09:56

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **9.4** 0.0038 0.010 ug/l 1 09/13/16 22:47
Zinc, Total **20** 0.036 0.20 ug/l 1 09/13/16 22:47

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **9.0** 0.0038 0.010 ug/l 1 08/31/16 23:21
Zinc, Dissolved **20** 0.036 0.20 ug/l 1 08/31/16 23:21



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-09-T

Sampled: 08/24/16 9:55 by Corey Sheredy/Tyler Huff

6H25063-06 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **8** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/30/16 12:41

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.2** 0.016 0.10 mg/l 1 09/01/16 10:14

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **9.3** 0.0038 0.010 ug/l 1 09/13/16 23:01
Zinc, Total **22** 0.036 0.20 ug/l 1 09/13/16 23:01

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **9.0** 0.0038 0.010 ug/l 1 08/31/16 23:35
Zinc, Dissolved **23** 0.036 0.20 ug/l 1 08/31/16 23:35



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Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-11-T
6H25063-07 (Water)

Sampled: 08/24/16 8:30 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw

Total Suspended Solids **12** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp

Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/30/16 13:00

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp

Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 10:28

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza

Copper, Total **9.0** 0.0038 0.010 ug/l 1 09/13/16 23:14

Zinc, Total **20** 0.036 0.20 ug/l 1 09/13/16 23:14

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza

Copper, Dissolved **8.4** 0.0038 0.010 ug/l 1 08/31/16 23:49

Zinc, Dissolved **21** 0.036 0.20 ug/l 1 08/31/16 23:49



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-FB-01
6H25063-08 (Water) Sampled: 08/24/16 16:00 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1564		Prepared: 08/26/16 09:43				Analyst: ajw
Total Suspended Solids	2		5	mg/l	1	08/26/16 13:00	J
Method: SM 5310B	Batch ID: W6H1725		Prepared: 08/30/16 08:11				Analyst: jlp
Total Organic Carbon (TOC)	0.16	0.016	0.10	mg/l	1	08/30/16 13:16	
Method: SM 5310B	Batch ID: W6I0037		Prepared: 09/01/16 07:00				Analyst: jlp
Dissolved Organic Carbon	0.15	0.016	0.10	mg/l	1	09/01/16 10:45	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1764		Prepared: 08/30/16 16:05				Analyst: gza
Copper, Total	0.017	0.0038	0.010	ug/l	1	09/13/16 23:28	
Zinc, Total	ND	0.036	0.20	ug/l	1	09/13/16 23:28	
Method: EPA 1640	Batch ID: W6H1780		Prepared: 08/30/16 16:53				Analyst: gza
Copper, Dissolved	0.046	0.0038	0.010	ug/l	1	09/01/16 00:03	
Zinc, Dissolved	ND	0.036	0.20	ug/l	1	09/01/16 00:03	



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-Filter Rinse-01
6H25063-09 (Water)

Sampled: 08/24/16 16:20 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Metals - Low Level by 1600 Series Methods

Method: EPA 1640

Batch ID: W6H1780

Prepared: 08/30/16 16:53

Analyst: gza

Copper, Dissolved

0.035

0.0038

0.010

ug/l

1

09/01/16 00:17

Zinc, Dissolved

ND

0.036

0.20

ug/l

1

09/01/16 00:17



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-01-M

Sampled: 08/24/16 14:30 by Corey Sheredy/Tyler Huff

6H25063-10 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/30/16 13:31

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 11:00

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **16** 0.0038 0.010 ug/l 1 09/13/16 23:42
Zinc, Total **33** 0.036 0.20 ug/l 1 09/13/16 23:42

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **15** 0.0038 0.010 ug/l 1 09/01/16 00:30
Zinc, Dissolved **34** 0.036 0.20 ug/l 1 09/01/16 00:30



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-03-M

Sampled: 08/24/16 15:30 by Corey Sheredy/Tyler Huff

6H25063-11 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 14:58

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 11:15

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **15** 0.0038 0.010 ug/l 1 09/13/16 23:56
Zinc, Total **27** 0.036 0.20 ug/l 1 09/13/16 23:56

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **13** 0.0038 0.010 ug/l 1 09/01/16 00:44
Zinc, Dissolved **28** 0.036 0.20 ug/l 1 09/01/16 00:44



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-05-M

Sampled: 08/24/16 13:10 by Corey Sheredy/Tyler Huff

6H25063-12 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1564 **Prepared:** 08/26/16 09:43 **Analyst:** ajw
Total Suspended Solids **10** 5 mg/l 1 08/26/16 13:00

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 08/30/16 15:17

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/01/16 12:52

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **7.8** 0.0038 0.010 ug/l 1 09/14/16 00:10
Zinc, Total **17** 0.036 0.20 ug/l 1 09/14/16 00:10

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **6.9** 0.0038 0.010 ug/l 1 09/01/16 00:58
Zinc, Dissolved **16** 0.036 0.20 ug/l 1 09/01/16 00:58



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-M

Sampled: 08/24/16 11:15 by Corey Sheredy/Tyler Huff

6H25063-13 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **12** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 15:32

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 13:19

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **7.8** 0.0038 0.010 ug/l 1 09/14/16 00:23
Zinc, Total **17** 0.036 0.20 ug/l 1 09/14/16 00:23

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **7.5** 0.0038 0.010 ug/l 1 09/01/16 01:12
Zinc, Dissolved **18** 0.036 0.20 ug/l 1 09/01/16 01:12



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-M (REP) Sampled: 08/24/16 12:10 by Corey Sheredy/Tyler Huff
6H25063-14 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **12** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 15:46

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 13:33

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **6.7** 0.0038 0.010 ug/l 1 09/14/16 00:37
Zinc, Total **15** 0.036 0.20 ug/l 1 09/14/16 00:37

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **6.6** 0.0038 0.010 ug/l 1 09/01/16 01:26
Zinc, Dissolved **20** 0.036 0.20 ug/l 1 09/01/16 01:26



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-09-M
6H25063-15 (Water) Sampled: 08/24/16 10:05 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1591		Prepared: 08/26/16 14:08				Analyst: ajw
Total Suspended Solids	14		5	mg/l	1	08/26/16 16:20	
Method: SM 5310B	Batch ID: W6H1725		Prepared: 08/30/16 08:11				Analyst: jlp
Total Organic Carbon (TOC)	1.2	0.016	0.10	mg/l	1	08/30/16 16:05	
Method: SM 5310B	Batch ID: W6I0037		Prepared: 09/01/16 07:00				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	09/01/16 13:52	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1764		Prepared: 08/30/16 16:05				Analyst: gza
Copper, Total	9.0	0.0038	0.010	ug/l	1	09/14/16 00:51	
Zinc, Total	21	0.036	0.20	ug/l	1	09/14/16 00:51	
Method: EPA 1640	Batch ID: W6H1780		Prepared: 08/30/16 16:53				Analyst: gza
Copper, Dissolved	8.8	0.0038	0.010	ug/l	1	09/01/16 02:21	
Zinc, Dissolved	22	0.036	0.20	ug/l	1	09/01/16 02:21	



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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-11-M

Sampled: 08/24/16 8:45 by Corey Sheredy/Tyler Huff

6H25063-16 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **16** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.2** 0.016 0.10 mg/l 1 08/30/16 16:20

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 14:06

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **8.2** 0.0038 0.010 ug/l 1 09/14/16 01:46
Zinc, Total **18** 0.036 0.20 ug/l 1 09/14/16 01:46

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **7.9** 0.0038 0.010 ug/l 1 09/01/16 02:35
Zinc, Dissolved **19** 0.036 0.20 ug/l 1 09/01/16 02:35



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-01-B

Sampled: 08/24/16 14:40 by Corey Sheredy/Tyler Huff

6H25063-17 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **15** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 16:34

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 14:23

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **15** 0.0038 0.010 ug/l 1 09/14/16 02:00
Zinc, Total **30** 0.036 0.20 ug/l 1 09/14/16 02:00

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **14** 0.0038 0.010 ug/l 1 09/01/16 02:48
Zinc, Dissolved **31** 0.036 0.20 ug/l 1 09/01/16 02:48



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-03-B

Sampled: 08/24/16 15:40 by Corey Sheredy/Tyler Huff

6H25063-18 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 16:49

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 14:36

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **9.8** 0.0038 0.010 ug/l 1 09/14/16 02:14
Zinc, Total **20** 0.036 0.20 ug/l 1 09/14/16 02:14

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **9.0** 0.0038 0.010 ug/l 1 09/01/16 03:02
Zinc, Dissolved **20** 0.036 0.20 ug/l 1 09/01/16 03:02



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

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FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-05-B
6H25063-19 (Water) Sampled: 08/24/16 13:25 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1591		Prepared: 08/26/16 14:08				Analyst: ajw
Total Suspended Solids	18		5	mg/l	1	08/26/16 16:20	
Method: SM 5310B	Batch ID: W6H1725		Prepared: 08/30/16 08:11				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	08/30/16 17:03	
Method: SM 5310B	Batch ID: W6I0037		Prepared: 09/01/16 07:00				Analyst: jlp
Dissolved Organic Carbon	1.5	0.016	0.10	mg/l	1	09/01/16 14:55	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6H1764		Prepared: 08/30/16 16:05				Analyst: gza
Copper, Total	4.9	0.0038	0.010	ug/l	1	09/14/16 02:28	
Zinc, Total	11	0.036	0.20	ug/l	1	09/14/16 02:28	
Method: EPA 1640	Batch ID: W6H1780		Prepared: 08/30/16 16:53				Analyst: gza
Copper, Dissolved	4.1	0.0038	0.010	ug/l	1	09/01/16 03:16	
Zinc, Dissolved	10	0.036	0.20	ug/l	1	09/01/16 03:16	



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-B

Sampled: 08/24/16 11:25 by Corey Sheredy/Tyler Huff

6H25063-20 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1725 **Prepared:** 08/30/16 08:11 **Analyst:** jlp
Total Organic Carbon (TOC) **1.3** 0.016 0.10 mg/l 1 08/30/16 17:17

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 15:13

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **3.3** 0.0038 0.010 ug/l 1 09/14/16 02:41
Zinc, Total **7.3** 0.036 0.20 ug/l 1 09/14/16 02:41

Method: EPA 1640 **Batch ID:** W6H1780 **Prepared:** 08/30/16 16:53 **Analyst:** gza
Copper, Dissolved **2.9** 0.0038 0.010 ug/l 1 09/01/16 03:30
Zinc, Dissolved **7.1** 0.036 0.20 ug/l 1 09/01/16 03:30



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-07-B (REP) Sampled: 08/24/16 12:25 by Corey Sheredy/Tyler Huff
6H25063-21 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1852 **Prepared:** 08/31/16 12:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.6** 0.016 0.10 mg/l 1 08/31/16 14:58

Method: SM 5310B **Batch ID:** W6I0037 **Prepared:** 09/01/16 07:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 15:31

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6H1764 **Prepared:** 08/30/16 16:05 **Analyst:** gza
Copper, Total **4.2** 0.0038 0.010 ug/l 1 09/14/16 02:55
Zinc, Total **9.4** 0.036 0.20 ug/l 1 09/14/16 02:55

Method: EPA 1640 **Batch ID:** W6I0253 **Prepared:** 09/07/16 12:47 **Analyst:** gza
Copper, Dissolved **3.8** 0.0038 0.010 ug/l 1 09/08/16 23:56
Zinc, Dissolved **9.2** 0.036 0.20 ug/l 1 09/08/16 23:56



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-09-B

Sampled: 08/24/16 10:15 by Corey Sheredy/Tyler Huff

6H25063-22 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **16** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1852 **Prepared:** 08/31/16 12:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/31/16 16:02

Method: SM 5310B **Batch ID:** W6I0082 **Prepared:** 09/01/16 09:29 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/01/16 17:31

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **4.6** 0.0038 0.010 ug/l 1 09/14/16 18:07
Zinc, Total **11** 0.036 0.20 ug/l 1 09/14/16 18:07

Method: EPA 1640 **Batch ID:** W6I0253 **Prepared:** 09/07/16 12:47 **Analyst:** gza
Copper, Dissolved **4.4** 0.0038 0.010 ug/l 1 09/09/16 00:10
Zinc, Dissolved **11** 0.036 0.20 ug/l 1 09/09/16 00:10



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Sample Results

(Continued)

Sample: SS-11-B

Sampled: 08/24/16 8:55 by Corey Sheredy/Tyler Huff

6H25063-23 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1591 **Prepared:** 08/26/16 14:08 **Analyst:** ajw
Total Suspended Solids **16** 5 mg/l 1 08/26/16 16:20

Method: SM 5310B **Batch ID:** W6H1852 **Prepared:** 08/31/16 12:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 08/31/16 16:16

Method: SM 5310B **Batch ID:** W6I0082 **Prepared:** 09/01/16 09:29 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/01/16 17:44

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **4.4** 0.0038 0.010 ug/l 1 09/14/16 18:20
Zinc, Total **9.9** 0.036 0.20 ug/l 1 09/14/16 18:20

Method: EPA 1640 **Batch ID:** W6I0253 **Prepared:** 09/07/16 12:47 **Analyst:** gza
Copper, Dissolved **4.2** 0.0038 0.010 ug/l 1 09/09/16 00:24
Zinc, Dissolved **10** 0.036 0.20 ug/l 1 09/09/16 00:24



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

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

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1564 - SM 2540D										
Blank (W6H1564-BLK1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1564-BS1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	55.0		mg/l	57.9		95	90-110			
Duplicate (W6H1564-DUP1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	3.00	Source: 6H24078-02	mg/l		3.00			0	20	J
Duplicate (W6H1564-DUP2)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	11.0	Source: 6H25063-01	mg/l		11.0			0	20	
Batch: W6H1591 - SM 2540D										
Blank (W6H1591-BLK1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1591-BS1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	66.0		mg/l	62.6		105	90-110			
Duplicate (W6H1591-DUP1)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	11.0	Source: 6H25063-13	mg/l		12.0			9	20	
Duplicate (W6H1591-DUP2)				Prepared & Analyzed: 08/26/16						
Total Suspended Solids	14.0	Source: 6H25063-18	mg/l		14.0			0	20	
Batch: W6H1725 - SM 5310B										
Blank (W6H1725-BLK1)				Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	0.0221	0.0090	mg/l							J



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)
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Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6H1725 - SM 5310B (Continued)										
Blank (W6H1725-BLK2)				Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	0.0305	0.0090	mg/l							J
LCS (W6H1725-BS1)				Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	0.995	0.0090	mg/l	1.00		100	80-120		10	
LCS (W6H1725-BS2)				Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	1.90	0.0090	mg/l	2.00		95	80-120		10	
Matrix Spike (W6H1725-MS1)				Source: 6H25063-05 Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	5.76	0.0090	mg/l	5.00	1.28	90	80-120		10	
Matrix Spike (W6H1725-MS2)				Source: 6H25063-05 Prepared & Analyzed: 08/30/16						
Total Organic Carbon (TOC)	5.96	0.0090	mg/l	5.00	1.28	94	80-120		10	
Batch: W6H1852 - SM 5310B										
Blank (W6H1852-BLK1)				Prepared & Analyzed: 08/31/16						
Total Organic Carbon (TOC)	0.0325	0.0090	mg/l							J
Blank (W6H1852-BLK2)				Prepared & Analyzed: 08/31/16						
Total Organic Carbon (TOC)	0.0486	0.0090	mg/l							J
LCS (W6H1852-BS1)				Prepared & Analyzed: 08/31/16						
Total Organic Carbon (TOC)	1.09	0.0090	mg/l	1.00		109	80-120		10	
LCS (W6H1852-BS2)				Prepared & Analyzed: 08/31/16						
Total Organic Carbon (TOC)	2.08	0.0090	mg/l	2.00		104	80-120		10	



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6H1852 - SM 5310B (Continued)										
Matrix Spike (W6H1852-MS1)				Source: 6H25063-21		Prepared & Analyzed: 08/31/16				
Total Organic Carbon (TOC)	6.47	0.0090	mg/l	5.00	1.63	97	80-120		10	
Matrix Spike Dup (W6H1852-MSD1)				Source: 6H25063-21		Prepared & Analyzed: 08/31/16				
Total Organic Carbon (TOC)	6.32	0.0090	mg/l	5.00	1.63	94	80-120	2	10	
Batch: W6I0037 - SM 5310B										
Blank (W6I0037-BLK1)				Prepared & Analyzed: 09/01/16						
Dissolved Organic Carbon	ND	0.013	mg/l							
Blank (W6I0037-BLK2)				Prepared & Analyzed: 09/01/16						
Dissolved Organic Carbon	ND	0.013	mg/l							
LCS (W6I0037-BS1)				Prepared & Analyzed: 09/01/16						
Dissolved Organic Carbon	1.04	0.013	mg/l	1.00		104	80-120		20	
LCS (W6I0037-BS2)				Prepared & Analyzed: 09/01/16						
Dissolved Organic Carbon	1.94	0.013	mg/l	2.00		97	80-120		20	
Matrix Spike (W6I0037-MS1)				Source: 6H25063-11		Prepared & Analyzed: 09/01/16				
Dissolved Organic Carbon	6.42	0.013	mg/l	5.00	1.30	102	80-120		20	
Matrix Spike Dup (W6I0037-MSD1)				Source: 6H25063-11		Prepared & Analyzed: 09/01/16				
Dissolved Organic Carbon	6.32	0.013	mg/l	5.00	1.30	100	80-120	1	20	
Batch: W6I0082 - SM 5310B										
Blank (W6I0082-BLK1)				Prepared & Analyzed: 09/01/16						
Dissolved Organic Carbon	0.0443	0.013	mg/l							

J



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FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
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Batch: W6I0082 - SM 5310B (Continued)

LCS (W6I0082-B51)

Prepared & Analyzed: 09/01/16

Dissolved Organic Carbon	1.15	0.013	mg/l	1.00		115	80-120		20	
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LCS Dup (W6I0082-BSD1)

Prepared & Analyzed: 09/01/16

Dissolved Organic Carbon	1.08	0.013	mg/l	1.00		108	80-120	6	20	
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Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1764 - EPA 1640										
Blank (W6H1764-BLK1)				Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	ND	0.0038	ug/l							
Zinc, Total	ND	0.036	ug/l							
LCS (W6H1764-BS1)				Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	10.2	0.0038	ug/l	10.0		102	73-122			
Zinc, Total	30.4	0.036	ug/l	30.0		101	75-127			
Matrix Spike (W6H1764-MS1)				Source: 6H25063-04 Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	20.5	0.0038	ug/l	10.0	10.5	100	60-138			
Zinc, Total	52.7	0.036	ug/l	30.0	22.5	101	68-132			
Matrix Spike (W6H1764-MS2)				Source: 6H25063-02 Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	27.2	0.0038	ug/l	10.0	16.6	106	60-138			
Zinc, Total	61.2	0.036	ug/l	30.0	30.5	102	68-132			
Matrix Spike Dup (W6H1764-MSD1)				Source: 6H25063-04 Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	20.5	0.0038	ug/l	10.0	10.5	100	60-138	0.06	30	
Zinc, Total	52.5	0.036	ug/l	30.0	22.5	100	68-132	0.4	30	
Matrix Spike Dup (W6H1764-MSD2)				Source: 6H25063-02 Prepared: 08/30/16 Analyzed: 09/13/16						
Copper, Total	26.7	0.0038	ug/l	10.0	16.6	101	60-138	2	30	
Zinc, Total	60.9	0.036	ug/l	30.0	30.5	101	68-132	0.6	30	
Batch: W6H1780 - EPA 1640										
Blank (W6H1780-BLK1)				Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							



