Uninc. County

Section 11.0 Attachments

Reporting Year 2015-2016

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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IN REPLY PLEASE
REFER TO FILE: WM-7

October 3, 2016

Dr. Maria de la Paz Carpio-Obeso
Chief, Ocean Standards Unit
California State Water Resources Control Board
Division of Water Quality
Watersheds, Ocean, and Wetlands Section
P.O. Box 100
Sacramento, CA 95812-0100

Dear Dr. Carpio-Obeso:

AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE 24
REPORT ON SUPPLEMENTAL MONITORING

On September 18, 2014, the County of Los Angeles and the Los Angeles County Flood Control District submitted the Draft Area of Special Biological Significance 24 (ASBS 24) Compliance Plan to the State Water Resources Control Board (SWRCB) for review and comment. On March 17, 2015, the SWRCB provided comments on the Compliance Plan and requested the LACFCD and the County to complete all outstanding monitoring activities as well as conduct additional monitoring activities within the ASBS 24. On September 17, 2015, the County and LACFCD submitted a revised compliance plan that addressed all of the SWRCBs comments and informed the SWRCB that they would be performing the requested monitoring.

In early 2016, as requested, site ASBS-S01 and its associated outfall were monitored for two wet weather events, and site ASBS-S02 and its associated outfall were monitored for one wet weather event. In accordance with the Special Protections document, described in SWRCB Resolution 2012-0031, an analysis of the monitoring results, in conjunction with previous monitoring was performed. The determination was that, other than as previously identified and addressed in the Compliance Plan, storm water discharges did not cause or contribute to the alterations of natural water quality in the ASBS 24.

Dr. Maria de la Paz Carpio-Obeso
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A summary of the monitoring data is presented in Table 1 below, and the Monitoring Report is enclosed. The data indicated that alterations of natural water quality for selenium, polycyclic aromatic hydrocarbons, and silver had occurred. However, selenium and polycyclic aromatic hydrocarbons at similar concentrations had already been identified and addressed in the ASBS 24 Compliance Plan. Further, the data shows that concentrations of silver in the storm water discharges were lower than the corresponding concentrations in the ASBS 24.

Table 1. Altered Natural Water Quality Summary Data

Event	Constituant	Units	Natural Water Quality 85th Percentile	Ocean Plan Inst Max	Receiving Water ASBS-S01	Outfall ASBS-016	Receiving Water ASBS-S02	Outfall ASBS-028
02/28/2014	Selenium	(µg/L)	0.003*	150	.011J	0.226	0.155**	0.334
01/06/2016	Selenium	(µg/L)	0.003*	150	.012J	0.965	0.076**	1.482
03/06/2016	Selenium	(µg/L)	0.003*	150	0.042	0.12	N/S	N/S
02/28/2014	Silver	(µg/L)	0.08	7	0.18**	0.1	0.14**	0.01J
01/06/2016	Silver	(µg/L)	0.08	7	0.09**	0.08	0.09**	0.01J
03/06/2016	Silver	(µg/L)	0.08	7	0.02	<0.01	N/S	N/S
02/28/2014	Total PAHs	(ng/L)	12.5	N/A	18.5	1087.2	84.1**	1178.8
01/06/2016	Total PAHs	(ng/L)	12.5	N/A	12.5	223.3	35.1**	2161.2
03/06/2016	Total PAHs	(ng/L)	12.5	N/A	18.8	226.9	N/S	N/S

J-Analyte was detected at a concentration below the reporting limit. Reported value is estimated.
* Value was based on a series of non-detects and is 1/2 the detection limit.
** concentrations higher than the 85% reference and occurring twice in a row.
(µg/L) = micrograms per liter; (ng/L) = nanograms per liter

As detailed in the enclosed Monitoring Report the additional monitoring performed in response to the comments on the ASBS 24 Compliance Plan has raised no issues that would alter the actions proposed in the ASBS 24 Compliance Plan. Consequently, the County and the LACFCD will continue to implement the actions identified in the ASBS 24 Compliance Plan and request that, at your earliest convenience, your board provide an approval letter for the ASBS 24 Pollution Prevention Plan and Compliance Plan submitted to the SWRCB on September 18, 2014, and September 17, 2015, respectively.

Dr. Maria de la Paz Carpio-Obeso
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If you have any questions, please contact me at (626) 458-4300 or ageorge@dpw.lacounty.gov or your staff may contact Mr. Paul Alva at (626) 458-4325 or palva@dpw.lacounty.gov.