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Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
Batch: W6H1780 - EPA 1640 (Continued)										
LCS (W6H1780-BS1)				Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	10.2	0.0038	ug/l	10.0		102	70-130			
Zinc, Dissolved	30.7	0.036	ug/l	30.0		102	75-127			
Matrix Spike (W6H1780-MS1)				Source: 6H25063-04 Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	20.6	0.0038	ug/l	10.0	10.1	105	70-130			
Zinc, Dissolved	54.8	0.036	ug/l	30.0	22.8	107	68-132			
Matrix Spike (W6H1780-MS2)				Source: 6H25063-02 Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	25.5	0.0038	ug/l	10.0	14.9	106	70-130			
Zinc, Dissolved	62.5	0.036	ug/l	30.0	30.4	107	68-132			
Matrix Spike Dup (W6H1780-MSD1)				Source: 6H25063-04 Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	20.4	0.0038	ug/l	10.0	10.1	104	70-130	0.6	30	
Zinc, Dissolved	53.5	0.036	ug/l	30.0	22.8	102	68-132	2	30	
Matrix Spike Dup (W6H1780-MSD2)				Source: 6H25063-02 Prepared: 08/30/16 Analyzed: 08/31/16						
Copper, Dissolved	25.2	0.0038	ug/l	10.0	14.9	103	70-130	1	30	
Zinc, Dissolved	61.3	0.036	ug/l	30.0	30.4	103	68-132	2	30	
Batch: W6I0106 - EPA 1640										
Blank (W6I0106-BLK1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	ND	0.0038	ug/l							
Zinc, Total	ND	0.036	ug/l							
LCS (W6I0106-BS1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	10.2	0.0038	ug/l	10.0		102	73-122			
Zinc, Total	31.0	0.036	ug/l	30.0		103	75-127			



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FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
Batch: W6I0106 - EPA 1640 (Continued)										
Matrix Spike (W6I0106-MS1)	Source: 6H26060-02		Prepared: 09/02/16 Analyzed: 09/14/16							
Copper, Total	21.1	0.0038	ug/l	10.0	10.9	102	60-138			
Zinc, Total	56.2	0.036	ug/l	30.0	25.1	104	68-132			
Matrix Spike (W6I0106-MS2)	Source: 6H25063-23		Prepared: 09/02/16 Analyzed: 09/14/16							
Copper, Total	14.6	0.0038	ug/l	10.0	4.37	102	60-138			
Zinc, Total	41.1	0.036	ug/l	30.0	9.94	104	68-132			
Matrix Spike Dup (W6I0106-MSD1)	Source: 6H26060-02		Prepared: 09/02/16 Analyzed: 09/14/16							
Copper, Total	20.8	0.0038	ug/l	10.0	10.9	99	60-138	1	30	
Zinc, Total	56.4	0.036	ug/l	30.0	25.1	104	68-132	0.4	30	
Matrix Spike Dup (W6I0106-MSD2)	Source: 6H25063-23		Prepared: 09/02/16 Analyzed: 09/14/16							
Copper, Total	14.2	0.0038	ug/l	10.0	4.37	99	60-138	2	30	
Zinc, Total	40.6	0.036	ug/l	30.0	9.94	102	68-132	1	30	
Batch: W6I0253 - EPA 1640										
Blank (W6I0253-BLK1)			Prepared: 09/07/16 Analyzed: 09/08/16							
Copper, Dissolved	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							
LCS (W6I0253-BS1)			Prepared: 09/07/16 Analyzed: 09/08/16							
Copper, Dissolved	10.4	0.0038	ug/l	10.0		104	70-130			
Zinc, Dissolved	31.4	0.036	ug/l	30.0		105	75-127			
Matrix Spike (W6I0253-MS1)	Source: 6H25063-21		Prepared: 09/07/16 Analyzed: 09/08/16							
Copper, Dissolved	14.7	0.0038	ug/l	10.0	3.77	109	70-130			
Zinc, Dissolved	41.9	0.036	ug/l	30.0	9.19	109	68-132			



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FINAL REPORT

Reported:
09/16/2016 14:27

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike	Source	%REC		RPD		Qualifier
				Level	Result	%REC	Limits	RPD	Limit	
Batch: W6I0253 - EPA 1640 (Continued)										
Matrix Spike Dup (W6I0253-MSD1)		Source: 6H25063-21		Prepared: 09/07/16		Analyzed: 09/08/16				
Copper, Dissolved	14.4	0.0038	ug/l	10.0	3.77	107	70-130	2	30	
Zinc, Dissolved	41.6	0.036	ug/l	30.0	9.19	108	68-132	0.8	30	

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Project Manager: Rolf Schottle

Reported:
09/16/2016 14:27

Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

SIYB Analytical Reports

Day 3

Work Orders: 6H26060

Report Date: 9/16/2016

Received Date: 8/26/2016

Project: 2016 Shelter Island Yacht Basin (Special Study)

Turnaround Time: Normal

Phones: (858) 300-4323

Fax: (858) 300-4301

P.O. #:

Attn: Rolf Schottle

Client: Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

DoD-ELAP #L15-366 • ELAP-CA #1132 • EPA-UCMR #CA00211 • HW-DOH # • ISO 17025 #L15-365 • NELAP-OR #4047 • NJ-DEP
#CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Rolf Schottle,

Enclosed are the results of analyses for samples received 8/26/16 with the Chain-of-Custody document. The samples were received in good condition, at 1.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:



Hai Van Nguyen
Senior Project Manager





WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Certificate of Analysis

FINAL REPORT

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Reported:
09/16/2016 14:40

Sample Summary

Sample ID	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
SS-02-T	Corey Sheredy/Tyler Huff	6H26060-01	Water	08/25/16 16:40	
SS-04-T	Corey Sheredy/Tyler Huff	6H26060-02	Water	08/25/16 14:30	
SS-04-T(REP)	Corey Sheredy/Tyler Huff	6H26060-03	Water	08/25/16 15:40	
SS-06-T	Corey Sheredy/Tyler Huff	6H26060-04	Water	08/25/16 13:20	
SS-08-T	Corey Sheredy/Tyler Huff	6H26060-05	Water	08/25/16 12:00	
SS-10-T	Corey Sheredy/Tyler Huff	6H26060-06	Water	08/25/16 10:45	
SS-12-T	Corey Sheredy/Tyler Huff	6H26060-07	Water	08/25/16 09:15	
SS-FB-02	Corey Sheredy/Tyler Huff	6H26060-08	Water	08/25/16 17:50	
SS-Filter Rinse-02	Corey Sheredy/Tyler Huff	6H26060-09	Water	08/25/16 21:00	
SS-02-M	Corey Sheredy/Tyler Huff	6H26060-10	Water	08/25/16 16:55	
SS-04-M	Corey Sheredy/Tyler Huff	6H26060-11	Water	08/25/16 14:50	
SS-04-M(REP)	Corey Sheredy/Tyler Huff	6H26060-12	Water	08/25/16 15:50	
SS-06-M	Corey Sheredy/Tyler Huff	6H26060-13	Water	08/25/16 13:30	
SS-08-M	Corey Sheredy/Tyler Huff	6H26060-14	Water	08/25/16 12:10	
SS-10-M	Corey Sheredy/Tyler Huff	6H26060-15	Water	08/25/16 10:55	
SS-12-M	Corey Sheredy/Tyler Huff	6H26060-16	Water	08/25/16 09:30	
SS-02-B	Corey Sheredy/Tyler Huff	6H26060-17	Water	08/25/16 17:10	
SS-04-B	Corey Sheredy/Tyler Huff	6H26060-18	Water	08/25/16 15:10	
SS-04-B(REP)	Corey Sheredy/Tyler Huff	6H26060-19	Water	08/25/16 16:10	
SS-06-B	Corey Sheredy/Tyler Huff	6H26060-20	Water	08/25/16 13:40	
SS-08-B	Corey Sheredy/Tyler Huff	6H26060-21	Water	08/25/16 12:20	
SS-10-B	Corey Sheredy/Tyler Huff	6H26060-22	Water	08/25/16 11:05	
SS-12-B	Corey Sheredy/Tyler Huff	6H26060-23	Water	08/25/16 09:40	



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FINAL REPORT

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Reported:

09/16/2016 14:40

Project Manager: Rolf Schottle

Sample Results

Sample: SS-02-T

Sampled: 08/25/16 16:40 by Corey Sheredy/Tyler Huff

6H26060-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw
Total Suspended Solids **11** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/02/16 11:26

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Dissolved Organic Carbon **1.7** 0.016 0.10 mg/l 1 09/07/16 13:47

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **14** 0.0038 0.010 ug/l 1 09/14/16 18:34
Zinc, Total **35** 0.036 0.20 ug/l 1 09/14/16 18:34

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza
Copper, Dissolved **13** 0.0038 0.010 ug/l 1 09/15/16 22:39
Zinc, Dissolved **33** 0.036 0.20 ug/l 1 09/15/16 22:39



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Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-T

Sampled: 08/25/16 14:30 by Corey Sheredy/Tyler Huff

6H26060-02 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/02/16 11:39

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/07/16 14:01

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/14/16 19:29
Zinc, Total **25** 0.036 0.20 ug/l 1 09/14/16 19:29

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza
Copper, Dissolved **10** 0.0038 0.010 ug/l 1 09/15/16 22:53
Zinc, Dissolved **24** 0.036 0.20 ug/l 1 09/15/16 22:53



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FINAL REPORT

Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-T(REP) 6H26060-03 (Water) Sampled: 08/25/16 15:40 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	14		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/02/16 11:57	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 15:00	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	14	0.0038	0.010	ug/l	1	09/14/16 19:43	
Zinc, Total	33	0.036	0.20	ug/l	1	09/14/16 19:43	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	14	0.0038	0.010	ug/l	1	09/15/16 23:07	
Zinc, Dissolved	31	0.036	0.20	ug/l	1	09/15/16 23:07	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-06-T

Sampled: 08/25/16 13:20 by Corey Sheredy/Tyler Huff

6H26060-04 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw
Total Suspended Solids **13** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.4** 0.016 0.10 mg/l 1 09/02/16 12:10

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/07/16 15:14

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **11** 0.0038 0.010 ug/l 1 09/14/16 19:57
Zinc, Total **26** 0.036 0.20 ug/l 1 09/14/16 19:57

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza
Copper, Dissolved **10** 0.0038 0.010 ug/l 1 09/15/16 23:20
Zinc, Dissolved **25** 0.036 0.20 ug/l 1 09/15/16 23:20



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-08-T

Sampled: 08/25/16 12:00 by Corey Sheredy/Tyler Huff

6H26060-05 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	15		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.7	0.016	0.10	mg/l	1	09/02/16 12:28	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.5	0.016	0.10	mg/l	1	09/07/16 15:28	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	7.4	0.0038	0.010	ug/l	1	09/14/16 20:11	
Zinc, Total	17	0.036	0.20	ug/l	1	09/14/16 20:11	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	6.4	0.0038	0.010	ug/l	1	09/16/16 00:16	
Zinc, Dissolved	15	0.036	0.20	ug/l	1	09/16/16 00:16	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-10-T

Sampled: 08/25/16 10:45 by Corey Sheredy/Tyler Huff

6H26060-06 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw
Total Suspended Solids **14** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/02/16 12:41

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/07/16 15:42

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **10** 0.0038 0.010 ug/l 1 09/14/16 20:24
Zinc, Total **24** 0.036 0.20 ug/l 1 09/14/16 20:24

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza
Copper, Dissolved **9.3** 0.0038 0.010 ug/l 1 09/16/16 00:29
Zinc, Dissolved **23** 0.036 0.20 ug/l 1 09/16/16 00:29



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-12-T
6H26060-07 (Water)

Sampled: 08/25/16 9:15 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw

Total Suspended Solids **11** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp

Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/02/16 12:55

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp

Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/07/16 16:01

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza

Copper, Total **6.6** 0.0038 0.010 ug/l 1 09/14/16 20:38

Zinc, Total **16** 0.036 0.20 ug/l 1 09/14/16 20:38

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza

Copper, Dissolved **6.1** 0.0038 0.010 ug/l 1 09/16/16 00:43

Zinc, Dissolved **15** 0.036 0.20 ug/l 1 09/16/16 00:43



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-FB-02
6H26060-08 (Water)

Sampled: 08/25/16 17:50 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	1		5	mg/l	1	08/29/16 10:30	J
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	0.20	0.016	0.10	mg/l	1	09/02/16 14:29	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	0.30	0.016	0.10	mg/l	1	09/07/16 16:30	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	0.027	0.0038	0.010	ug/l	1	09/14/16 20:52	
Zinc, Total	0.042	0.036	0.20	ug/l	1	09/14/16 20:52	J
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	0.028	0.0038	0.010	ug/l	1	09/16/16 00:57	
Zinc, Dissolved	ND	0.036	0.20	ug/l	1	09/16/16 00:57	



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-Filter Rinse-02
6H26060-09 (Water)

Sampled: 08/25/16 21:00 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Metals - Low Level by 1600 Series Methods

Method: EPA 1640

Batch ID: W610786

Prepared: 09/15/16 11:29

Analyst: gza

Copper, Dissolved	ND	0.0038	0.010	ug/l	1	09/16/16 01:11	
Zinc, Dissolved	ND	0.036	0.20	ug/l	1	09/16/16 01:11	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-02-M

Sampled: 08/25/16 16:55 by Corey Sheredy/Tyler Huff

6H26060-10 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1644 **Prepared:** 08/29/16 09:07 **Analyst:** ajw
Total Suspended Solids **15** 5 mg/l 1 08/29/16 10:30

Method: SM 5310B **Batch ID:** W6I0092 **Prepared:** 09/02/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/02/16 14:43

Method: SM 5310B **Batch ID:** W6I0261 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Dissolved Organic Carbon **1.4** 0.016 0.10 mg/l 1 09/07/16 16:49

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0106 **Prepared:** 09/02/16 12:39 **Analyst:** gza
Copper, Total **14** 0.0038 0.010 ug/l 1 09/14/16 21:06
Zinc, Total **34** 0.036 0.20 ug/l 1 09/14/16 21:06

Method: EPA 1640 **Batch ID:** W6I0786 **Prepared:** 09/15/16 11:29 **Analyst:** gza
Copper, Dissolved **12** 0.0038 0.010 ug/l 1 09/16/16 01:25
Zinc, Dissolved **32** 0.036 0.20 ug/l 1 09/16/16 01:25



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-M

Sampled: 08/25/16 14:50 by Corey Sheredy/Tyler Huff

6H26060-11 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	11		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/02/16 14:56	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 17:03	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	10	0.0038	0.010	ug/l	1	09/14/16 21:20	
Zinc, Total	24	0.036	0.20	ug/l	1	09/14/16 21:20	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	9.3	0.0038	0.010	ug/l	1	09/16/16 01:38	
Zinc, Dissolved	22	0.036	0.20	ug/l	1	09/16/16 01:38	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-M(REP) 6H26060-12 (Water) Sampled: 08/25/16 15:50 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	16		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/02/16 15:14	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 18:53	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	11	0.0038	0.010	ug/l	1	09/14/16 21:33	
Zinc, Total	26	0.036	0.20	ug/l	1	09/14/16 21:33	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	10	0.0038	0.010	ug/l	1	09/16/16 01:52	
Zinc, Dissolved	24	0.036	0.20	ug/l	1	09/16/16 01:52	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-06-M

Sampled: 08/25/16 13:30 by Corey Sheredy/Tyler Huff

6H26060-13 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	15		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.4	0.016	0.10	mg/l	1	09/02/16 15:32	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 19:12	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0106		Prepared: 09/02/16 12:39				Analyst: gza
Copper, Total	11	0.0038	0.010	ug/l	1	09/14/16 22:29	
Zinc, Total	28	0.036	0.20	ug/l	1	09/14/16 22:29	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	11	0.0038	0.010	ug/l	1	09/16/16 02:06	
Zinc, Dissolved	26	0.036	0.20	ug/l	1	09/16/16 02:06	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-08-M

Sampled: 08/25/16 12:10 by Corey Sheredy/Tyler Huff

6H26060-14 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	13		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.8	0.016	0.10	mg/l	1	09/02/16 15:50	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.5	0.016	0.10	mg/l	1	09/07/16 19:25	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	7.6	0.0038	0.010	ug/l	1	09/15/16 00:19	
Zinc, Total	17	0.036	0.20	ug/l	1	09/15/16 00:19	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	6.4	0.0038	0.010	ug/l	1	09/16/16 02:20	
Zinc, Dissolved	15	0.036	0.20	ug/l	1	09/16/16 02:20	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-10-M

Sampled: 08/25/16 10:55 by Corey Sheredy/Tyler Huff

6H26060-15 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	12		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/02/16 16:04	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	09/07/16 19:45	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	6.7	0.0038	0.010	ug/l	1	09/15/16 00:33	
Zinc, Total	16	0.036	0.20	ug/l	1	09/15/16 00:33	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	6.0	0.0038	0.010	ug/l	1	09/16/16 03:15	
Zinc, Dissolved	15	0.036	0.20	ug/l	1	09/16/16 03:15	



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FINAL REPORT

Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-12-M
6H26060-16 (Water)
Sampled: 08/25/16 9:30 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	14		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.4	0.016	0.10	mg/l	1	09/02/16 16:22	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 19:59	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	6.4	0.0038	0.010	ug/l	1	09/15/16 00:47	
Zinc, Total	16	0.036	0.20	ug/l	1	09/15/16 00:47	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	5.6	0.0038	0.010	ug/l	1	09/16/16 03:29	
Zinc, Dissolved	14	0.036	0.20	ug/l	1	09/16/16 03:29	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-02-B

Sampled: 08/25/16 17:10 by Corey Sheredy/Tyler Huff

6H26060-17 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	14		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/02/16 16:40	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 20:19	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	10	0.0038	0.010	ug/l	1	09/15/16 01:00	
Zinc, Total	24	0.036	0.20	ug/l	1	09/15/16 01:00	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	8.7	0.0038	0.010	ug/l	1	09/16/16 03:43	
Zinc, Dissolved	22	0.036	0.20	ug/l	1	09/16/16 03:43	



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Reported:
09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-B

Sampled: 08/25/16 15:10 by Corey Sheredy/Tyler Huff

6H26060-18 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	15		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0092		Prepared: 09/02/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.7	0.016	0.10	mg/l	1	09/02/16 16:57	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.6	0.016	0.10	mg/l	1	09/07/16 20:37	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	5.9	0.0038	0.010	ug/l	1	09/15/16 01:14	
Zinc, Total	13	0.036	0.20	ug/l	1	09/15/16 01:14	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	5.2	0.0038	0.010	ug/l	1	09/16/16 03:56	
Zinc, Dissolved	12	0.036	0.20	ug/l	1	09/16/16 03:56	



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-04-B(REP) 6H26060-19 (Water) Sampled: 08/25/16 16:10 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	16		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0243		Prepared: 09/07/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.7	0.016	0.10	mg/l	1	09/07/16 11:31	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.4	0.016	0.10	mg/l	1	09/07/16 20:56	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	6.2	0.0038	0.010	ug/l	1	09/15/16 01:28	
Zinc, Total	14	0.036	0.20	ug/l	1	09/15/16 01:28	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	5.2	0.0038	0.010	ug/l	1	09/16/16 04:10	
Zinc, Dissolved	12	0.036	0.20	ug/l	1	09/16/16 04:10	



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-06-B

Sampled: 08/25/16 13:40 by Corey Sheredy/Tyler Huff

6H26060-20 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	13		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0243		Prepared: 09/07/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/07/16 11:49	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	09/07/16 21:10	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	9.5	0.0038	0.010	ug/l	1	09/15/16 02:23	
Zinc, Total	28	0.036	0.20	ug/l	1	09/15/16 02:23	
Method: EPA 1640	Batch ID: W6I0786		Prepared: 09/15/16 11:29				Analyst: gza
Copper, Dissolved	11	0.0038	0.010	ug/l	1	09/16/16 04:24	
Zinc, Dissolved	27	0.036	0.20	ug/l	1	09/16/16 04:24	



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-08-B

Sampled: 08/25/16 12:20 by Corey Sheredy/Tyler Huff

6H26060-21 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1644		Prepared: 08/29/16 09:07				Analyst: ajw
Total Suspended Solids	16		5	mg/l	1	08/29/16 10:30	
Method: SM 5310B	Batch ID: W6I0243		Prepared: 09/07/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.8	0.016	0.10	mg/l	1	09/07/16 12:03	
Method: SM 5310B	Batch ID: W6I0261		Prepared: 09/07/16 09:00				Analyst: jlp
Dissolved Organic Carbon	1.5	0.016	0.10	mg/l	1	09/07/16 21:30	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	4.6	0.0038	0.010	ug/l	1	09/15/16 02:37	
Zinc, Total	13	0.036	0.20	ug/l	1	09/15/16 02:37	
Method: EPA 1640	Batch ID: W6I0253		Prepared: 09/07/16 12:47				Analyst: gza
Copper, Dissolved	5.7	0.0038	0.010	ug/l	1	09/09/16 00:37	
Zinc, Dissolved	13	0.036	0.20	ug/l	1	09/09/16 00:37	



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-10-B

Sampled: 08/25/16 11:05 by Corey Sheredy/Tyler Huff

6H26060-22 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
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Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: SM 2540D **Batch ID:** W6H1741 **Prepared:** 08/30/16 12:01 **Analyst:** ajw
Total Suspended Solids **11** 5 mg/l 1 09/01/16 00:00

Method: SM 5310B **Batch ID:** W6I0243 **Prepared:** 09/07/16 09:00 **Analyst:** jlp
Total Organic Carbon (TOC) **1.5** 0.016 0.10 mg/l 1 09/07/16 12:17

Method: SM 5310B **Batch ID:** W6I0313 **Prepared:** 09/08/16 09:59 **Analyst:** jlp
Dissolved Organic Carbon **1.3** 0.016 0.10 mg/l 1 09/08/16 11:14

Metals - Low Level by 1600 Series Methods

Method: EPA 1640 **Batch ID:** W6I0107 **Prepared:** 09/02/16 12:41 **Analyst:** gza
Copper, Total **1.7** 0.0038 0.010 ug/l 1 09/15/16 02:51
Zinc, Total **7.8** 0.036 0.20 ug/l 1 09/15/16 02:51

Method: EPA 1640 **Batch ID:** W6I0253 **Prepared:** 09/07/16 12:47 **Analyst:** gza
Copper, Dissolved **3.8** 0.0038 0.010 ug/l 1 09/09/16 00:51
Zinc, Dissolved **9.2** 0.036 0.20 ug/l 1 09/09/16 00:51



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09/16/2016 14:40

Sample Results

(Continued)

Sample: SS-12-B
6H26060-23 (Water) Sampled: 08/25/16 9:40 by Corey Sheredy/Tyler Huff

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods							
Method: SM 2540D	Batch ID: W6H1741		Prepared: 08/30/16 12:01				Analyst: ajw
Total Suspended Solids	12		5	mg/l	1	09/01/16 00:00	
Method: SM 5310B	Batch ID: W6I0243		Prepared: 09/07/16 09:00				Analyst: jlp
Total Organic Carbon (TOC)	1.5	0.016	0.10	mg/l	1	09/07/16 12:36	
Method: SM 5310B	Batch ID: W6I0313		Prepared: 09/08/16 09:59				Analyst: jlp
Dissolved Organic Carbon	1.3	0.016	0.10	mg/l	1	09/08/16 11:33	
Metals - Low Level by 1600 Series Methods							
Method: EPA 1640	Batch ID: W6I0107		Prepared: 09/02/16 12:41				Analyst: gza
Copper, Total	1.8	0.0038	0.010	ug/l	1	09/15/16 03:05	
Zinc, Total	7.7	0.036	0.20	ug/l	1	09/15/16 03:05	
Method: EPA 1640	Batch ID: W6I0253		Prepared: 09/07/16 12:47				Analyst: gza
Copper, Dissolved	3.5	0.0038	0.010	ug/l	1	09/09/16 01:05	
Zinc, Dissolved	8.6	0.036	0.20	ug/l	1	09/09/16 01:05	



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09/16/2016 14:40

Quality Control Results

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

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6H1644 - SM 2540D										
Blank (W6H1644-BLK1)				Prepared & Analyzed: 08/29/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1644-BS1)				Prepared & Analyzed: 08/29/16						
Total Suspended Solids	68.0		mg/l	65.8		103	90-110			
Duplicate (W6H1644-DUP1)				Prepared & Analyzed: 08/29/16						
Total Suspended Solids	12.0	Source: 6H26060-01	mg/l		11.0			9	20	
Duplicate (W6H1644-DUP2)				Prepared & Analyzed: 08/29/16						
Total Suspended Solids	13.0	Source: 6H26060-02	mg/l		14.0			7	20	
Batch: W6H1741 - SM 2540D										
Blank (W6H1741-BLK1)				Prepared: 08/30/16 Analyzed: 09/01/16						
Total Suspended Solids	ND		mg/l							
LCS (W6H1741-BS1)				Prepared: 08/30/16 Analyzed: 09/01/16						
Total Suspended Solids	73.0		mg/l	68.0		107	90-110			
Duplicate (W6H1741-DUP1)				Prepared: 08/30/16 Analyzed: 09/01/16						
Total Suspended Solids	12.0	Source: 6H25065-01	mg/l		11.0			9	20	
Duplicate (W6H1741-DUP2)				Prepared: 08/30/16 Analyzed: 09/01/16						
Total Suspended Solids	10.0	Source: 6H26060-22	mg/l		11.0			10	20	
Batch: W6I0092 - SM 5310B										
Blank (W6I0092-BLK1)				Prepared & Analyzed: 09/02/16						
Total Organic Carbon (TOC)	ND	0.0090	mg/l							



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Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6I0092 - SM 5310B (Continued)										
Blank (W6I0092-BLK2)				Prepared & Analyzed: 09/02/16						
Total Organic Carbon (TOC)	0.0780	0.0090	mg/l							J
LCS (W6I0092-BS1)				Prepared & Analyzed: 09/02/16						
Total Organic Carbon (TOC)	1.02	0.0090	mg/l	1.00		102	80-120		10	
LCS (W6I0092-BS2)				Prepared & Analyzed: 09/02/16						
Total Organic Carbon (TOC)	2.18	0.0090	mg/l	2.00		109	80-120		10	
Matrix Spike (W6I0092-MS1)				Source: 6H26060-02		Prepared & Analyzed: 09/02/16				
Total Organic Carbon (TOC)	6.84	0.0090	mg/l	5.00	1.46	107	80-120		10	
Matrix Spike Dup (W6I0092-MSD1)				Source: 6H26060-02		Prepared & Analyzed: 09/02/16				
Total Organic Carbon (TOC)	6.94	0.0090	mg/l	5.00	1.46	109	80-120	1	10	
Batch: W6I0243 - SM 5310B										
Blank (W6I0243-BLK1)				Prepared & Analyzed: 09/07/16						
Total Organic Carbon (TOC)	ND	0.0090	mg/l							
LCS (W6I0243-BS1)				Prepared & Analyzed: 09/07/16						
Total Organic Carbon (TOC)	1.08	0.0090	mg/l	1.00		108	80-120		10	
Matrix Spike (W6I0243-MS1)				Source: 6H26060-23		Prepared & Analyzed: 09/07/16				
Total Organic Carbon (TOC)	6.91	0.0090	mg/l	5.00	1.48	109	80-120		10	
Matrix Spike Dup (W6I0243-MSD1)				Source: 6H26060-23		Prepared & Analyzed: 09/07/16				
Total Organic Carbon (TOC)	6.81	0.0090	mg/l	5.00	1.48	107	80-120	2	10	



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Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6I0261 - SM 5310B										
Blank (W6I0261-BLK1)				Prepared & Analyzed: 09/07/16						
Dissolved Organic Carbon	0.0263	0.013	mg/l							J
Blank (W6I0261-BLK2)				Prepared & Analyzed: 09/07/16						
Dissolved Organic Carbon	0.0288	0.013	mg/l							J
LCS (W6I0261-BS1)				Prepared & Analyzed: 09/07/16						
Dissolved Organic Carbon	1.09	0.013	mg/l	1.00		109	80-120		20	
LCS (W6I0261-BS2)				Prepared & Analyzed: 09/07/16						
Dissolved Organic Carbon	2.18	0.013	mg/l	2.00		109	80-120		20	
Matrix Spike (W6I0261-MS1)				Source: 6H26060-02						
Dissolved Organic Carbon	6.93	0.013	mg/l	5.00	1.34	112	80-120		20	
Matrix Spike Dup (W6I0261-MSD1)				Source: 6H26060-02						
Dissolved Organic Carbon	6.84	0.013	mg/l	5.00	1.34	110	80-120	1	20	
Batch: W6I0313 - SM 5310B										
Blank (W6I0313-BLK1)				Prepared & Analyzed: 09/08/16						
Dissolved Organic Carbon	ND	0.013	mg/l							
LCS (W6I0313-BS1)				Prepared & Analyzed: 09/08/16						
Dissolved Organic Carbon	1.08	0.013	mg/l	1.00		108	80-120		20	
Matrix Spike (W6I0313-MS1)				Source: 6H26060-23						
Dissolved Organic Carbon	6.95	0.013	mg/l	5.00	1.35	112	80-120		20	



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Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Batch: W610313 - SM 5310B (Continued)

Matrix Spike Dup (W610313-MSD1)

Source: 6H26060-23

Prepared & Analyzed: 09/08/16

Dissolved Organic Carbon	6.82	0.013	mg/l	5.00	1.35	109	80-120	2	20	
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Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6I0106 - EPA 1640										
Blank (W6I0106-BLK1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	ND	0.0038	ug/l							
Zinc, Total	ND	0.036	ug/l							
LCS (W6I0106-BS1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	10.2	0.0038	ug/l	10.0		102	73-122			
Zinc, Total	31.0	0.036	ug/l	30.0		103	75-127			
Matrix Spike (W6I0106-MS1)				Source: 6H26060-02 Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	21.1	0.0038	ug/l	10.0	10.9	102	60-138			
Zinc, Total	56.2	0.036	ug/l	30.0	25.1	104	68-132			
Matrix Spike (W6I0106-MS2)				Source: 6H25063-23 Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	14.6	0.0038	ug/l	10.0	4.37	102	60-138			
Zinc, Total	41.1	0.036	ug/l	30.0	9.94	104	68-132			
Matrix Spike Dup (W6I0106-MSD1)				Source: 6H26060-02 Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	20.8	0.0038	ug/l	10.0	10.9	99	60-138	1	30	
Zinc, Total	56.4	0.036	ug/l	30.0	25.1	104	68-132	0.4	30	
Matrix Spike Dup (W6I0106-MSD2)				Source: 6H25063-23 Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	14.2	0.0038	ug/l	10.0	4.37	99	60-138	2	30	
Zinc, Total	40.6	0.036	ug/l	30.0	9.94	102	68-132	1	30	
Batch: W6I0107 - EPA 1640										
Blank (W6I0107-BLK1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	ND	0.0038	ug/l							
Zinc, Total	ND	0.036	ug/l							



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Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Qualifier
Batch: W6I0107 - EPA 1640 (Continued)										
LCS (W6I0107-BS1)				Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	10.4	0.0038	ug/l	10.0		104	73-122			
Zinc, Total	32.0	0.036	ug/l	30.0		107	75-127			
Matrix Spike (W6I0107-MS1)				Source: 6H26060-14 Prepared: 09/02/16 Analyzed: 09/14/16						
Copper, Total	17.7	0.0038	ug/l	10.0	7.56	102	60-138			
Zinc, Total	48.7	0.036	ug/l	30.0	17.2	105	68-132			
Matrix Spike Dup (W6I0107-MSD1)				Source: 6H26060-14 Prepared: 09/02/16 Analyzed: 09/15/16						
Copper, Total	18.0	0.0038	ug/l	10.0	7.56	104	60-138	1	30	
Zinc, Total	49.6	0.036	ug/l	30.0	17.2	108	68-132	2	30	
Batch: W6I0253 - EPA 1640										
Blank (W6I0253-BLK1)				Prepared: 09/07/16 Analyzed: 09/08/16						
Copper, Dissolved	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							
LCS (W6I0253-BS1)				Prepared: 09/07/16 Analyzed: 09/08/16						
Copper, Dissolved	10.4	0.0038	ug/l	10.0		104	70-130			
Zinc, Dissolved	31.4	0.036	ug/l	30.0		105	75-127			
Matrix Spike (W6I0253-MS1)				Source: 6H25063-21 Prepared: 09/07/16 Analyzed: 09/08/16						
Copper, Dissolved	14.7	0.0038	ug/l	10.0	3.77	109	70-130			
Zinc, Dissolved	41.9	0.036	ug/l	30.0	9.19	109	68-132			
Matrix Spike Dup (W6I0253-MSD1)				Source: 6H25063-21 Prepared: 09/07/16 Analyzed: 09/08/16						
Copper, Dissolved	14.4	0.0038	ug/l	10.0	3.77	107	70-130	2	30	
Zinc, Dissolved	41.6	0.036	ug/l	30.0	9.19	108	68-132	0.8	30	



WECK LABORATORIES, INC.

Amec Foster Wheeler - San Diego 2
9210 Sky Park Court, Suite 200
San Diego, CA 92123

Project Number: 2016 Shelter Island Yacht Basin (Special Study)

Project Manager: Rolf Schottle

Certificate of Analysis

FINAL REPORT

Reported:
09/16/2016 14:40

Quality Control Results

(Continued)

Metals - Low Level by 1600 Series Methods (Continued)

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	Limit	RPD	Limit	Qualifier
Batch: W6I0786 - EPA 1640										
Blank (W6I0786-BLK1)				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	ND	0.0038	ug/l							
Zinc, Dissolved	ND	0.036	ug/l							
LCS (W6I0786-BS1)				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	9.88	0.0038	ug/l	10.0		99	70-130			
Zinc, Dissolved	30.1	0.036	ug/l	30.0		100	75-127			
Matrix Spike (W6I0786-MS1)				Source: 6H26060-01						
				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	23.2	0.0038	ug/l	10.0	13.0	102	70-130			
Zinc, Dissolved	64.9	0.036	ug/l	30.0	33.4	105	68-132			
Matrix Spike (W6I0786-MS2)				Source: 6H26060-02						
				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	20.2	0.0038	ug/l	10.0	10.2	100	70-130			
Zinc, Dissolved	54.9	0.036	ug/l	30.0	24.3	102	68-132			
Matrix Spike Dup (W6I0786-MSD1)				Source: 6H26060-01						
				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	22.9	0.0038	ug/l	10.0	13.0	99	70-130	1	30	
Zinc, Dissolved	64.0	0.036	ug/l	30.0	33.4	102	68-132	1	30	
Matrix Spike Dup (W6I0786-MSD2)				Source: 6H26060-02						
				Prepared & Analyzed: 09/15/16						
Copper, Dissolved	20.3	0.0038	ug/l	10.0	10.2	102	70-130	0.8	30	
Zinc, Dissolved	54.7	0.036	ug/l	30.0	24.3	101	68-132	0.4	30	



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FINAL REPORT

Reported:
09/16/2016 14:40



Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Appendix E

Field Data Sheets

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station
Identification: S14B-01

Date:
(mm/dd/yyyy) 8/23/2016

Time Started:
(hh:mm) 1750 Ended:
(hh:mm) 1840

GPS:
(WGS84) Lat. 32.71828 Long. -117.22602

Tide (ft): 18' 0" ↓ 2.7 Time of Slack
' High Tide: 1345

Water Depth
(ft): 18' 0"

Current
Speed and
Direction: calm, ^(CCS) ~~1-2 knots N~~

Water
Visibility (ft) 12'

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1755

Mid-depth Collection (ft): 9 Time Collected: 1815

Bottom-depth Collection (ft): 15 Time Collected: 1830

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / (NA)
Mid-depth: (Y) / N
Bottom: (Y) / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1750	8.11	33.22	22.2
End of sample collection (concurrent with CTD cast)	1835	8.11	33.24	22.3
Average value	-	8.11	33.23	22.3

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1835

CTD Collection Coordinates (WGS84):

Lat: 32.71822 Long: -117.22604

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-01 (REP)

Date: (mm/dd/yyyy) 08/23/2016

Time Started: (hh:mm) 1840 Ended: (hh:mm) 1910

GPS: (WGS84) Lat. 32.71822 Long. -117.22604

Tide (ft): 2.0↑ Time of Slack High Tide: 1345

Water Depth (ft): 18.2

Current Speed and Direction: ~~1 Knt W~~ calm ^(CCS)

Water Visibility (ft) 12.0

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1840

Mid-depth Collection (ft): 9 Time Collected: 1855

Bottom-depth Collection (ft): 15 Time Collected: 1905

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / (NA)
Mid-depth: (Y) / N
Bottom: (Y) / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1840	8.11	33.25	22.3
End of sample collection (concurrent with CTD cast)	1912	8.11	33.26	21.6
Average value	—	8.11	33.26	21.9

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1910

CTD Collection Coordinates (WGS84):

Lat: 32.71822 Long: -117.22604

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station
Identification: SIB-02

Date:
(mm/dd/yyyy) 08/23/2016

Time Started:
(hh:mm) 1645 Ended:
(hh:mm) 1735

GPS:
(WGS84) Lat. 32.71422 Long. -117.22924

Tide (ft): ↓ 3.8 Time of Slack
High Tide: 1345

Water Depth
(ft): 15.2

Current
Speed and
Direction: calm, sunny

Water
Visibility (ft) 4-12 to 12

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1650

Mid-depth Collection (ft): 7 Time Collected: 1710

Bottom-depth Collection (ft): 12 Time Collected: 1720

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1650	8.12	33.23	22.0
End of sample collection (concurrent with CTD cast)	1730	8.12	33.22	21.9
Average value	-	8.12	33.23	22.0