Very truly yours,

GAIL FARBER
Director of Public Works

ANGELA R. GEORGE for
Assistant Deputy Director
Watershed Management Division

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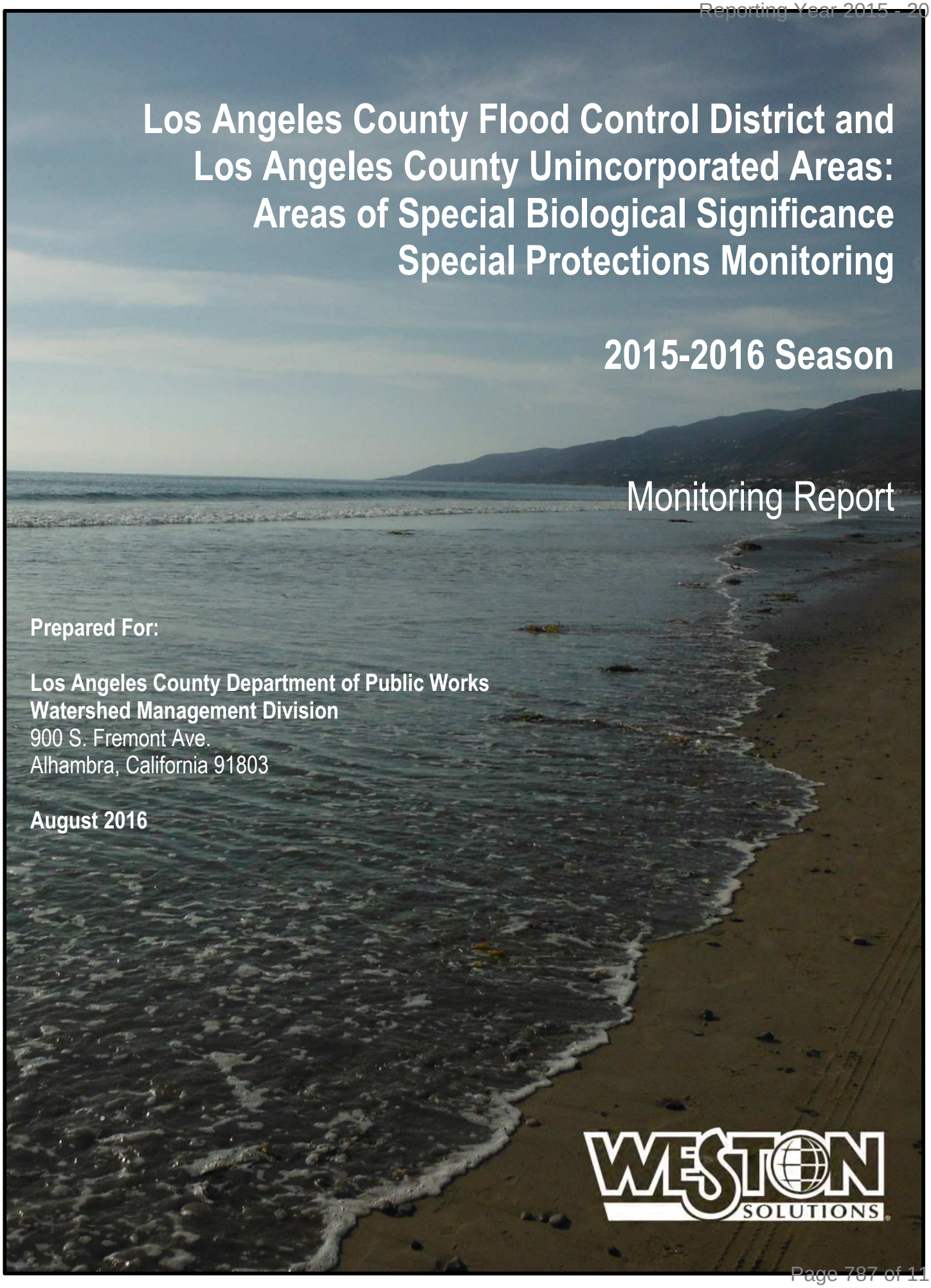

Los Angeles County Flood Control District and Los Angeles County Unincorporated Areas: Areas of Special Biological Significance Special Protections Monitoring

2015-2016 Season

Monitoring Report

Prepared For:

Los Angeles County Department of Public Works
Watershed Management Division
900 S. Fremont Ave.
Alhambra, California 91803

August 2016

WESTON SOLUTIONS

Los Angeles County Flood Control District and Los Angeles County Unincorporated Areas: Areas of Special Biological Significance Special Protections Monitoring

2015-2016 Season

MONITORING REPORT

Prepared For:

Los Angeles County Department of Public Works
Watershed Management Division
900 S. Fremont Ave.
Alhambra, California 91803

Prepared By:

Weston Solutions, Inc.
5817 Dryden Place, Suite 101
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August 2016

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LIST OF ACRONYMS

ABC Labs	Aquatic Bioassay and Consulting Laboratories, Inc.
ASBS	Area of Special Biological Significance
BMPs	best management practices
Caltrans	California Department of Transportation
COP	California Ocean Plan
County	Los Angeles County Unincorporated Areas
DO	dissolved oxygen
EC_{25}	effect concentration 25: concentration which causes an effect in 25% of test organisms
EC_{50}	effect concentration 50: concentration which causes an effect in 50% of test organisms
Imax	Instantaneous Maximum concentration in California Ocean Plan
LACFCD	Los Angeles County Flood Control District
LC_{50}	median lethal concentration: concentration which kills 50% of bioassay test organisms
LOEC	lowest observed effect concentration
NOEC	no observed effect concentration
OP	organophosphorus
PAH	polynuclear aromatic hydrocarbons
Public Works	Los Angeles County Department of Public Works
SCCWRP	Southern California Coastal Water Research Project
Special Protections	*Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges*
State Board	State Water Resources Control Board
Storm 1	storm event of February 19, 2013
Storm 2	storm event of March 8, 2013
Storm 3	storm event of February 28, 2014
Storm 4	storm event of January 6, 2016
Storm 5	storm event of March 6, 2016
TSS	total suspended solids
TUc	toxic units chronic
USEPA	United States Environmental Protection Agency
Weston	Weston Solutions, Inc.
WQOs	water quality objectives

LIST OF SYMBOLS AND MEASUREMENTS

>	greater than
<	less than
%	percent
^{o}C	degrees Celsius
ft	feet
L	liter
m	meter
mg	milligram
mS	microSiemens
ng	nanogram
NTU	nephelometric units
ppt	parts per thousand
µg	microgram

1.0 INTRODUCTION

The Area of Special Biological Significance (ASBS) 24, also referred to as the Laguna Point to Latigo Point ASBS or Malibu ASBS, was established in 1974 by the State Board to preserve sensitive marine habitat (State Water Resources Control Board [State Board], 1976). The ASBS stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. Approximately 500 direct discharges and 31 natural streams drain to ASBS 24. The boundary of ASBS 24 extends out from the mean high tide line at Laguna Point in Ventura County to either 1000 feet (ft) from shore or to the 100-ft isobath (whichever is greater) in a southwesterly direction to Latigo Point in Malibu, Los Angeles County. Water depth within the conservation area ranges from 0 ft to approximately 100 ft and includes sloping sandy habitat, a rocky intertidal reef complex, and subtidal reef and kelp forest habitat. A wide range of sandy substrate, rocky reef, and coastal pelagic species can be found within the Laguna Point to Latigo Point ASBS.