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1730

CTD Collection Coordinates (WGS84):

Lat: 37.71418 Long: -117.22927

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SINB-03

Date: (mm/dd/yyyy) 08/23/2016

Time Started: (hh:mm) 1525 Ended: (hh:mm) 1610

GPS: (WGS84) Lat. 32.71546 Long. -117.22985

Tide (ft): -5.0 Time of Slack High Tide: 1345

Water Depth (ft): 22.2

Current Speed and Direction: strong current pushing north
3-5 knots (CCS)

Water Visibility (ft) 11.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1525

Mid-depth Collection (ft): 11 Time Collected: 1540

Bottom-depth Collection (ft): 1552 19 Time Collected: 1555

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA

Mid-depth: Y / N

Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1520	8.13	33.23	21.8
End of sample collection (concurrent with CTD cast)	1605	8.12	33.22	21.8
Average value		8.13	33.23	21.8

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1605

CTD Collection Coordinates (WGS84):

Lat: 32.71538 Long: -117.22992

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SIYB-04

Date: (mm/dd/yyyy) 08/23/2016

Time Started: (hh:mm) 1355 Ended: (hh:mm) 1425

GPS: (WGS84) Lat. 32.71685 Long. -117.23200

Tide (ft): ↓ 5.4 Time of Slack High Tide: 1345

Water Depth (ft): 17.7

Current Speed and Direction: medium current pushing north
~~2-3 knot N~~ (CS)

Water Visibility (ft) 7.7

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1400

Mid-depth Collection (ft): 9 Time Collected: 1425

Bottom-depth Collection (ft): 14 Time Collected: 1445

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / (NA)

Mid-depth: (Y) / N

Bottom: (Y) / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1400	8.12	33.26	21.5
End of sample collection (concurrent with CTD cast)	1455	8.12	33.21	21.6
Average value	.	8.12	33.24	21.6

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1455

CTD Collection Coordinates (WGS84):

Lat: 32.71696 Long: -117.23203

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SLYB-05

Date: (mm/dd/yyyy) 08/23/2016

Time Started: (hh:mm) 1240

Ended: (hh:mm) 1345

GPS: (WGS84) Lat. 32.71217 Long. -117.23293

Tide (ft): 5.2 Time of Slack High Tide: 1345

Water Depth (ft): 25.1

Current Speed and Direction: 0 ~~knots~~ Calm ^(WS)

Water Visibility (ft): 8.0

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1240

Mid-depth Collection (ft): 13 Time Collected: 1305

Bottom-depth Collection (ft): 22 Time Collected: 1320

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / (NA)

Mid-depth: (Y) / N

Bottom: (Y) / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1240	8.10	33.47	21.6
End of sample collection (concurrent with CTD cast)	1345	8.11	33.35	21.9
Average value	-	8.11	33.41	21.8

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1342

CTD Collection Coordinates (WGS84):

Lat: 32.71202 Long: -117.23293

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station
Identification: SLYB-06

Date:
(mm/dd/yyyy) 08/23/2016

Time Started:
(hh:mm) 1125

Ended:
(hh:mm) 1230

GPS:
(WGS84) Lat. 32.70878 Long. -117.23512

Tide (ft): 44.2 Time of Slack
High Tide: 1345

Water Depth
(ft): 18.2

Current
Speed and
Direction: ~~1 Knot~~ ^{CLG} Calm

Wind: 2.0

Water
Visibility (ft) 10.2

Conditions: Warm +
Sunny, some clouds

Sample Collection Depths:

Surface Collection Depth (ft): ~~18.2~~ 3 Time Collected: 1130

Mid-depth Collection (ft): 9 Time Collected: 1150

Bottom-depth Collection (ft): 15 Time Collected: 1210

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA

Mid-depth: Y / N

Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1130	8.10	33.35	20.9
End of sample collection (concurrent with CTD cast)	1225	8.09	33.40	21.6
Average value		8.10	33.38	21.3

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1225

CTD Collection Coordinates (WGS84):

Lat: 32.70877 Long: -117.23512

Notes:

Police boat in way of SIYB-02.
moved north and collected on boat.

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

ON SITE AT 0850

Station Identification: SIB-REF

Date: (mm/dd/yyyy) 08/23/2016

Time Started: (hh:mm) 1000

Ended: (hh:mm) _____

GPS: (WGS84) Lat. 32.70407 Long. -117.23235

Tide (ft): +3.0 Time of Slack High Tide: 1345

Water Depth (ft): 67.0+

Current Speed and Direction: mostly calm, slight current
2 ft/sec pushing N Wind: 1.2

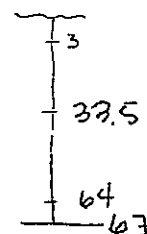
Water Visibility (ft): 9.0

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1000

Mid-depth Collection (ft): 33 Time Collected: 1030

Bottom-depth Collection (ft): 64 Time Collected: 1050



Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / (NA)
Mid-depth: (Y) / N
Bottom: (Y) / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1000	8.11	33.51	20.7
End of sample collection (concurrent with CTD cast)	1105	8.12	33.23	20.0
Average value		8.12	33.37	20.4

*Water quality measured within 1 meter from the surface.

Time of CTD Cast

(after bottom collection only): 1105

CTD Collection Coordinates (WGS84):

Lat: 32.70403 Long: -117.23221

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-01 1451 away from target coordinates due to prox. to vessels

Date: (mm/dd/yyyy) 08/24/2016

Time Started: (hh:mm) 1420 Ended: (hh:mm) _____

GPS: (WGS84) Lat. 32.71646 Long. -117.22498

Tide (ft): 5.4 ↑ Time of Slack High Tide: 1430

Water Depth (ft): 16' 8" actual station depth: 16' 8"

Current Speed and Direction: calm (CCS) ~~0-1 knot North~~ Weather Conditions: Sunny + warm

Water Visibility (ft): 10' 4" Wind (mph): 5.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1420

Mid-depth Collection (ft): 8.5 Time Collected: 1430

Bottom-depth Collection (ft): 13.75 Time Collected: 1440

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ / N / NA
Mid-depth: ☒ / N
Bottom: ☒ / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Arrival on station (following cool-down period)	1420	8.13	33.27	22.3
Sample collection inherent with CTD cast	1454	8.09	33.29	22.7
Average value		8.11	33.28	22.5

*Water quality measured within 1 meter from the surface.

of CTD Cast
Bottom collection only): 1453

Collection Coordinates (WGS84):

32.71647 Long: -117.22496

90
er ~ ~~65~~ away, downstream.



PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-03 ONSITE AT 1505
30' FROM PROPOSED
COORDINATE

Date: (mm/dd/yyyy) 08/24/2016

Time Started: (hh:mm) 1515 Ended: (hh:mm) 1600

GPS: (WGS84) Lat. 32.71550 Long. -117.22659

Tide (ft): 5.4 ↓ Time of Slack High Tide: 1450

Water Depth (ft): 17' 6" *actual station depth*

Current Speed and Direction: Calm CLS Weather Conditions: Sunny + Warm

Water Visibility (ft): 13' 6" Wind (mph): 5.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1515

Mid-depth Collection (ft): 8.5 Time Collected: 1530

Bottom-depth Collection (ft): 14.5 Time Collected: 1540

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ / N / NA
Mid-depth: ☒ / N
Bottom: ☒ / N

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1510	8.13	33.33	22.1
End of sample collection (concurrent with CTD cast)	1550	8.10	33.29	22.5
Average value	—	8.12	33.31	22.3

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1550

CTD Collection Coordinates (WGS84):

Lat: 32.71550 Long: -117.22659

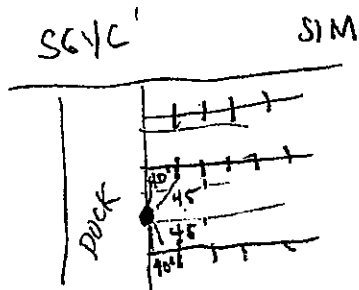
Notes:

1400: Hull cleaners in area. Moved onto station SS-01 first.

1305: Hull cleaner in area, completed at 1300.

Hull cleaner indicated paint on hull was 5 years old.
Waited

side-tied at SGYC → proposed area current too strong.



nearest vessel = 40'
hull cleaner = 43'

FIELD BLANK
COMPLETED AT
THIS SITE AT:
1600

FILTER RINSE:
1620

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-05 ONSITE AT 1245
4' FROM PROPOSED
COORDINATES
Date: (mm/dd/yyyy) 08/24/2016
Time Started: (hh:mm) 1300 Ended: (hh:mm) 1340
GPS: (WGS84) Lat. 32.71741 Long. -117.23309
Tide (ft): 4.7 ↑ Time of Slack High Tide: 1450
Water Depth (ft): 15.6" actual
station depth 15.6
Current Speed and Direction: CC medium current pushing ~~2-3 knots~~ north Weather Conditions: Sunny + warm
Water Visibility (ft): 4.7 ↑ 7.0" Wind (mph): -6.3

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1300

Mid-depth Collection (ft): 7 Time Collected: 1310

Bottom-depth Collection (ft): 12 Time Collected: 1325

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1300	8.12	33.23	21.2
End of sample collection (concurrent with CTD cast)	1338	8.13	33.22	21.2
Average value	—	8.13	33.23	21.2

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1338

CTD Collection Coordinates (WGS84):

Lat: 32.71743 Long: -117.23731

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-07

ON SITE @ 1045
11' from proposed
coordinates

Date: (mm/dd/yyyy) 8/24/2016

Time Started: (hh:mm) 1100

Ended: (hh:mm) 1140

GPS: (WGS84) Lat. 32.71346 Long. -117.23218

Tide (ft): 3.1 ↑ Time of Slack High Tide: 1450

Water Depth (ft): 21.5" actual station depth: 21.5

Current Speed and Direction: ~~1-2 Knts~~ ^{CCS} calm Weather Conditions: sunny and warm

Water Visibility (ft): 11.0" Wind (mph): ~~4.6~~

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1100

Mid-depth Collection (ft): 10.5 Time Collected: 1115

Bottom-depth Collection (ft): 18.5 Time Collected: 1125

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1055	8.11	33.23	21.2
End of sample collection (concurrent with CTD cast)	1138	8.11	33.27	21.4
Average value	—	8.11	33.25	21.3

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1138

CTD Collection Coordinates (WGS84):

Lat: 32.71354 Long: -117.23220

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-07 (REP) DISTANCE FROM PROPOSED LOCATION: _____

Date: (mm/dd/yyyy) 08/24/2016

Time Started: (hh:mm) 1200 Ended: (hh:mm) 1238

GPS: (WGS84) Lat. 32.71353 Long. -117.23222

Tide (ft): 3.9 ↑ Time of Slack High Tide: 1450

Water Depth (ft): 22.0" actual station depth: 22.0

Current Speed and Direction: ~~0.5 knots~~ calm Weather Conditions: sunny + warm

Water Visibility (ft) 8.0" Wind (mph): 3.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1200

Mid-depth Collection (ft): 11.0 Time Collected: 1210

Bottom-depth Collection (ft): 19.0 Time Collected: 1225

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1155	8.12	33.29	21.4
End of sample collection (concurrent with CTD cast)	1235	8.13	33.33	21.4
Average value	—	8.13	33.31	21.4

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1235

CTD Collection Coordinates (WGS84):

Lat: 32.71353 Long: -117.23222

Notes:

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-09 ONSITE @ 0945
18 feet off
proposed location
Date: (mm/dd/yyyy) 08/24/2016
Time Started: (hh:mm) 0955 Ended: (hh:mm) 1030
GPS: (WGS84) Lat. 32.71037 Long. -117.23314
Tide (ft): 2.3 ↑ Time of Slack High Tide: 1450
Water Depth (ft): 22.3' actual station depth: 22.3
Current Speed and Direction: calm (CCS) ~~0-2 knts N~~ Weather Conditions: sunny, slightly overcast, warm
Water Visibility (ft): 12.0' Wind (mph): 2.0

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 0955

Mid-depth Collection (ft): 11 Time Collected: 1005

Bottom-depth Collection (ft): 19 Time Collected: 1015

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	0955	8.08	33.32	21.1
End of sample collection (concurrent with CTD cast)	1028	8.10	33.31	21.3
Average value	—	8.09	33.32	21.2

*Water quality measured within 1 meter from the surface.

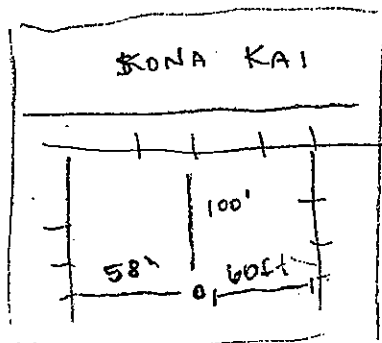
Time of CTD Cast
(after bottom collection only): 1028

CTD Collection Coordinates (WGS84):

Lat: 32.71032 Long: -117.23299

Notes:

Hull cleaning ~180 feet away (East)
Lots of maintenance activities but no
Hull cleaners left at 0950



PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station
Identification:

SS-11

DNSITE @ 0820

Date:
(mm/dd/yyyy)

08/24/2016

17 ft away from
proposed coordinates

Time Started:
(hh:mm)

0830

Ended:
(hh:mm)

~~0845~~ 0925

GPS:
(WGS84)

Lat. 32.71035

Long. -117.23613

Tide (ft):

1.8 ↑ (low tide at 0800)

Time of Slack
High Tide:

1450

Water Depth
(ft):

19.2"

actual
station depth: 19.2

Current
Speed and
Direction:

Calm

Weather
Conditions:

Sunny, humid

Water
Visibility (ft)

12.3"

Wind (mph):

1.3

Sample Collection Depths:

Surface Collection Depth (ft):

3

Time Collected:

0830

Mid-depth Collection (ft):

9

Time Collected:

0845

Bottom-depth Collection (ft):

16

Time Collected:

0855

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ Y / N / NA

Mid-depth: ☒ Y / N

Bottom: ☒ Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	0830	7.97	33.19	21.0
End of sample collection (concurrent with CTD cast)	0925	8.10	33.30	21.1
Average value	—	8.04	33.25	21.1

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 0925

CTD Collection Coordinates (WGS84):

Lat: 32.71044 Long: -117.23614
32.71041 -117.23615

Notes: hull cleaning boat coming in.

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station
Identification:

SS-02

arrived on station
1624 → moved

Date:
(mm/dd/yyyy)

8/25/2016

Time Started:
(hh:mm)

1640

Ended:
(hh:mm)

1725

GPS:
(WGS84)

Lat. 32.71883

Long. -117.22829

Tide (ft):

5.5 ↓

Time of Slack
High Tide:

1605

Water Depth
(ft):

18' 06"

Current
Speed and
Direction:

~~1-2 knots~~, calm

Weather
Conditions:

sunny + warm

Water
Visibility (ft)

11'

Wind (mph):

4.3

Sample Collection Depths:

Surface Collection Depth (ft):

3

Time Collected:

1640

Mid-depth Collection (ft):

9

Time Collected:

1655

Bottom-depth Collection (ft):

15

Time Collected:

1710

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ / N / NA

Mid-depth: ☒ / N

Bottom: ☒ / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1650	8.11	33.20	22.1
End of sample collection (concurrent with CTD cast)	1720	8.11	33.20	22.2
Average value	—	8.11	33.20	22.2

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1720

CTD Collection Coordinates (WGS84):

Lat: 32.71886 Long: -117.22822

Notes:

* fairway too narrow. Wind blowing East and we would have had to drop anchor in ship. Moved 1 (wider) fairway west

FIELD BLANK: 1750

FILTER RINSE: 2100

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-04 ON SITE AT 1410
20' From station
proposed coordinates

Date: (mm/dd/yyyy) 08/25/2016

Time Started: (hh:mm) 1430 Ended: (hh:mm) _____

GPS: (WGS84) Lat. 32.71681 Long. -117.22806

Tide (ft): 4.9 ↑ Time of Slack High Tide: 1605

Water Depth (ft): 22' 3"

Current Speed and Direction: strong current pushing
3-4 knots N Weather Conditions: sunny, some clouds, warm

Water Visibility (ft): 11' 4" Wind (mph): 3.8

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1430

Mid-depth Collection (ft): 11 Time Collected: 1450

Bottom-depth Collection (ft): 19 Time Collected: 1510

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1425	8.14	33.22	21.8
End of sample collection (concurrent with CTD cast)	1525	8.12	33.19	22.2
Average value	—	8.13	33.21	21.5

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1525

CTD Collection Coordinates (WGS84):

Lat: 32.71675 Long: -117.22800

Notes:

>60' from nearest boat.

- Hull cleaner motored by; no cleaning observed.

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-04 (REP)

Date: (mm/dd/yyyy) 8/25/2016

Time Started: (hh:mm) 1540 Ended: (hh:mm) _____

GPS: (WGS84) Lat. 32.71670 Long. -117.22805

Tide (ft): 5.4 ↑ Time of Slack High Tide: 1605

Water Depth (ft): 23' 0"

Current Speed and Direction: Strong current pushing N
~~3-4 knots~~ (CWS) Weather Conditions: Sunny, some clouds, warm

Water Visibility (ft): 9' 6" Wind (mph): 5.3

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1540

Mid-depth Collection (ft): 11.5 Time Collected: 1550

Bottom-depth Collection (ft): 20 Time Collected: 1610

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Q / N / NA
Mid-depth: Q / N
Bottom: Q / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1530	8.12	33.22	22.2
End of sample collection (concurrent with CTD cast)	1615	8.11	33.20	22.3
Average value	—	8.12	33.21	22.3

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1615

CTD Collection Coordinates (WGS84):

Lat: 32.71676 Long: -117.22804

Notes:

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-06 ON SITE : 1310
Date: (mm/dd/yyyy) 8/25/2016 APPROX. 100' E FROM
Time Started: (hh:mm) 1320 Ended: (hh:mm) 1400 PROPOSED COORDINATES.*
GPS: (WGS84) Lat. 32.71191 Long. -117.23042
Tide (ft): 4.2 ↑ Time of Slack High Tide: 1605
Water Depth (ft): 14' 6"
Current Speed and Direction: ~~SE~~ calm (CS) Weather Conditions: Sunny + warm
Water Visibility (ft): 14' 6" (hit bottom) Wind (mph): 4.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1320
Mid-depth Collection (ft): 7 Time Collected: 1330
Bottom-depth Collection (ft): 11 Time Collected: 1340

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1315	8.12	33.27	21.9
End of sample collection (concurrent with CTD cast)	1400	8.11	33.23	21.9
Average value	-	8.12	33.25	21.9

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): ~~1400~~ 1358

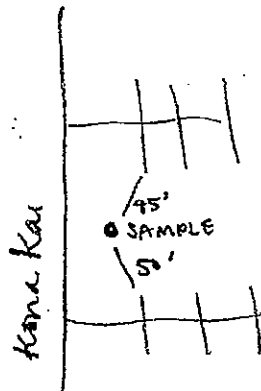
CTD Collection Coordinates (WGS84):

Lat: 32.7191 Long: -117.23040

Notes:

*channel too narrow and wind was variable; boat was weatherveining in channel.