Since 1983, the California Ocean Plan (COP) has prohibited the discharge of waste into ASBS along the California Coast, unless the State Board grants an exception to dischargers. The southern and central portions of ASBS 24 that are located in Los Angeles County are subject to direct discharges from roads, urban landscape runoff, homes, and small businesses. In general, the near coast storm water runoff along ASBS 24 within Los Angeles County is conveyed through storm drain systems before it is discharged at multiple locations along the beach. On December 30, 2004, the Los Angeles County Department of Public Works (Public Works) requested an exception for storm water discharges to ASBS 24 from the State Board on behalf of the County and the Los Angeles County Flood Control District (LACFCD). The State Board received applications from numerous other applicants for an exception to the Ocean Plan. In 2012 the State Board adopted a General Exception to the COP. As part of the General Exception, the State Board produced guidance for monitoring discharges to ASBS entitled *Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges* (Special Protections) (State Board, 2012) (Appendix A). The *Special Protections* document is intended to define the terms and conditions that limit storm water discharges to the ASBS for applicants along the California Coast (34 ASBSs have been designated throughout the state). Storm drain discharge pipes along the Malibu coastline fall under various jurisdictions including LACFCD, the Los Angeles County Unincorporated Areas (County), City of Malibu, and the California Department of Transportation (Caltrans).

There are 31 storm drain outfalls 18 inches in diameter or larger located in the County. Nine outfalls are operated by the LACFCD and 12 are operated by the County. The storm drain

outfalls discharge storm water runoff that reaches ASBS 24; therefore, in accordance with the Special Protections document, the 21 outfalls under the jurisdiction of the County and LACFCD were identified for monitoring during the 2012-2013 and 2013-2014 storm seasons by Public Works. Additionally, two ocean receiving water stations, located on Zuma Beach and Escondido Beach, were also monitored during this time (Figure 1-1). The full report of the results from this monitoring is provided in Appendix B (2014 Malibu ASBS Special Protections Monitoring-Final Report).

Additional ASBS Special Protections monitoring was conducted during the 2015-2016 wet weather season at the two ocean receiving water stations and their respective beach outfalls. This monitoring was performed to satisfy comments from the State Board regarding the *ASBS 24 Draft Compliance Plan for the County of Los Angeles and City of Malibu* (Weston Solutions, Inc. [Weston], 2014). In their *Compliance Plan* comments, the State Board requested that additional monitoring be conducted at the two designated ocean receiving water stations (located on Zuma Beach and Escondido Beach) to more fully understand any potential water quality impacts from storm water runoff to the ocean receiving water of ASBS 24. Monitoring was conducted in accordance with the methods and requirements set forth in the Special Protections document.

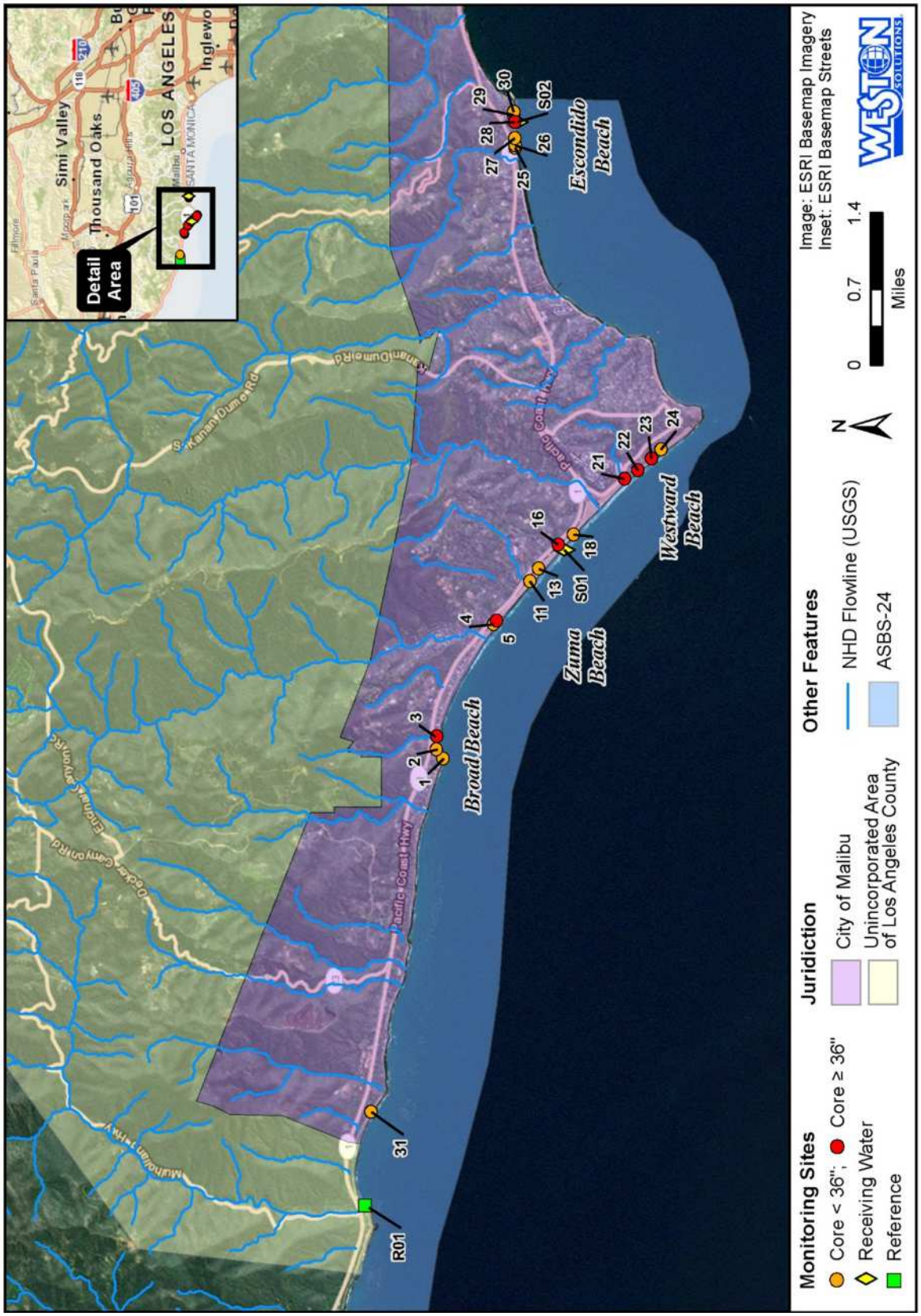

Figure 1-1. Core, Ocean Receiving Water, and Reference Monitoring Locations along ASBS 24 in Malibu, CA