- vessel swung towards boats after bottom cast. sample was not taken w/in 20' of boats.



2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-08 on site at 1135
Date: 8/25/2016 1 away from
Time Started: 1200 Ended: 1245
proposed coordinates
GPS: (WGS84) Lat. 32.71606 Long. -117.23492
Tide (ft): 3.1 ↑ Time of Slack High Tide: 1605
Water Depth (ft): 12' 7"
Current Speed and Direction: medium current pushing towards shore 0.3
3-4 knots N Weather Conditions: Sunny + Warm
Water Visibility (ft): 6' 3" Wind (mph): 5.0

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1200

Mid-depth Collection (ft): 6 Time Collected: 1210

Bottom-depth Collection (ft): 9 Time Collected: 1220

Bottle-top filtration tower flushed with 500mL of site water?

Surface: Y / N / NA
Mid-depth: Y / N
Bottom: Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1155	8.16	33.23	21.6
End of sample collection (concurrent with CTD cast)	1240	8.13	33.22	21.8
Average value	—	8.15	33.23	21.7

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 1240

CTD Collection Coordinates (WGS84):

Lat: 32.71600 Long: -117.23487

Notes:

approx. 160' away from storm drain.

- maintenance workers on (what looks like) copper roof. ~300' away.

Hull cleaners ~310' SW - at southwestern yacht club.

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

Station Identification: SS-10 on site at 1030
Date: (mm/dd/yyyy) 8/25/2016 12' from station proposed
Time Started: (hh:mm) 1045 coordinates
Ended: (hh:mm) 1125
GPS: (WGS84) Lat. 32.71174 Long. -117.23425
Tide (ft): 2.4 ↑ Time of Slack High Tide: 1605
Water Depth (ft): 22' 3"
Current Speed and Direction: ~~3-4 knots~~, calm. Weather Conditions: warm & sunny
Water Visibility (ft): 10' 6" Wind (mph): 5.5

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 1045

Mid-depth Collection (ft): 11 Time Collected: 1055

Bottom-depth Collection (ft): 19 Time Collected: 1105

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ Y / N / NA
Mid-depth: ☒ Y / N
Bottom: ☒ Y / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	1040	8.12	33.27	21.5
End of sample collection (concurrent with CTD cast)	1120	8.12	33.26	21.6
Average value	—	8.12	33.27	21.6

*Water quality measured within 1 meter from the surface.

Time of CTD Cast

(after bottom collection only): 1120

CTD Collection Coordinates (WGS84):

Lat: 32.71169 Long: -117.23427

Notes:

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

ON SITE AT 0900
30' FROM PROPOSED
COORDINATES

Station Identification: SS-12

Date: (mm/dd/yyyy) 08/25/2016

Time Started: (hh:mm) 0915 Ended: (hh:mm) 0955

GPS: (WGS84) Lat. 32.70765 Long. -117.23647

Tide (ft): 2.2 ↑ Time of Slack High Tide: 1605

Water Depth (ft): 22' 5"

Current Speed and Direction: ~~1-2 Knt N~~, calm Weather Conditions: overcast, calm, humid

Water Visibility (ft) 9.0 Wind (mph): ~~0.8~~ 1.4

Sample Collection Depths:

Surface Collection Depth (ft): 3 Time Collected: 0915

Mid-depth Collection (ft): 11 Time Collected: 0930

Bottom-depth Collection (ft): 19 Time Collected: 0940

Bottle-top filtration tower flushed with 500mL of site water?

Surface: ☒ N / NA
Mid-depth: ☒ / N
Bottom: ☒ / N

PORT OF SAN DIEGO
SHELTER ISLAND YACHT BASIN
ENHANCED WATER QUALITY SPECIAL STUDY
2016

2016 SPECIAL STUDY FIELD WATER QUALITY DATA SHEET

YSI Surface Water Quality Measurements	Time of Measure	pH	Salinity (ppt)	Temperature (°C)
Upon arrival on station (following boat cool-down period)	0915	8.07	33.06	21.0
End of sample collection (concurrent with CTD cast)	0950	8.11	33.08	21.0
Average value				

*Water quality measured within 1 meter from the surface.

Time of CTD Cast
(after bottom collection only): 0950

CTD Collection Coordinates (WGS84):

Lat: 32.70762 Long: -117.23643

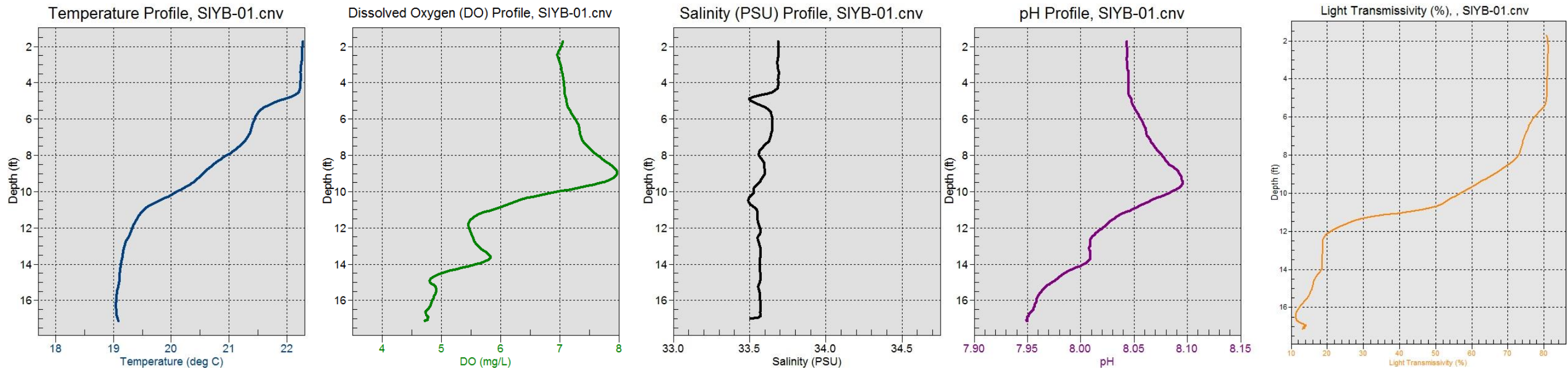
Notes:

Samples taken ~ 70' from R/V Sprawl.

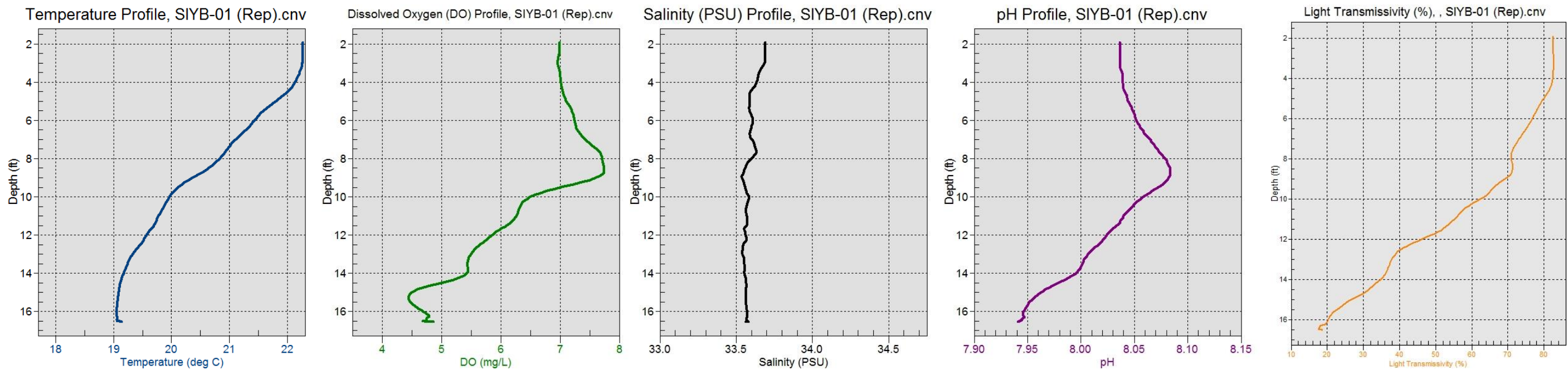
Appendix F

In situ Data

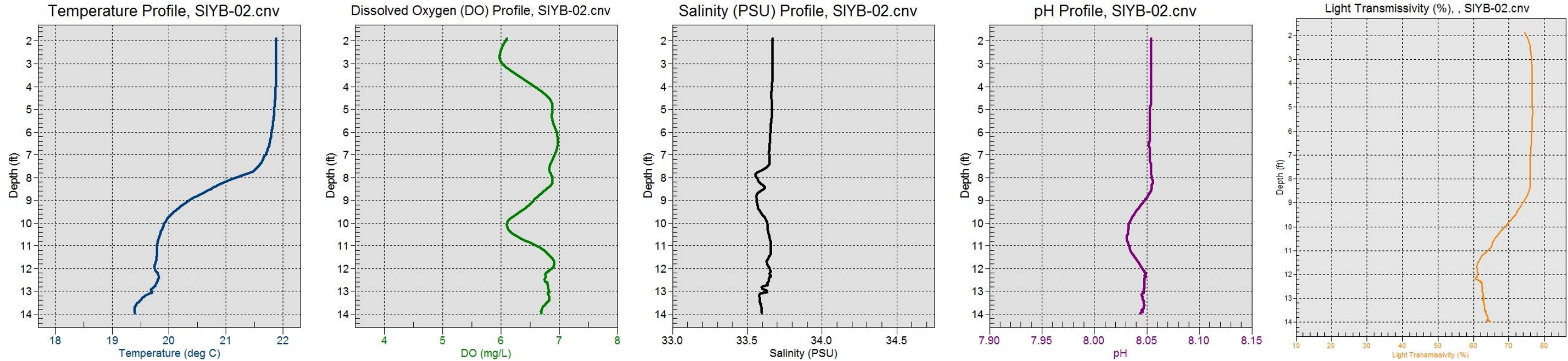
SIYB-1



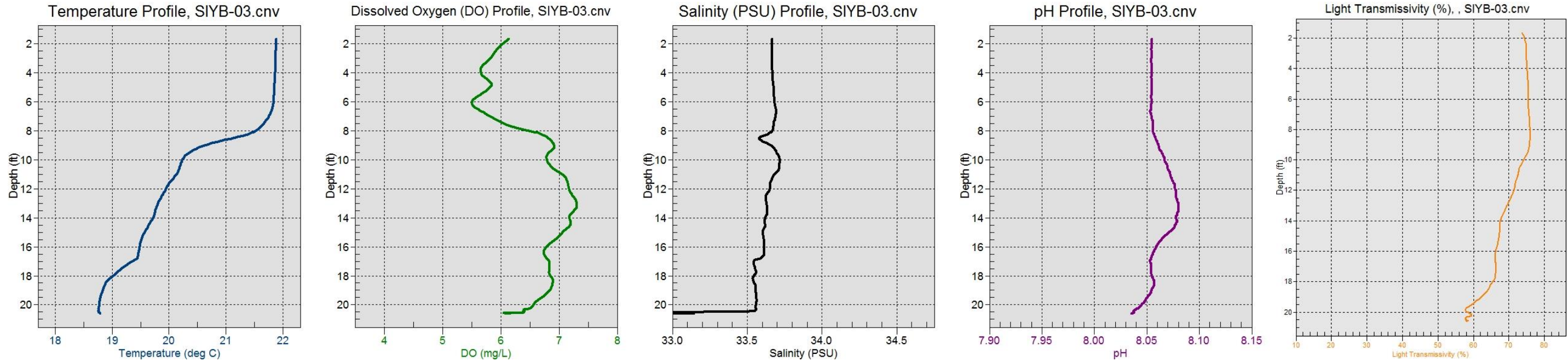
SIYB-1 (REP)