1.1 Study Objectives

The ASBS 24 Special Protections Monitoring Study was designed to comply with the storm water monitoring requirements set forth in Attachment B of the State Water Resources Control Board Resolution No. 2012-0012, Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges. The Special Protections document provides descriptions of the following two types of monitoring programs:

1. **Core Discharge (Outfall) Monitoring** – collecting and analyzing wet weather runoff from the discharge during a storm event.
2. **Ocean Receiving Water Monitoring** – collecting and analyzing samples from the ocean before and after a storm event at two locations (i.e., directly in front of the discharge and at a reference site removed from the discharge).

Monitoring requirements set forth in the Special Protections document are intended to help answer the following questions.

1. **What are the conditions of storm water effluent in the storm drains prior to being discharged into the ocean receiving waters? And what is the range of natural conditions at reference locations?**
2. **What are the conditions of the ocean receiving water directly in front of large storm drain outfalls both prior to, and immediately following, storm events? And how do these conditions compare to natural conditions at reference locations?**
3. **What are the estimated pollutant loads that are being transported into ASBS 24 from storm drains that fall under the jurisdiction of the County and the LACFCD?**

Specifically, Study Questions 1 and 2 can be answered by monitoring water quality in ocean receiving water (ASBS 24) and in storm drain effluent associated with storm drains proximal to the monitored receiving water location in ASBS 24. Flow monitoring equipment installed into two of the largest storm drains that flow into ASBS 24 during the 2012-2013 storm season provided information that was used to help answer Study Question 3 by accurately estimating the volume of storm water runoff flowing to the beach and into the receiving water during storm events. Pollutant loads entering ASBS 24 were calculated based upon flow measurements and flow modeling in combination with results of chemical analyses from three storm events during the 2012-2013 and 2013-2014 wet weather seasons.

Results from this study will enable the County and LACFD to conform to regional compliance monitoring requirements and will help prioritize potential best management practices (BMPs) for the purpose of reducing pollutant loading to the ASBS.

This report presents and summarizes data collected from sampling events that occurred during the 2015-2016 storm season and evaluates compliance with natural water quality based on these data in combination with previous data collected during the 2012-2013 and 2013-2014 storm seasons. Details of the monitoring design are provided in the following section.

2.0 STUDY DESIGN

The ASBS Compliance Monitoring Program was designed to be consistent with a broader Regional ASBS Work Plan created by a planning committee as part of the Southern California Bight 2013 Regional Monitoring Survey and the State Board Special Protections document. The study design for the 2015-2016 storm season was intended to supplement previous data collected during the 2012-2013 and 2013-2014 wet weather seasons, and therefore was limited in scope. Monitoring for the 2015-2016 study consisted of monitoring one large outfall and its paired ocean receiving water location at Zuma Beach and one large outfall and its paired ocean receiving water location at Escondido Beach.

2.1 Core Discharge and Ocean Receiving Water Monitoring

Core Discharge Monitoring during the 2012-2013 and 2013-2014 storm seasons consisted of sampling and analysis (water chemistry and toxicity) of wet weather discharges from 20 storm drains (greater than 18 inches in diameter) that discharge to ASBS 24. For storm drain outfalls that were greater than 18 inches and less than 36 inches in diameter, oil and grease and TSS were measured for each storm event, whereas for storm drains that are either 36 inches or larger in diameter or are linked with an ocean receiving water site, oil and grease, TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate as N, and total phosphorus were analyzed for each storm event. Additionally, during one storm event at each outfall, chronic toxicity was measured using bivalve embryos. For the 2015-2016 storm season, core discharge monitoring was performed at outfalls ASBS-016 and ASBS-028. Both of these outfalls are linked with an ocean receiving water site and therefore were analyzed for the full suite of chemical constituents. The toxicity testing requirement for outfalls ASBS-016 and ASBS-028 had been met during the 2012-2013 storm season, therefore, no toxicity testing was performed at these outfall stations during the 2015-2016 storm season.

The Ocean Receiving Water Monitoring Program was designed to compare conditions in the ASBS near major discharges to “natural” or reference conditions, both prior to and immediately following a storm event. Reference sites located at the mouths of streams in un-urbanized watersheds along the Southern California coast were used to define “natural water quality” based on criteria identified in the Regional ASBS Work Plan. The conditions monitored in this program included water chemistry, water toxicity, and biological integrity. For the 2015-2016 storm season, ocean receiving water monitoring was performed at stations ASBS-SO1 and ASBS-SO2 both prior to, and during, each monitored storm event. Ocean receiving water was analyzed for the same constituent list as the core discharge sites: oil and grease, TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate as N, and total phosphorus prior to (pre-storm) and during or immediately following each storm event (post-storm). Post-storm samples must be collected while runoff from the outfall is flowing to the receiving water; therefore they may be collected while it is raining or after it has stopped raining, provided discharge from the outfall is still flowing into the receiving water. Additionally, chronic toxicity to bivalve embryos, echinoderms, and kelp was measured from post-storm samples collected during each storm event.

Table 2-1 details the characteristics of the stations that were monitored during the 2015-2016 storm season. The core discharge station ASBS-016 and its linked ocean receiving water station

ASBS-SO1 were monitored for two storm events while the core discharge stations ASBS-028 and its linked ocean receiving water station ASBS-SO2 were monitored for one storm event.

Table 2-1. Monitoring Program Stations, Outfall Dimensions, Ownership, and Required Analyses for the 2015-2016 Wet Weather Season

Monitoring Type	Beach Location	Site Name	LACDPW Storm Drain Tag	Pipe Diameter	Ownership		Chemical Analyses and Number of Storms to Be Tested	Toxicity Testing** and Number of Storms to Be Tested
					Flood Control District	LA County		
Core Monitoring	Zuma Beach	ASBS-016	Zuma Open Channel	60		x	Full List* 2 storms	None
	Escondido Beach	ASBS-028	MTD 622 Line 4	36	x		Full List* 1 storm	None
Receiving Water Monitoring	Zuma Beach	ASBS-SO1	Linked to Zuma Open Channel	NA			Full List* 2 storms	3 species 2 storms
	Escondido Beach	ASBS-SO2	Linked to MTD 622 Line 4	NA			Full List* 1 storm	3 species 1 storm

*Full constituent list comprises TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate, and total phosphorus.
**Toxicity species includes bivalves, giant kelp and sea urchins.

2.1.1 Sampling Locations

The location of Zuma Beach outfall ASBS-016 and its receiving water ASBS-SO1 is shown in Figure 2-1 and Figure 2-2, whereas the location of Escondido Beach outfall ASBS-028 and its receiving water ASBS-SO2 is shown in Figure 2-3 and Figure 2-4. A brief description of the two storm drain outfall pipes and their respective ocean receiving water stations is presented below.

- **Outfall ASBS-016 South Zuma Beach—** ASBS-016 is located west of the Pacific Coast Highway (approximately 100 meter [m] south of Morning View Drive) along the Zuma Beach Access Road. The watershed draining to ASBS-016 is 115 acres and comprises the following mix of land uses: 33 percent (%) public facilities, 25% rural residential, 19% vacant, 13% residential, 8% transportation, and 2% open space and recreation. Storm runoff to this outfall follows a more or less natural drainage path to the beach. Just before reaching the beach, the flow enters a road culvert under PCH and travels an additional 20 m across an open channel where it splits into three pipes that discharge onto the sand at Zuma Beach (Figure 2-1). During the summer, the outfall pipes along South Zuma Beach are buried for safety purposes and then excavated prior to the storm season to ensure storm water flows are not impeded. Once the pipes are excavated, however, the elevation of the surrounding sand berm can be as high as 3 m above the outfall pipe. For this reason Beaches and Harbors re-excavates the sand berm immediately in front of the ASBS-016 outfall before large storm events. Receiving water samples were collected at ASBS-SO1 in the ASBS mixing zone in approximately 1 m of water, directly in front of the Zuma Beach outfall of ASBS-016.

Figure 2-1. Box Culvert (A); Zuma Beach Outfall of ASBS-016 (B); and Ocean Receiving Water of ASBS-SO1(C)

Figure 2-2. Core Discharge and Ocean Receiving Water Monitoring Locations along Zuma Beach

- **Outfall ASBS-028 Escondido Beach —** ASBS-028 is located west of Malibu Cove Colony Drive on Escondido Beach beneath an elevated house. The watershed draining to ASBS-028 is 36 acres and comprises the following mix of land uses: 44% rural residential, 33% vacant, 9% residential, 8% agriculture, and 6% transportation. As a result of its proximity to the ocean, this monitoring station is generally not accessible during tides greater than 3 ft (Figure 2-4). There is no sand berm associated with this outfall, and as a result of the narrow beach, flow typically reaches the receiving water during even minor storm events (less than 0.25" of rainfall). Receiving water samples were collected at ASBS-SO2 in the ASBS mixing zone in approximately 1 m of water directly in front of outfall ASBS-028.

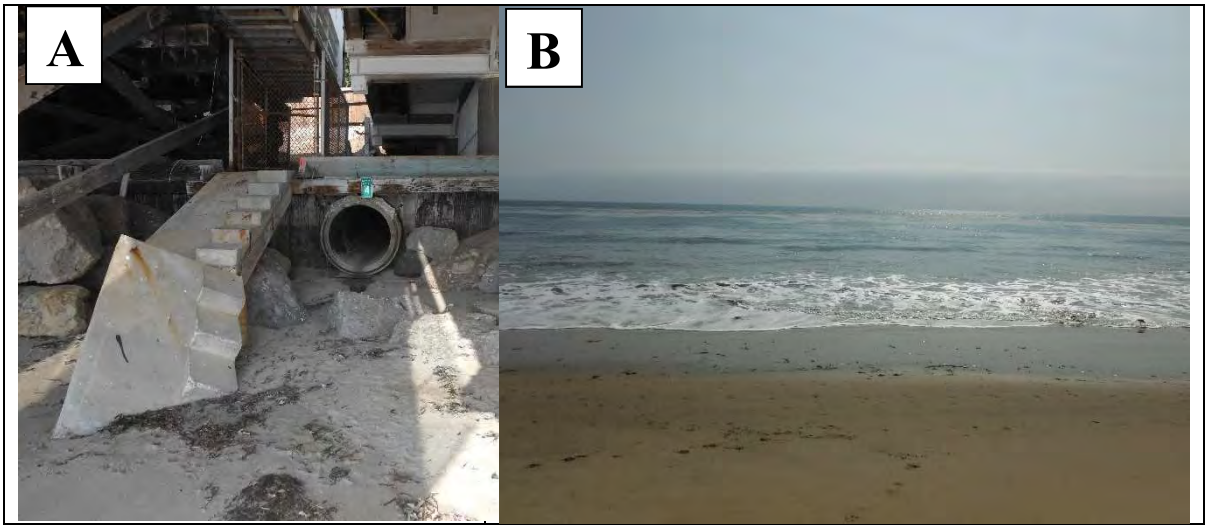

Figure 2-3. ASBS-028 Escondido Beach Outfall (A) and Ocean Receiving Water site ASBS-SO2 (B)

Figure 2-4. Core Discharge and Ocean Receiving Water Monitoring Locations along Escondido Beach

2.2 Sampling Methods

2.2.1 Water Collection

Core discharge samples were collected at the base of each outfall. Samples were collected in certified clean laboratory bottles appropriate for the analyses to be conducted. Following sampling, samples were placed on ice in a cooler and delivered within the required holding times to Physis Environmental Laboratories, Inc.