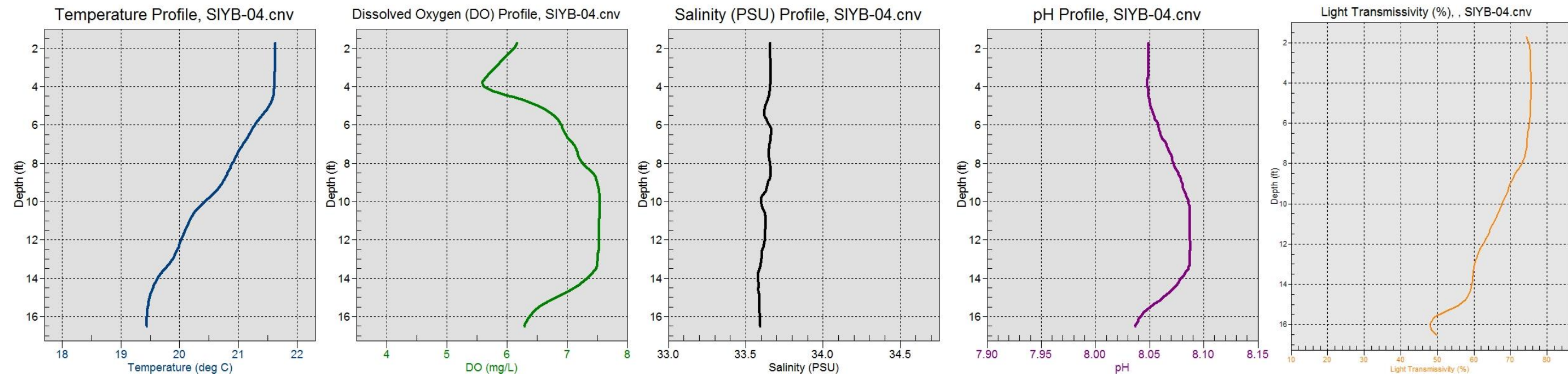
SIYB-2



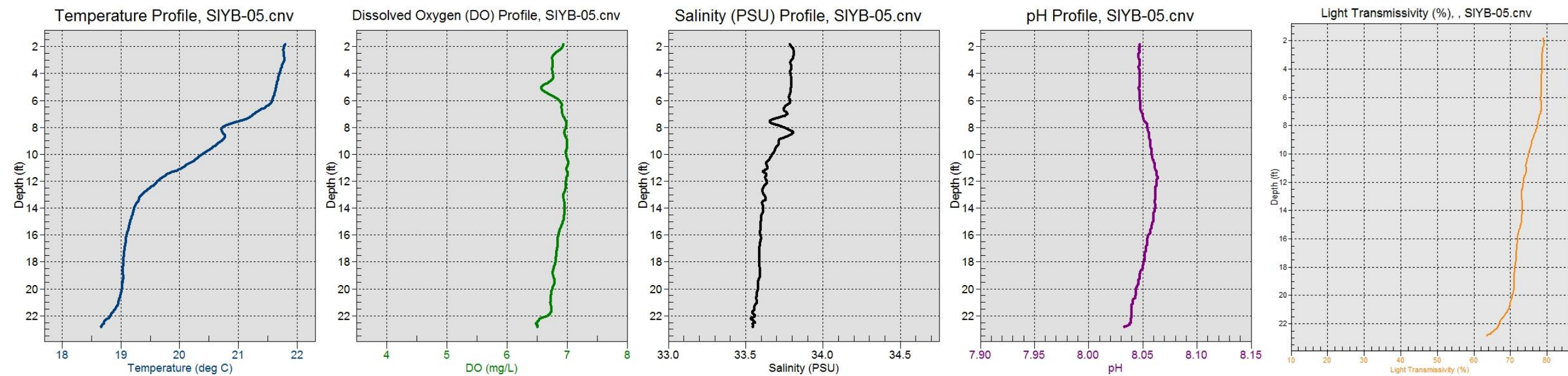
SIYB-3



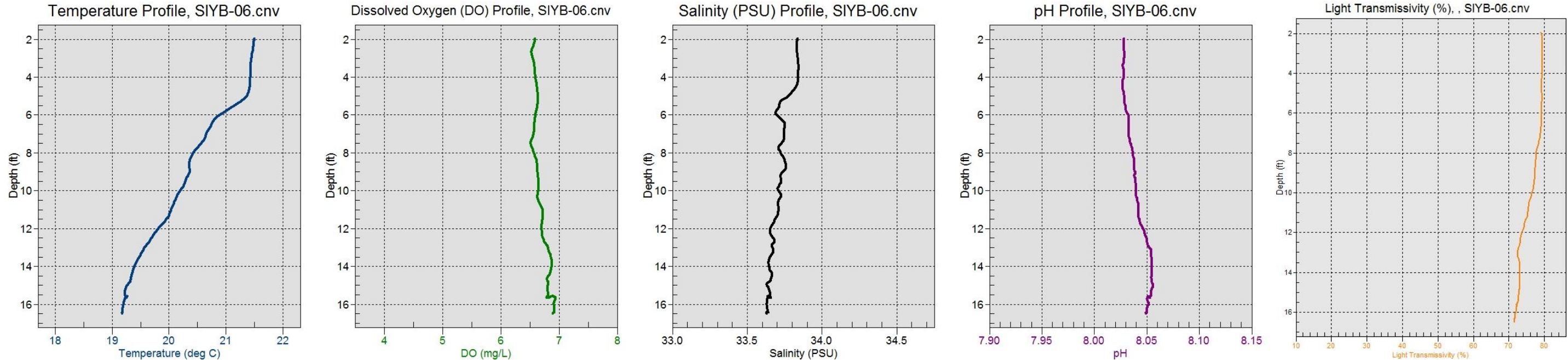
SIYB-4



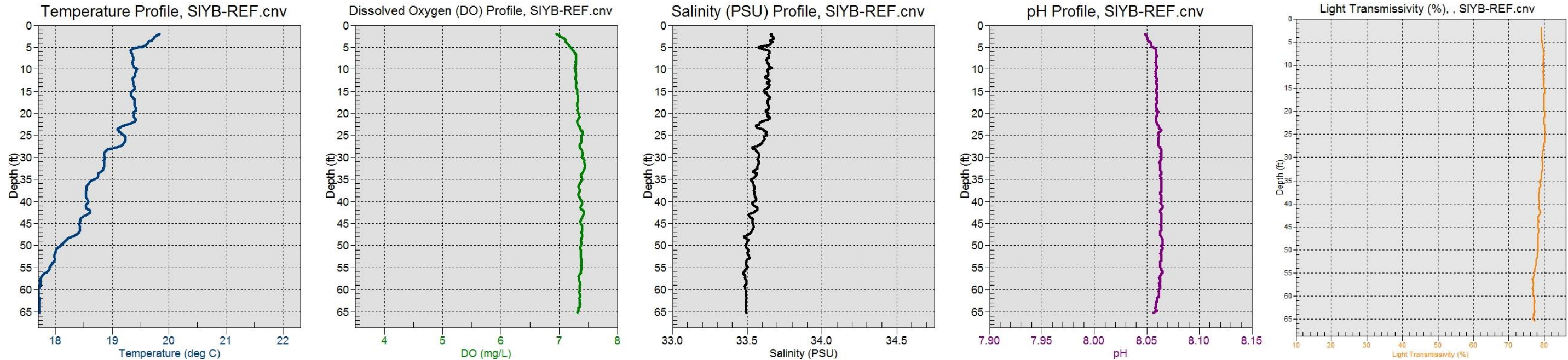
SIYB-5



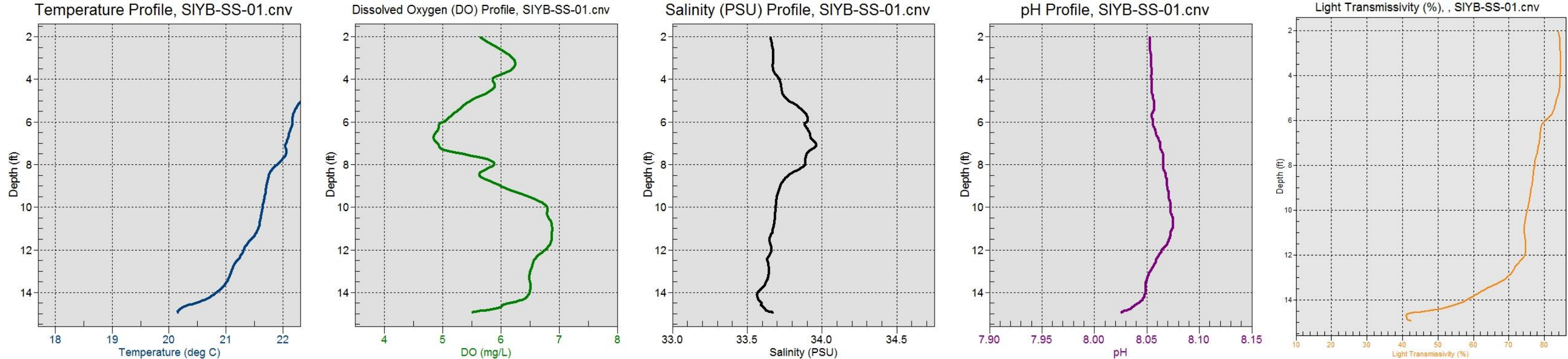
SIYB-6



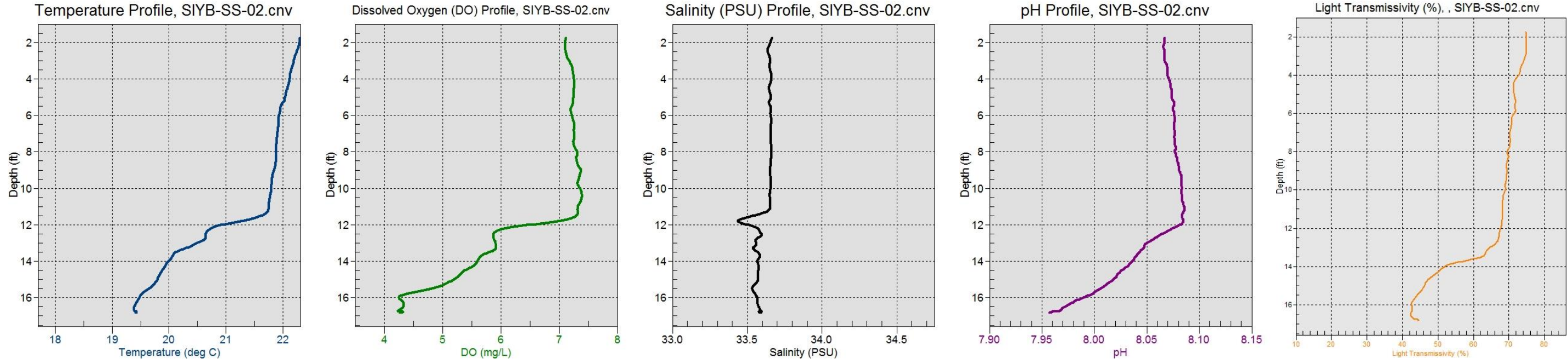
SIYB-REF



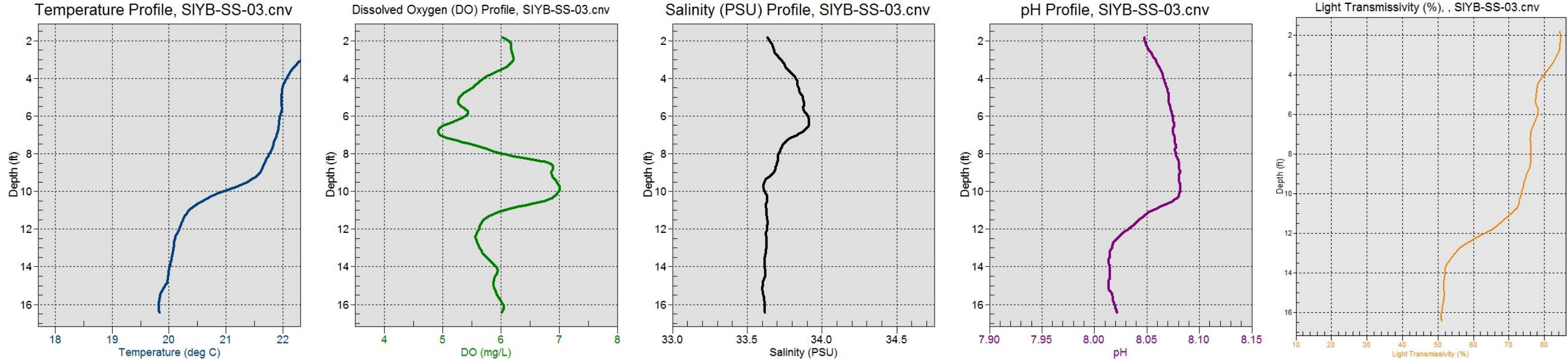
SS-01



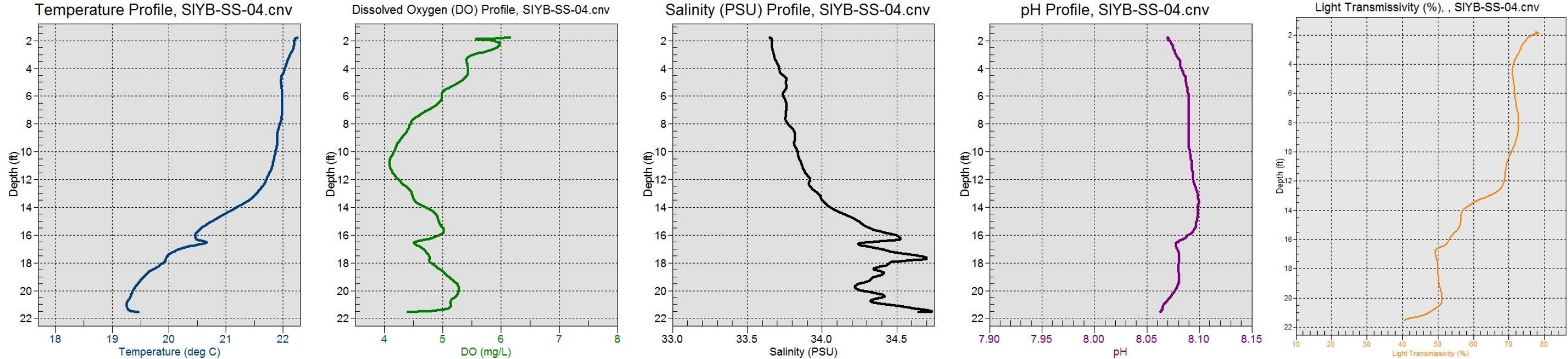
SS-02



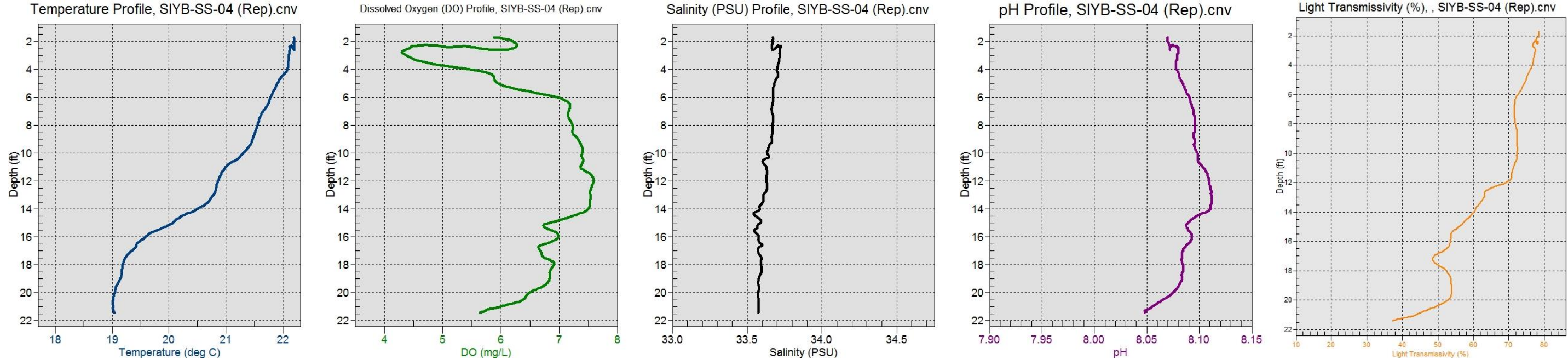
SS-03



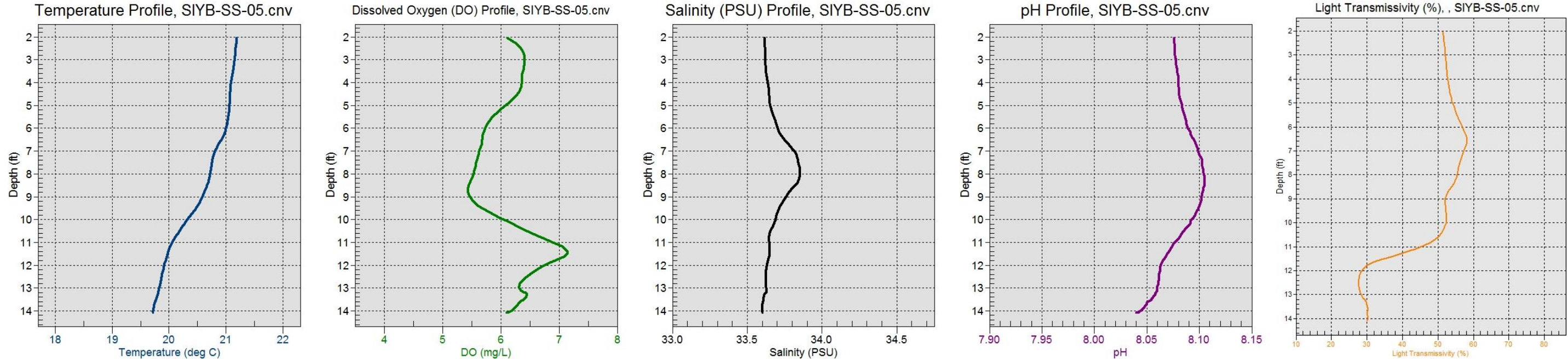
SS-04



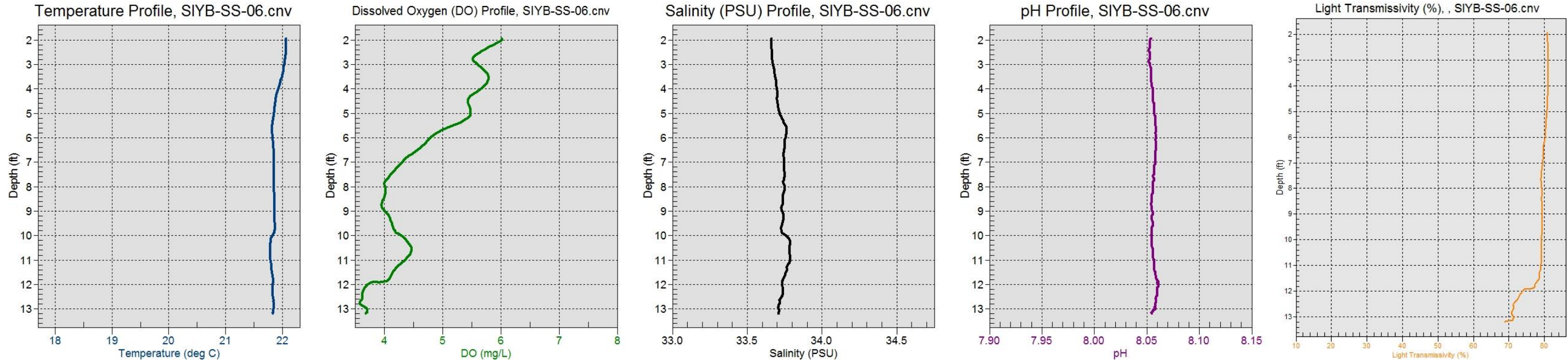
SS-04 (REP)



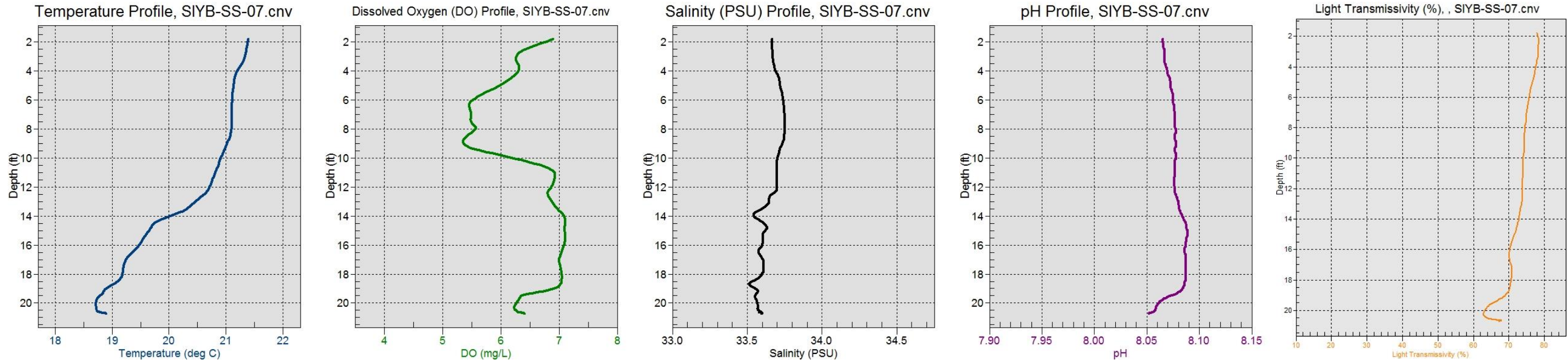
SS-05



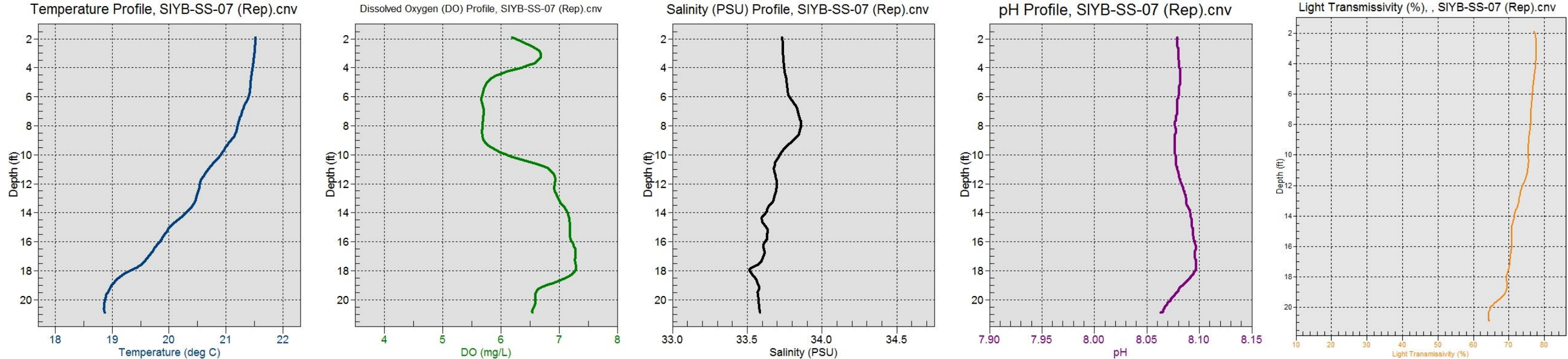
SS-06



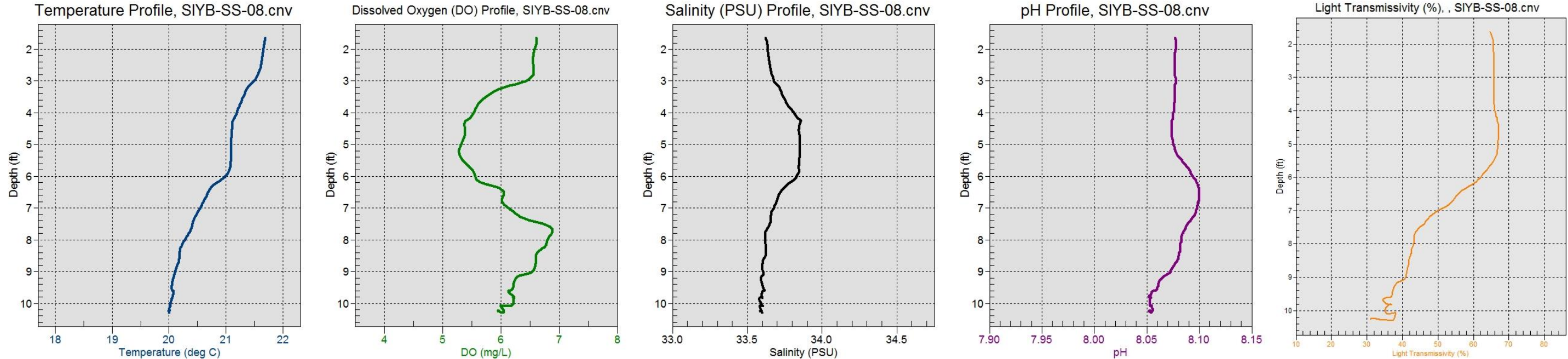
SS-07



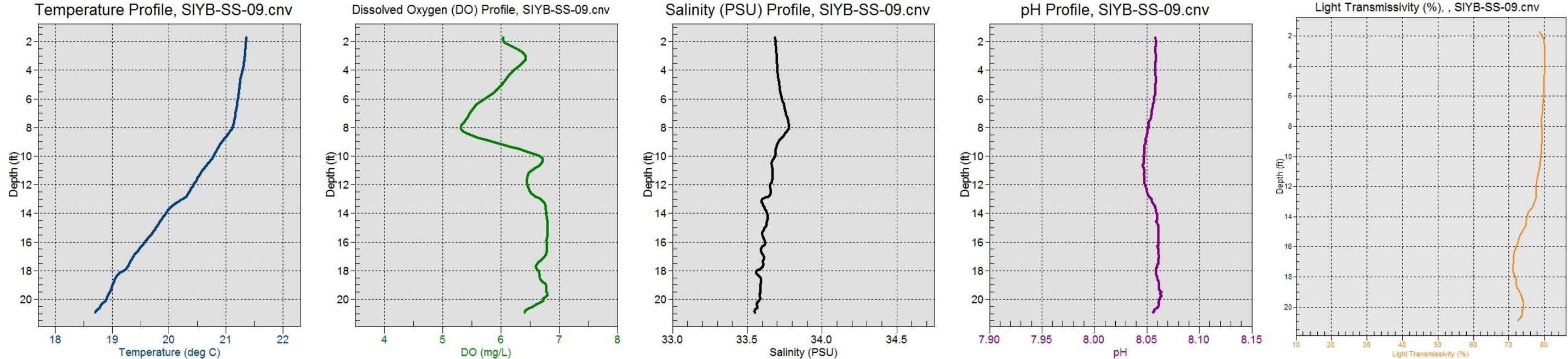
SS-07 (REP)