Sampling of ocean receiving water was performed prior to each storm's arrival (within 48 hours) and again during, or immediately following, the storm while storm water runoff was flowing to the receiving water. Ocean receiving water samples were collected in the ocean directly in front of the storm drain outfall by submerging a clean 4 liter (L) glass container just below the surface of the water in the mixing zone. Water from the glass sampling container was then evenly distributed to each of seven certified clean, pre-labeled laboratory bottles as well as to plastic cubitainers used for toxicity analysis. Each laboratory bottle was filled to approximately 25% of capacity before the glass sampling container was then refilled in the same manner as previously described and the collected water re-distributed to each of the laboratory bottles and cubitainers. This process continued until all containers were filled. The water depth was approximately 1 m at the sample collection point. Samples were collected in bottles appropriate for the analysis to be conducted. After retrieval, the samples were placed on ice in a cooler and delivered within the required holding times for analysis to Physis Environmental Laboratories, Inc. for chemical testing. Cubitainers for toxicity testing were kept on ice in coolers and shipped the following day for overnight delivery to Aquatic Bioassay and Consulting Laboratories, Inc. (ABC Labs.) for toxicity testing.

2.2.2 Field Water Quality

During each sampling event, several water quality parameters were measured in the ocean receiving water with a handheld YSI multi-probe water quality meter (Model 650MDS). The meter was submerged in the surf zone at the receiving water monitoring site. The following parameters were measured and recorded on field data sheets: water temperature, salinity, pH, conductivity, turbidity, and dissolved oxygen (DO). In addition, the following observations were recorded on the field data sheets: weather and ocean conditions, beach characteristics, and runoff characteristics. Photographs were taken and are provided in this report where appropriate.

2.2.3 Chain of Custody

Chain-of-custody forms were completed for each sample and accompanied the samples to the appropriate laboratories. Samples were considered to be in custody if they were:

- In the custodian's possession or view,
- Retained in a secured place (under lock) with restricted access, or
- Placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal.

Chain-of-custody procedures were used for all samples throughout the collection, transport, and analytical process and were initiated during sample collection.

Documentation of sample handling and custody included the following:

- 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 Chain-of-custody forms were be placed in a plastic envelope and kept inside the cooler containing the samples. Once delivered to the analytical laboratory, the person receiving the samples signed the Chain-of-custody form.

2.2.4 Sample Analyses - Water

After collection, core discharge and ocean receiving water samples were submitted to Physis Environmental Laboratories, Inc. for analyses. Chemical and biological analysis methods, detection limits, and reporting limits for constituents that were measured in the 2015–2016 Ocean Receiving Water Sampling are listed in Table 2-2.

Table 2-2. List of Constituents Analyzed for the 2015-2016 Core Discharge and Ocean Receiving Water Sampling Programs

Constituent	Method	MDL[1]	RL[2]	Units
General Chemistry				
Total suspended solids (TSS)*	SM 2540-D		5	mg/L
Nitrate as N	SM4500-NO3 E		0.05	mg/L
Ammonia	SM4500-NH3D		0.06	mg/L
Oil and grease*	USEPA[3] 1664A		5	mg/L
Total orthophosphate as P	SM4500-P E		0.02	mg/L
Total and Dissolved Trace Metals				
Aluminum (Al)	USEPA[3] 200.8(m)		8.25	µg/L
Antimony (Sb)			0.015	µg/L
Arsenic (As)			0.045	µg/L
Beryllium (Be)			0.1	µg/L
Cadmium (Cd)			0.010	µg/L
Chromium (Cr)			0.25	µg/L
Copper (Cu)			0.05	µg/L
Lead (Pb)			0.05	µg/L
Manganese (Mn)			0.45	
Mercury (Hg)			0.1	µg/L
Molybdenum (Mo)			0.1	
Nickel (Ni)			0.1	µg/L
Selenium (Se)			0.25	µg/L
Silver (Ag)			0.15	µg/L
Thallium (Tl)			0.05	
Zinc (Zn)			0.01	µg/L
Organophosphorus Pesticides				
Bolstar (sulprofos)	USEPA[3] 625		4	ng/L

Constituent	Method	MDL[1]	RL[2]	Units
Chlorpyrifos			2	ng/L
Demeton			2	ng/L
Diazinon			4	ng/L
Dichlorvos			6	ng/L
Disulfoton			2	ng/L
Ethoprop (ethoprofos)			2	ng/L
Fenchlorophos (eonnel)			4	ng/L
Fensulfothion			2	ng/L
Fenthion			4	ng/L
Malathion			6	ng/L
Methyl parathion			2	ng/L
Mevinphos (phosdrin)			16	ng/L
Phorate			12	ng/L
Tetrachlorvinphos (stirofos)			4	ng/L
Tokuthion			6	ng/L
Trichloronate			2	ng/L
Polynuclear Aromatic Hydrocarbons (PAHs)				
1-Methylnaphthalene			5	ng/L
1-Methylphenanthrene			5	ng/L
2,3,5-Trimethylnaphthalene			5	ng/L
2,6-Dimethylnaphthalene			5	ng/L
2-Methylnaphthalene			5	ng/L
Acenaphthene			5	ng/L
Acenaphthylene			5	ng/L
Anthracene			5	ng/L
Benz[a]anthracene			5	ng/L
Benzo[a]pyrene			5	ng/L
Benzo[b]fluoranthene			5	ng/L
Benzo[e]pyrene			5	ng/L
Benzo[g,h,i]perylene	USEPA[3] 625		5	ng/L
Benzo[k]fluoranthene			5	ng/L
Biphenyl			5	ng/L
Chrysene			5	ng/L
Dibenz[a,h]anthracene			5	ng/L
Dibenzothiophene			5	ng/L
Fluoranthene			5	ng/L
Fluorene			5	ng/L
Indeno[1,2,3-c,d]pyrene			5	ng/L
Naphthalene			5	ng/L
Perylene			5	ng/L
Phenanthrene			5	ng/L
Pyrene			5	ng/L
Allethrin			2	ng/L
Bifenthrin			2	ng/L
Cyfluthrin			2	ng/L
Cypermethrin			2	ng/L
Danitol (Fenpropathrin)			2	ng/L
Deltamethrin/Tralomethrin			2	ng/L
Esfenvalerate	USEPA[3] 625 NCI		2	ng/L
Fenvalerate			2	ng/L
Fluvalinate			2	ng/L
L-Cyhalothrin			2	ng/L
Permethrin			25	ng/L
Prallethrin			2	ng/L
Resmethrin			25	ng/L