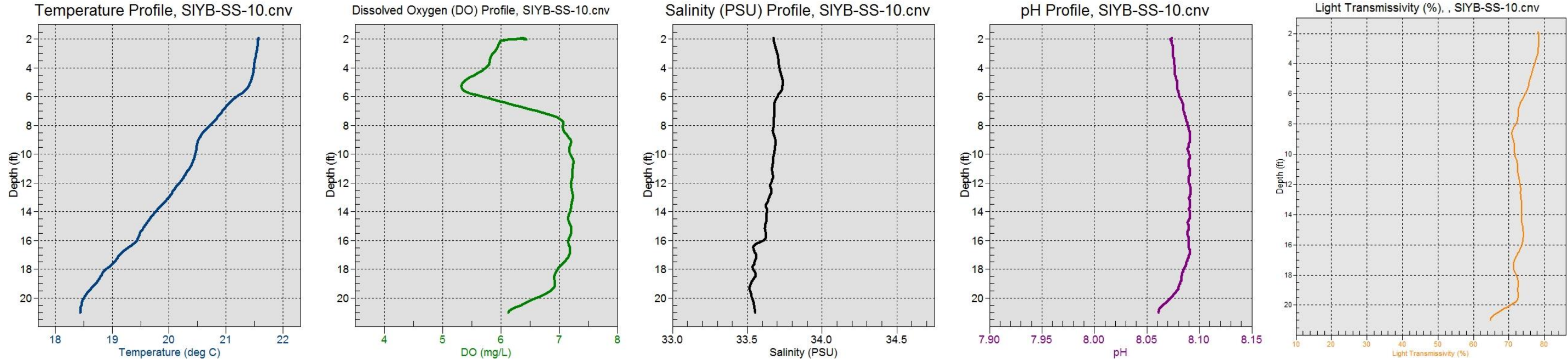
SS-08



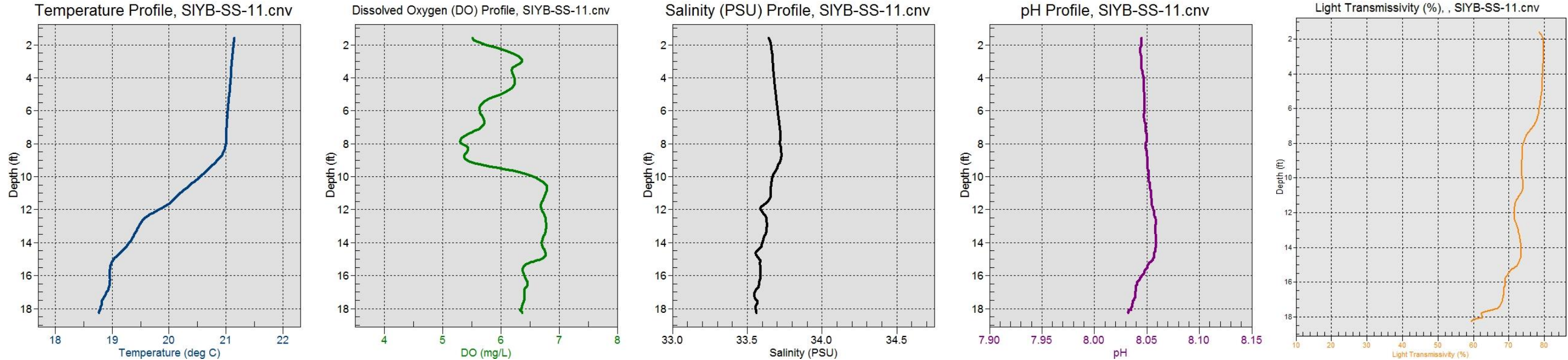
SS-09



SS-10



SS-11



SS-12

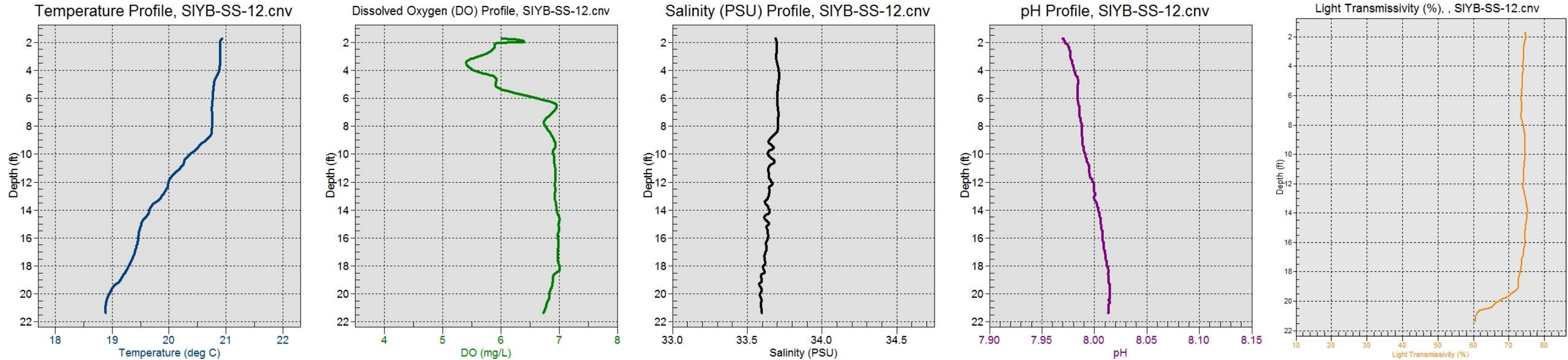


Table F-1. SIYB Continuous Water Quality Measurements for Temperature (°C)

SBE-19 CTD Profile Casts. Values are displayed as averages of 1-ft increments.

Dav 1							
Depth Bin (ft)	SIYB-1	SIYB-1 (Rep)	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6
1	22.275	22.2441	21.8764	21.88	21.6251	21.8955	21.5174
2	22.2702	22.2639	21.8758	21.8753	21.6231	21.773	21.4943
3	22.2472	22.251	21.8763	21.871	21.619	21.7664	21.4467
4	22.2288	22.1157	21.8714	21.8627	21.6069	21.6961	21.4258
5	21.8833	21.7927	21.8477	21.8484	21.5178	21.6401	21.3293
6	21.4341	21.4309	21.8004	21.831	21.2792	21.5533	20.908
7	21.3051	21.1131	21.6817	21.7459	21.079	21.2605	20.6567
8	20.9558	20.8186	21.1746	21.4844	20.8973	20.7895	20.4382
9	20.5504	20.3656	20.375	20.6681	20.7219	20.6955	20.3412
10	20.1014	19.9774	19.9449	20.2467	20.4342	20.3911	20.1947
11	19.554	19.7797	19.7976	20.1223	20.1725	20.0195	20.0359
12	19.3346	19.5739	19.7947	19.9468	20.0254	19.6338	19.8189
13	19.2003	19.3387	19.6807	19.8087	19.8666	19.371	19.5796
14	19.1352	19.1758	19.3435	19.7111	19.6315	19.2323	19.399
15	19.0983	19.0907		19.5726	19.494	19.1617	19.2782
16	19.0553	19.0654		19.4889	19.4472	19.1016	19.2116
17	19.0746	19.1997		19.3525	19.4345	19.0681	
18				19.0211		19.0464	
19				18.8402		19.0405	
20				18.7809		19.0159	
21				18.8054		18.9567	
22						18.814	
23						18.6289	

Dav 2							
Depth Bin (ft)	SS-01	SS-3	SS-05	SS-07	SS-07 (Rep)	SS-09	SS-11
1	22.8068	22.9018	21.2458	21.3754	21.5034	21.3558	21.1368
2	22.7921	22.7127	21.19	21.3778	21.5166	21.3513	21.1311
3	22.6818	22.3349	21.1463	21.3227	21.4984	21.3276	21.1032
4	22.4552	22.0637	21.0904	21.198	21.4638	21.2853	21.0828
5	22.3097	21.976	21.0579	21.1316	21.4343	21.2406	21.0574
6	22.1606	21.9528	20.9848	21.1088	21.3866	21.208	21.0301
7	22.0667	21.8846	20.8134	21.1015	21.2847	21.1676	21.0109
8	21.8926	21.7555	20.7128	21.0918	21.1984	21.0996	20.9917
9	21.7063	21.5689	20.5822	21.0131	21.0887	20.9316	20.8418
10	21.641	20.9529	20.3232	20.9079	20.9029	20.7748	20.5415
11	21.5494	20.3727	20.062	20.8099	20.6878	20.5901	20.2017
12	21.3105	20.1742	19.9114	20.7024	20.5439	20.4283	19.8183
13	21.0972	20.0801	19.8265	20.4658	20.47	20.2336	19.4697
14	20.781	20.0138	19.7187	20.0184	20.2891	19.9484	19.2991
15	20.0423	19.9258		19.6459	20.0188	19.7695	19.0512
16		19.8411		19.4693	19.8295	19.5783	18.9686
17				19.2587	19.6398	19.3828	18.9115
18				19.1725	19.3278	19.2025	18.7903
19				18.9191	19.0069	19.0164	
20				18.7419	18.8797	18.8906	
21				18.8629	18.8646	18.6959	

Dav 3							
Depth Bin (ft)	SS-02	SS-04	SS-04 (Rep)	SS-06	SS-08	SS-10	SS-12
1	22.2702	22.2187	22.268	22.04	21.727	21.5742	20.9702
2	22.2848	22.2074	22.1975	22.0695	21.6589	21.5666	20.9014
3	22.1884	22.1269	22.1128	22.0296	21.4608	21.5288	20.9018
4	22.1136	22.0298	22.0621	21.9231	21.1871	21.4872	20.8679
5	22.026	21.9667	21.905	21.8461	21.0971	21.4196	20.792
6	21.9333	21.9866	21.7858	21.8271	20.9224	21.1966	20.7676
7	21.901	21.9833	21.6542	21.8464	20.5462	20.9349	20.7567
8	21.8806	21.9469	21.5514	21.8483	20.2826	20.717	20.7551
9	21.8413	21.9006	21.467	21.8587	20.1115	20.5264	20.6372
10	21.791	21.8688	21.2992	21.8276	20.0323	20.4584	20.3789
11	21.7382	21.8069	21.013	21.7978		20.3485	20.1845
12	21.028	21.7027	20.8642	21.8351		20.1788	20.0006
13	20.459	21.5331	20.7723	21.8391		19.991	19.8634
14	19.9873	21.1833	20.4925			19.7667	19.6662
15	19.7844	20.7578	20.0408			19.5714	19.5162
16	19.4865	20.5356	19.5969			19.4146	19.4602
17	19.3877	20.3087	19.3424			19.1449	19.3966
18		19.87	19.1906			18.9041	19.2906
19		19.5634	19.1352			18.7057	19.1373
20		19.3691	19.0449			18.5141	18.9508
21		19.2892	19.0302			18.4343	18.8892
22		19.569					

Depth Bin (ft)	Dav 1
	SIYB-REF
1	19.628
2	19.8203
3	19.7317
4	19.6302
5	19.4738
6	19.3266
7	19.3635
8	19.3702
9	19.3681
10	19.4242
11	19.4126
12	19.3741
13	19.3728
14	19.3908
15	19.359
16	19.3436
17	19.3938
18	19.3992
19	19.4151
20	19.3829
21	19.3965
22	19.3632
23	19.1789
24	19.1033
25	19.2032
26	19.2304
27	19.187
28	19.0041
29	18.8689
30	18.8689
31	18.8634
32	18.8639
33	18.8246
34	18.7556
35	18.6902
36	18.5918
37	18.5569
38	18.5466
39	18.5484
40	18.575
41	18.5459
42	18.5991
43	18.5581
44	18.4529
45	18.4369
46	18.44
47	18.4203
48	18.3068
49	18.1848
50	18.0997
51	18.0262
52	17.9973
53	17.9969
54	17.959
55	17.9112
56	17.8576
57	17.7733
58	17.7465
59	17.7458
60	17.7193
61	17.7155
62	17.7253
63	17.7284
64	17.726
65	17.7289

Table F-2. SIYB Continuous Water Quality Measurements for Dissolved Oxygen (mg/L)

SBE-19 CTD Profile Casts. Values are displayed as averages of 1-ft increments.

Day 1							
Depth Bin (ft)	SIYB-1	SIYB-1 (Rep)	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6
1	7.0525	7.0207	6.4156	6.9528	6.9249	6.9262	5.7624
2	7.0096	6.9997	6.0544	6.0394	6.1107	6.9101	6.5703
3	7.0094	6.9706	6.064	5.8175	5.8083	6.7651	6.5522
4	7.0716	7.0178	6.5744	5.6978	5.7241	6.7604	6.5984
5	7.116	7.1161	6.874	5.8007	6.4891	6.6256	6.6332
6	7.2605	7.2436	6.948	5.5493	6.8937	6.8450	6.5999
7	7.3759	7.437	6.9199	5.8156	7.0945	6.9316	6.5541
8	7.6519	7.7107	6.8645	6.4653	7.2847	6.9769	6.5671
9	7.9061	7.5204	6.5777	6.8873	7.4952	6.9949	6.6341
10	6.9917	6.5646	6.1786	6.8138	7.5486	6.9944	6.6405
11	5.8743	6.2499	6.5798	7.037	7.5384	7.0071	6.7017
12	5.5089	5.8642	6.7739	7.1805	7.5383	6.9927	6.7074
13	5.647	5.5076	6.8139	7.2897	7.5086	6.9524	6.8023
14	5.5388	5.3534	6.6977	7.2022	7.3386	6.9626	6.858
15	4.861	4.5768		7.0729	6.8246	6.9297	6.8058
16	4.8483	4.7029		6.8128	6.3976	6.8604	6.8972
17	4.749	4.8005		6.8113	6.2062	6.8367	
18				6.8595		6.8052	
19				6.8177		6.7796	
20				6.5359		6.7592	
21				5.8853		6.7362	
22						6.6375	
23						6.4449	

Day 2							
Depth Bin (ft)	SS-01	SS-3	SS-05	SS-07	SS-07 (Rep)	SS-09	SS-11
1	6.6165	6.7663	6.97	6.6202	7.1351	6.6965	6.9033
2	5.6569	6.1305	6.1799	6.7311	6.2724	6.0825	5.7660
3	6.1498	6.1891	6.3895	6.2991	6.6825	6.3968	6.2465
4	5.9421	5.7369	6.3547	6.284	6.3375	6.2383	6.2277
5	5.5065	5.3359	6.0782	5.9644	5.7857	6.016	5.9778
6	5.0291	5.3156	5.7631	5.5387	5.6854	5.7281	5.6615
7	4.9724	5.0627	5.6357	5.4828	5.7038	5.4761	5.6077
8	5.7222	6.129	5.523	5.5224	5.6908	5.3577	5.3823
9	5.986	6.9017	5.494	5.4397	5.7200	5.8514	5.5335
10	6.7248	6.9423	6.0556	6.2077	6.1157	6.5996	6.5003
11	6.8733	6.1381	6.8749	6.8824	6.8140	6.5466	6.7620
12	6.7457	5.6332	6.8579	6.8562	6.9387	6.4611	6.7206
13	6.5235	5.654	6.4526	6.8739	6.9900	6.6514	6.7782
14	6.4254	5.8884	6.2051	7.0701	7.1364	6.78	6.7219
15	5.6288	5.8946		7.1033	7.1892	6.8077	6.6175
16		6.0059		7.0814	7.2244	6.7967	6.4305
17				7.0154	7.2806	6.732	6.4308
18				7.0452	7.2624	6.6288	6.3577
19				6.7642	6.8116	6.7525	
20				6.3003	6.5919	6.7226	
21				6.3806	6.5340	6.358	

Day 3							
Depth Bin (ft)	SS-02	SS-04	SS-04 (Rep)	SS-06	SS-08	SS-10	SS-12
1	7.1433	6.8595	7.0282	6.7641	7.0509	7.0865	5.8596
2	7.1047	5.8199	6.3343	5.9484	6.5982	6.2508	6.1171
3	7.1738	5.6052	4.3128	5.5807	6.2635	5.8766	5.6164
4	7.2523	5.4255	5.3934	5.6163	5.5375	5.7156	5.6255
5	7.2456	5.2805	6.0194	5.4223	5.34	5.3784	5.9453
6	7.2235	4.9870	6.8973	4.8237	5.6446	5.6791	6.6128
7	7.2603	4.7492	7.1834	4.3194	6.2209	6.6124	6.8725
8	7.2925	4.4463	7.2185	4.0208	6.7591	7.0628	6.7777
9	7.3506	4.3024	7.3150	4.0223	6.4533	7.178	6.9119
10	7.3562	4.1644	7.3968	4.283	6.1092	7.2035	6.9134
11	7.3394	4.1094	7.4217	4.3008		7.2393	6.9349
12	6.5476	4.2557	7.5810	3.8511		7.2166	6.9389
13	5.9029	4.4643	7.5388	3.647		7.231	6.9358
14	5.593	4.7088	7.4720			7.1876	6.9683
15	5.169	4.9439	6.9058			7.193	7.0033
16	4.3917	4.8376	6.9246			7.1751	6.9867
17	4.2429	4.6002	6.6856			7.1596	6.9865
18		4.8349	6.8758			6.9869	6.9956
19		5.1151	6.8214			6.9174	6.9003
20		5.2716	6.5257			6.6016	6.8436
21		5.0736	5.9414			6.0987	6.7671
22		3.9219					

Depth Bin (ft)	Dav 1
	SIYB-REF
1	7.2121
2	6.9679
3	7.0805
4	7.1381
5	7.2002
6	7.2602
7	7.2914
8	7.2937
9	7.2891
10	7.2796
11	7.2912
12	7.2867
13	7.2978
14	7.3016
15	7.3157
16	7.324
17	7.3252
18	7.3185
19	7.3202
20	7.333
21	7.3447
22	7.3198
23	7.3487
24	7.3906
25	7.3997
26	7.392
27	7.3663
28	7.3729
29	7.4092
30	7.4045
31	7.4369
32	7.4517
33	7.4235
34	7.3851
35	7.3959
36	7.3578
37	7.3481
38	7.3456
39	7.3516
40	7.3868
41	7.3828
42	7.4056
43	7.4227
44	7.3852
45	7.3787
46	7.404
47	7.3932
48	7.3966
49	7.3857
50	7.3773
51	7.3729
52	7.3822
53	7.3855
54	7.391
55	7.3867
56	7.3778
57	7.3464
58	7.3535
59	7.3628
60	7.3579
61	7.3568
62	7.3572
63	7.3606
64	7.3508
65	7.3272

Table F-3. SIYB Continuous Water Quality Measurements for Salinity (ppt)

SBE-19 CTD Profile Casts. Values are displayed as averages of 1-ft increments.