*Core discharge outfalls less than 36" in diameter were analyzed only for TSS and oil and grease. Outfalls greater than or equal to 36" in diameter, and ocean receiving water samples were analyzed for all constituents listed in Table 2-3.
[1]MDL = method detection limit.
[2]RL = reporting limit.
[3]USEPA = United States Environmental Protection Agency.

Details of analytical chemistry methods used for Malibu ASBS Special Protections Monitoring are provided in Appendix C.

2.2.5 Sample Analyses - Toxicity

Toxicity testing of three different marine species was performed during each monitored storm event for ocean receiving waters. Toxicity testing was performed using the marine bivalve, *Mytilus galloprovincialis*, the purple sea urchin, *Strongylocentrotus purpuratus*, and the kelp, *Macrocystis pyrifera*. Toxicity test methods that were used included the following: chronic 48-hour bivalve development test, chronic 40-minute echinoderm fertilization test, and chronic 48-hour kelp germination and growth test. The marine bivalve test was performed using a modified method based on EPA 600/R-15-136 that was used for the Bight '08 program, whereas the purple sea urchin and kelp tests were performed using EPA 600/R-15/136. Each of these methods is approved by the United States Environmental Protection Agency (USEPA) for testing toxicity in marine and estuarine waters of the United States. Details of toxicity test protocols used for Malibu ASBS Special Protections Monitoring are provided in Appendix D.

3.0 2015-2016 MONITORING RESULTS

Core Discharge Monitoring and Ocean Receiving Water Monitoring were conducted over two storm events during the 2015-2016 Storm Season. The first storm occurred on January 6, 2016 and the second storm occurred on March 6, 2016. Monitoring was successfully completed at both outfalls and receiving water locations. The analyses performed at each sampling location are listed in Table 3-1.

Table 3-1. Summary of Core Discharge and Ocean Receiving Water Sample Collection

Event	Sampling Location	Outfall or Receiving Water	Storm Event			
			January 6, 2016		March 6, 2016	
			Chem	Tox	Chem	Tox
Pre-Storm	ASBS-SO1	Receiving Water	x		x	
	ASBS-SO2	Receiving Water	x			
Storm	ASBS-016	Outfall	x		x	
	ASBS-SO1	Receiving Water	x	x	x	x
	ASBS-028	Outfall	x			
	ASBS-SO2	Receiving Water	x	x		

Storm Event: January 6, 2016

Pre-storm ocean receiving water samples were collected on January 3, 2016 at 11:40 at ASBS-SO2 and 12:10 from ASBS-SO1 during a low tide. The forecast storm arrived on January 5, 2016 and continued into January 7, 2016, with sampling beginning at 16:30 on January 6, 2016 and continuing until 17:15 that day. A total of 1.7 inches of rainfall were recorded at the Leo Carrillo beach rain gauge: (https://www.wunderground.com/personal-weather-station/dashboard?ID=MLCBC1) over the course of the storm, whereas 1.58 inches of rainfall were recorded at the Point Dume rain gauge: (https://www.wunderground.com/personal-weather-station/dashboard?ID=KCAMALIB6). Effluent from both ASBS-016 and ASBS-028 outfalls was flowing into the ocean receiving water while samples were being collected.

Storm Event: March 6, 2016

The pre-storm ocean receiving water sample at ASBS-SO1 was collected on March 4, 2016 at 13:30. The forecast storm arrived on the night of March 5, 2016 and continued into the early morning on March 6, 2016. A small amount of additional rain also occurred on March 7, 2016. Sampling began at 21:50 on March 7, 2016 and continued until 01:53 on March 8, 2016. A storm total of 1.45 inches of rainfall were recorded at a rain gauge located just south of Leo Carrillo Beach: (https://www.wunderground.com/personal-weather-station/dashboard?ID=KCAMALIB610), whereas 1.23 inches of rainfall were recorded at the Point Dume rain gauge. Effluent from the ASBS-016 outfall was flowing into the ocean receiving water while the receiving water samples were being collected.

3.1 Core Discharge Monitoring

Core discharge samples were collected manually using clean laboratory-certified containers supplied by the analytical laboratory. Grab samples were collected as the storm water effluent flowed from the pipe onto the sand, or in the case of ASBS-016, from the box culvert onto the natural channel that flowed to Zuma Beach. Constituent concentrations from core discharge samples are presented in Table 3-2. In the summary table, only analytes that were measured above detection limits are listed under the categories organophosphorus pesticides, and synthetic pyrethroids. For results of individual OP pesticides, PAHs, and synthetic pyrethroids, refer to Appendix C which provides the full chemistry reports for each monitoring date. Total OP pesticides, total PAHs, and total pyrethroid pesticides were calculated in accordance with SCCWRP's method for establishing the 85th percentile reference threshold, and a value of one-half of the method detection limit was used for non-detect and estimated (J-flag) values. In the calculation of the total OP pesticides concentration, a subset of eight OP pesticides were totaled. In the calculation of the total PAHs concentration, 25 individual PAHs were totaled with a value of 0.5 ng/L for each PAH that was non-detect or estimated. Thus, a total PAH value of 12.5 ng/L indicates that no PAHs were detected. For total pyrethroid pesticides concentration, a subset of ten pyrethroid pesticides were totaled.