Dav 1							
Depth Bin (ft)	SIYB-1	SIYB-1 (Rep)	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6
1	33.6883	33.6951	33.668	33.6648	33.6579	33.809	33.8453
2	33.6908	33.693	33.6693	33.6646	33.6593	33.803	33.8329
3	33.687	33.6818	33.6695	33.6658	33.6608	33.7991	33.8379
4	33.6849	33.6282	33.6656	33.669	33.6576	33.7928	33.8389
5	33.5649	33.5895	33.6646	33.6758	33.6305	33.7942	33.7677
6	33.6482	33.6018	33.6562	33.6838	33.6491	33.7769	33.717
7	33.6318	33.6051	33.6492	33.6884	33.6582	33.7385	33.7434
8	33.5761	33.6009	33.5888	33.653	33.6579	33.741	33.7278
9	33.5904	33.548	33.5751	33.6457	33.6455	33.7286	33.7388
10	33.5237	33.5724	33.6263	33.7128	33.6063	33.6716	33.7155
11	33.5343	33.5691	33.655	33.6867	33.6268	33.6316	33.705
12	33.5631	33.5594	33.6499	33.6461	33.6212	33.6288	33.6623
13	33.5659	33.545	33.6133	33.6293	33.6007	33.6191	33.671
14	33.5699	33.5577	33.591	33.6244	33.5807	33.6095	33.653
15	33.5661	33.5657		33.6092	33.5869	33.5993	33.6488
16	33.5703	33.5693		33.6126	33.5919	33.5962	33.6393
17	33.2399	33.5742		33.5664	33.597	33.5906	
18				33.5475		33.5896	
19				33.5571		33.5888	
20				33.5388		33.5789	
21				32.2037		33.5659	
22						33.5493	
23						33.5481	

Dav 2							
Depth Bin (ft)	SS-01	SS-3	SS-05	SS-07	SS-07 (Rep)	SS-09	SS-11
1	33.5785	33.7028	33.4787	33.6471	33.6481	33.6962	33.6582
2	33.6581	33.6481	33.6156	33.6649	33.7355	33.6889	33.6559
3	33.672	33.721	33.6213	33.6709	33.741	33.6974	33.6704
4	33.7087	33.8169	33.6371	33.6915	33.7479	33.7031	33.6798
5	33.7941	33.8665	33.6571	33.721	33.7633	33.7139	33.6917
6	33.8949	33.8975	33.7081	33.7398	33.7874	33.7324	33.7041
7	33.9333	33.8305	33.8092	33.749	33.8359	33.759	33.7176
8	33.8623	33.7209	33.8425	33.7512	33.8565	33.7708	33.7229
9	33.723	33.667	33.7625	33.7319	33.8084	33.7118	33.7188
10	33.6921	33.6235	33.6857	33.704	33.7177	33.6814	33.6736
11	33.6705	33.6279	33.6492	33.6991	33.6796	33.6686	33.6553
12	33.6519	33.6309	33.6343	33.6952	33.6953	33.6597	33.6104
13	33.6399	33.6264	33.6225	33.6388	33.6754	33.6231	33.63
14	33.5913	33.6192	33.5996	33.568	33.6212	33.6291	33.6006
15	33.6325	33.606		33.6181	33.6244	33.6192	33.5782
16		33.6151		33.5929	33.6213	33.6105	33.5865
17				33.5995	33.6055	33.6051	33.5617
18				33.5923	33.5339	33.5826	33.5617
19				33.5524	33.5693	33.5904	
20				33.565	33.5759	33.5789	
21				33.6059	33.5874	33.551	

Day 3							
Depth Bin (ft)	SS-02	SS-04	SS-04 (Rep)	SS-06	SS-08	SS-10	SS-12
1	33.6774	33.6014	33.6144	33.3146	33.5452	33.6095	33.5004
2	33.6504	33.6632	33.6661	33.6613	33.6344	33.6771	33.6963
3	33.6494	33.6777	33.7187	33.6724	33.6903	33.6998	33.6968
4	33.6555	33.7123	33.7043	33.6964	33.8106	33.7168	33.7102
5	33.6519	33.7607	33.6845	33.7214	33.8497	33.7354	33.7088
6	33.6587	33.7476	33.673	33.7557	33.8056	33.7036	33.7029
7	33.6578	33.7605	33.6674	33.7462	33.6821	33.682	33.7075
8	33.6604	33.7755	33.6722	33.7449	33.6274	33.6759	33.7049
9	33.6553	33.8153	33.6624	33.7352	33.604	33.685	33.6623
10	33.6562	33.8331	33.6366	33.7533	33.5975	33.6794	33.6568
11	33.6385	33.8673	33.6225	33.7731		33.6693	33.6568
12	33.5186	33.9095	33.6315	33.7348		33.6614	33.6542
13	33.5606	33.9677	33.6165	33.7109		33.6466	33.6378
14	33.5766	34.0648	33.5734			33.6302	33.6356
15	33.5642	34.2386	33.5736			33.623	33.6324
16	33.561	34.4242	33.5704			33.5937	33.6353
17	33.5956	34.3628	33.5828			33.554	33.6224
18		34.5212	33.5955			33.5457	33.6144
19		34.3543	33.5805			33.5282	33.5924
20		34.2925	33.5758			33.5335	33.5915
21		34.5087	33.5758			33.5543	33.5956
22		34.8601					

Depth Bin (ft)	Dav 1
	SIYB-REF
1	33.7032
2	33.6581
3	33.6709
4	33.6577
5	33.5961
6	33.6437
7	33.6439
8	33.6322
9	33.6439
10	33.6509
11	33.6385
12	33.6267
13	33.6412
14	33.6414
15	33.6165
16	33.6421
17	33.6426
18	33.6403
19	33.6366
20	33.6303
21	33.6432
22	33.5939
23	33.568
24	33.6162
25	33.6229
26	33.611
27	33.5859
28	33.5472
29	33.5727
30	33.5772
31	33.5769
32	33.5712
33	33.5499
34	33.562
35	33.5337
36	33.5412
37	33.5479
38	33.5472
39	33.5548
40	33.5471
41	33.5506
42	33.5608
43	33.5198
44	33.5348
45	33.539
46	33.5407
47	33.5241
48	33.4877
49	33.5035
50	33.4939
51	33.5044
52	33.506
53	33.5084
54	33.492
55	33.4984
56	33.4814
57	33.4856
58	33.4941
59	33.4885
60	33.4889
61	33.4924
62	33.493
63	33.4912
64	33.4925
65	33.4926

Table F-4. SIYB Continuous Water Quality Measurements for pH

SBE-19 CTD Profile Casts. Values are displayed as averages of 1-ft increments.

Dav 1							
Depth Bin (ft)	SIYB-1	SIYB-1 (Rep)	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6
1	8.043	8.038	8.055	8.055	8.049	8.047	8.029
2	8.043	8.037	8.054	8.055	8.049	8.047	8.028
3	8.044	8.037	8.054	8.055	8.049	8.047	8.028
4	8.045	8.039	8.054	8.055	8.049	8.047	8.028
5	8.048	8.045	8.053	8.055	8.051	8.047	8.028
6	8.056	8.052	8.053	8.054	8.057	8.048	8.032
7	8.064	8.064	8.053	8.054	8.065	8.049	8.033
8	8.076	8.078	8.055	8.056	8.072	8.054	8.037
9	8.092	8.081	8.048	8.061	8.08	8.057	8.038
10	8.084	8.059	8.034	8.067	8.085	8.058	8.04
11	8.047	8.041	8.033	8.072	8.087	8.062	8.042
12	8.021	8.025	8.045	8.077	8.087	8.063	8.046
13	8.009	8.007	8.047	8.079	8.087	8.062	8.052
14	8.001	7.993	8.045	8.078	8.08	8.061	8.055
15	7.973	7.964		8.071	8.062	8.059	8.055
16	7.959	7.949		8.06	8.043	8.056	8.051
17	7.95	7.936		8.054	8.032	8.053	
18				8.055		8.051	
19				8.054		8.047	
20				8.044		8.045	
21				8.031		8.041	
22						8.04	
23						8.034	

Dav 2							
Depth Bin (ft)	SS-01	SS-3	SS-05	SS-07	SS-07 (Rep)	SS-09	SS-11
1	8.053	8.045	8.072	8.067	8.079	8.059	8.043
2	8.053	8.048	8.076	8.065	8.079	8.058	8.045
3	8.054	8.058	8.078	8.067	8.08	8.058	8.045
4	8.055	8.066	8.08	8.069	8.081	8.058	8.047
5	8.056	8.071	8.083	8.073	8.082	8.058	8.048
6	8.056	8.074	8.09	8.075	8.08	8.057	8.048
7	8.062	8.076	8.099	8.077	8.079	8.055	8.049
8	8.066	8.078	8.104	8.077	8.077	8.051	8.049
9	8.07	8.081	8.102	8.077	8.077	8.049	8.051
10	8.073	8.08	8.093	8.077	8.077	8.047	8.052
11	8.074	8.057	8.077	8.077	8.079	8.047	8.054
12	8.065	8.032	8.064	8.077	8.083	8.049	8.056
13	8.054	8.017	8.059	8.08	8.087	8.054	8.058
14	8.048	8.015	8.044	8.084	8.091	8.059	8.059
15	8.028	8.015		8.088	8.093	8.06	8.055
16		8.019		8.087	8.096	8.061	8.045
17				8.087	8.096	8.061	8.039
18				8.087	8.096	8.059	8.034
19				8.082	8.084	8.062	
20				8.063	8.073	8.062	
21				8.05	8.063	8.056	

Day 3							
Depth Bin (ft)	SS-02	SS-04	SS-04 (Rep)	SS-06	SS-08	SS-10	SS-12
1	8.069	8.072	8.068	8.057	8.077	8.073	7.968
2	8.067	8.071	8.07	8.053	8.077	8.073	7.972
3	8.068	8.078	8.08	8.053	8.077	8.075	7.977
4	8.071	8.083	8.079	8.055	8.075	8.077	7.981
5	8.075	8.088	8.084	8.057	8.077	8.079	7.984
6	8.076	8.09	8.09	8.059	8.094	8.081	7.984
7	8.076	8.09	8.095	8.058	8.096	8.086	7.986
8	8.078	8.09	8.096	8.056	8.084	8.089	7.988
9	8.081	8.09	8.095	8.055	8.071	8.091	7.989
10	8.083	8.091	8.098	8.055	8.053	8.09	7.991
11	8.085	8.093	8.103	8.057		8.091	7.995
12	8.079	8.095	8.109	8.06		8.091	7.998
13	8.052	8.098	8.112	8.057		8.091	8.001
14	8.035	8.099	8.109			8.091	8.004
15	8.017	8.098	8.091			8.09	8.006
16	7.989	8.088	8.092			8.09	8.008
17	7.953	8.078	8.085			8.09	8.01
18		8.081	8.084			8.085	8.013
19		8.081	8.083			8.081	8.014
20		8.077	8.074			8.072	8.015
21		8.067	8.055			8.06	8.014
22		8.059					

Depth Bin (ft)	Dav 1
	SIYB-REF
1	8.053
2	8.049
3	8.051
4	8.053
5	8.056
6	8.059
7	8.059
8	8.059
9	8.059
10	8.059
11	8.058
12	8.059
13	8.059
14	8.06
15	8.059
16	8.06
17	8.059
18	8.059
19	8.059
20	8.06
21	8.059
22	8.059
23	8.061
24	8.063
25	8.061
26	8.061
27	8.061
28	8.063
29	8.064
30	8.064
31	8.063
32	8.063
33	8.063
34	8.063
35	8.064
36	8.064
37	8.064
38	8.063
39	8.064
40	8.064
41	8.065
42	8.063
43	8.064
44	8.064
45	8.064
46	8.064
47	8.063
48	8.063
49	8.065
50	8.064
51	8.064
52	8.064
53	8.064
54	8.063
55	8.063
56	8.064
57	8.063
58	8.063
59	8.063
60	8.062
61	8.062
62	8.06
63	8.059
64	8.058
65	8.058

Table F-5. SIYB Continuous Water Quality Measurements for Light Transmittance (%)

SBE-19 CTD Profile Casts. Values are displayed as averages of 1-ft increments.

Dav 1							
Depth Bin (ft)	SIYB-1	SIYB-1 (Rep)	SIYB-2	SIYB-3	SIYB-4	SIYB-5	SIYB-6
1	NR	NR	NR	NR	NR	NR	NR
2	81.0516	82.5622	74.9947	74.3939	74.9047	79.0625	79.2603
3	81.139	82.6961	76.3708	74.947	75.5204	78.7438	79.4275
4	80.9705	82.3206	76.5977	75.1615	75.6328	78.6158	79.332
5	80.6621	79.9496	76.6874	75.4248	75.5518	78.5309	79.3019
6	77.506	76.7562	76.5061	75.5452	75.1756	78.4183	79.2553
7	74.7402	73.2346	76.1544	75.7046	74.5081	78.2295	78.8616
8	72.6309	71.1155	76.0001	75.9736	72.9069	77.3021	77.8363
9	65.982	68.9414	74.0056	75.7897	70.0574	76.0676	77.3619
10	56.8039	62.2345	68.8789	74.1917	67.7353	75.0184	76.4859
11	40.4417	55.1367	63.8381	72.5265	65.2356	74.3202	75.2426
12	22.0783	46.2367	61.9186	71.3442	62.4988	73.5538	73.743
13	18.782	37.8515	62.8523	69.4667	60.3906	73.1687	72.7312
14	18.0531	34.5726	64.2743	67.8048	59.4109	73.21	73.0655
15	15.7398	27.1068		67.2479	55.5983	72.794	72.9008
16	12.4471	20.5018		66.4377	49.0153	71.981	71.9756
17	13.1722	16.9984		66.336	50.8517	71.6457	
18				65.4365		71.2791	
19				61.9961		71.0719	
20				58.9181		70.503	
21				58.3171		69.2459	
22						66.8663	
23						63.3152	

Dav 2							
Depth Bin (ft)	SS-01	SS-3	SS-05	SS-07	SS-07 (Rep)	SS-09	SS-11
1	NR	NR	NR	NR	NR	NR	NR
2	83.9871	84.6013	51.4301	78.2345	77.3729	79.347	79.4054
3	84.5033	83.6454	52.1168	78.3105	77.7289	80.1995	79.7431
4	84.5169	79.9505	52.7848	77.5849	77.5611	80.1331	79.5341
5	83.5299	77.7371	54.2534	76.6685	77.0577	80.0063	79.2486
6	80.4137	77.8711	56.867	75.7428	76.6362	79.8744	78.5076
7	78.54	76.3505	57.4498	75.0624	76.337	79.4765	76.6582
8	77.2916	76.2738	55.233	74.6032	76.1217	79.3289	74.2037
9	76.387	75.182	52.415	74.3967	75.6434	79.3224	73.6905
10	75.2072	73.5502	52.0084	74.1367	75.5001	79.0473	73.8347
11	74.5379	70.6428	44.3047	73.972	75.2937	78.4302	72.9252
12	74.0469	63.0984	28.432	73.8018	73.9285	77.8053	71.6848
13	68.684	55.1581	29.2518	73.5674	72.7871	77.3115	72.5637
14	56.9733	52.1654	30.4996	72.7923	71.57	75.3138	73.4531
15	36.6726	51.7194		71.6059	70.8784	73.8809	71.9843
16		51.203		70.3584	70.7879	72.1306	69.1194
17				70.6096	70.2825	71.3495	68.1991
18				70.6454	69.491	71.7189	62.1145
19				68.3251	68.7877	73.0223	
20				63.9065	65.1736	74.0031	
21				68.5203	64.1642	72.9828	

Day 3							
Depth Bin (ft)	SS-02	SS-04	SS-04 (Rep)	SS-06	SS-08	SS-10	SS-12
1	NR	NR	NR	NR	NR	NR	NR
2	74.9496	77.1772	78.3554	80.95	65.4716	78.4328	74.7079
3	74.5375	73.1475	76.9798	81.0884	65.803	78.316	74.2314
4	72.5298	71.3695	76.4728	81.0796	66.3106	77.2407	74.0804
5	71.7428	71.2325	74.7508	80.7415	66.8111	75.9964	73.8439
6	71.4591	71.7035	72.6256	80.177	61.2782	74.6352	73.5898
7	70.5027	72.3019	71.5885	79.5097	50.333	72.8343	73.5894
8	69.9472	72.7584	71.917	79.2344	43.2016	71.8917	73.9938
9	69.4472	72.2132	72.3648	79.3523	40.091	71.2841	74.5433
10	68.867	70.7048	72.329	79.252	36.0448	71.8263	74.5297
11	68.2618	69.3388	71.3146	78.9293		72.546	74.2833
12	67.735	68.5565	68.4417	75.0443		73.1734	74.1087
13	64.9085	64.1295	62.708	70.5082		73.5212	74.7061
14	53.4575	57.4203	59.9943			73.6449	75.1456
15	46.0819	56.0993	55.8273			73.9981	74.714
16	42.9407	53.1276	53.4704			73.5954	74.5006
17	44.1722	49.3605	49.7357			71.8182	73.8823
18		50.082	51.8132			72.0505	73.1976
19		50.4037	53.8743			72.6494	72.2323
20		51.0973	52.3883			70.1139	67.4675
21		46.2444	42.5324			64.1567	61.0833
22		35.3028					

Depth Bin (ft)	Dav 1 SIYB-REF
1	NR
2	79.253
3	79.2922
4	79.2177
5	79.372
6	79.6796
7	79.8182
8	79.8672
9	79.7803
10	79.6903
11	79.6998
12	79.6926
13	79.7999
14	79.8668
15	79.9855
16	80.0455
17	79.9122
18	79.9431
19	79.974
20	80.0231
21	80.0792
22	79.9577
23	80.0542
24	80.1136
25	80.2432
26	80.1462
27	79.9565
28	79.7232
29	79.5674
30	79.5241
31	79.5083
32	79.5563
33	79.3758
34	79.197
35	78.9253
36	78.9081
37	78.6449
38	78.4582
39	78.5103
40	78.6402
41	78.607
42	78.8224
43	78.3101
44	78.3648
45	78.3362
46	78.3944
47	78.3474
48	78.3454
49	78.311
50	78.2786
51	78.087
52	77.8518
53	77.7334
54	77.4381
55	77.2162
56	76.917
57	76.8555
58	76.8002
59	76.8564
60	77.1032
61	77.217
62	77.1557
63	77.2336
64	77.0481
65	77.0876

NR = Not recorded. Sensor readings were highly variable and did not stablize until <1 foot of water depth.