January 6, 2016 Storm Event

In general, the effluent from outfalls ASBS-016 and ASBS-028 was similar in concentration for most metals. General chemistry constituents varied somewhat, however, as the nitrate concentration at ASBS-016 was approximately six times higher than at ASBS-028, and the TSS and oil and grease concentrations were substantially higher at ASBS-028 than at ASBS-016. No OP pesticides were detected at either outfall. Total PAHs were approximately ten times higher at ASBS-028 (2,161 ng/L) than at ASBS-016 (223 ng/l). No synthetic pyrethroid pesticides were detected at ASBS-016, whereas five different pyrethroids were detected at ASBS-028. Bifenthrin comprised 92% of the pyrethroid concentration at ASBS-028.

March 6, 2016 Storm Event

General chemistry concentrations at ASBS-016 during the March 6, 2016 storm event were similar to those measured during the January 6, 2016 storm event. Only the ammonia concentration (0.17 in March 2016 vs. 0.51 mg/L in January 2016) varied by more than 2-fold. Metals concentrations at ASBS-016 were all lower during the March 6, 2016 storm event than during the January 6, 2016 storm event, with cadmium, lead, mercury, and silver decreasing by the greatest percentages. Similar to the January 6, 2016 storm event, no OP pesticides or synthetic pyrethroid pesticides were detected at ASBS-016. The total PAH concentrations measured during both storm events were nearly identical (223 ng/L in January 2016 vs. 227 ng/L in March 2016).

Table 3-2. Summary of Core Discharge Results from Monitored Storm Events during the 2015-2016 Storm Season

Analyte	Units	Outfall ASBS-016 Post-Storm 1/6/2016	Outfall ASBS-028 Post-Storm 1/6/2016	Outfall ASBS-016 Post-Storm 3/6/2016
General Chemistry				
Ammonia as N	mg/L	0.51	0.42	0.17
Nitrate as N	mg/L	1.98	0.34	1.08
Oil & Grease	mg/L	<1	4.8	1J
Total Orthophosphate as P	mg/L	0.39	0.21	0.57
Total Suspended Solids	mg/L	284	1040	510
Total Metals				
Arsenic (As)	µg/L	4.141	7.243	2.483
Cadmium (Cd)	µg/L	9.210	8.325	0.897
Chromium (Cr)	µg/L	35.18	36.70	33.39
Copper (Cu)	µg/L	73.10	71.40	26.03
Lead (Pb)	µg/L	34.80	33.54	6.49
Mercury (Hg)	µg/L	0.439	0.560	0.063
Nickel (Ni)	µg/L	72.04	69.79	36.09
Selenium (Se)	µg/L	0.965	1.482	0.12
Silver (Ag)	µg/L	0.08	0.01J	<0.01
Zinc (Zn)	µg/L	446.5	413.4	102.7
Organophosphorus Pesticides				
Total OP Pesticides	ng/L	6	6	6
Polynuclear Aromatic Hydrocarbons				
Total PAHs	ng/L	223.3	2161.2	226.9
Synthetic Pyrethroid Pesticides				
Bifenthrin	ng/L	<0.5	164.2	<0.5
Cyhalothrin, Total Lambda	ng/L	<0.5	3.9	<0.5
Esfenvalerate	ng/L	<0.5	3.3	<0.5
Esfenvalerate/Fenvalerate	ng/L	<0.5	4.4	<0.5
Fenvalerate	ng/L	<0.5	1.1J	<0.5
Total Pyrethroids	ng/L	6.75	177.9	6.75

3.2 Ocean Receiving Water

Ocean receiving water samples were collected at ASBS-SO1 in front of ASBS-016 and at ASBS-SO2 in front of ASBS-028 within 48 hours prior to, and during or immediately following, the storm while effluent runoff was still flowing into the receiving water. Two storm events were monitored at ASBS-SO1 while one storm event was monitored at ASBS-SO2. The monitored storm events for the ocean receiving water stations coincided with the monitored storm at core discharge stations (outfalls). Constituent concentrations from ocean receiving water samples were compared to reference threshold concentrations. Reference threshold concentrations are defined as the 85th percentile of sample concentrations taken from reference sites in Southern California. Estimated values (J-flagged values) measured above the detection limit but below the reporting limit were not considered to be in exceedance of reference thresholds. Complete chemistry and toxicity reports for each storm event are provided in Appendices C and D, respectively. A summary of chemistry results is provided in Table 3-3, and is described in the following text.

3.2.1 Field Water Quality

January 6, 2016 Storm Event

Field parameter measurements at Ocean Receiving Water stations are provided in Table 3-4. Pre-storm measurements of temperature, salinity, conductivity, turbidity and DO were similar at ASBS-SO1 and ASBS-SO2 prior to the January 6, 2016 storm event. Pre-storm pH differed somewhat among the two sites however, measuring 8.26 pH units at ASBS-SO1 and 7.97 pH units at ASBS-SO2. Water temperature dropped slightly during the January storm event at both ASBS-SO1 and ASBS-SO2. Salinity, conductivity, and pH also decreased slightly during the storm event as fresh water entered the receiving water. Turbidity increased only slightly during the storm event from pre-storm conditions.

March 6, 2016 Storm Event

Salinity and conductivity were substantially lower during the storm (14.7 ppt) than before the storm (33.3 ppt). Since the ocean receiving water sample was collected in the mixing zone immediately out from where the effluent entered the receiving water, a drop in salinity and conductivity during the storm event is to be expected. Temperature was approximately two degrees lower and DO was approximately 1.3 mg/L higher during the storm event than before the storm event. Turbidity increased during the storm event, likely as a result of increased wave activity and turbid runoff entering the receiving water. pH was relatively unchanged by the storm event, decreasing less than 0.2 pH units from the pre-storm level.

Table 3-3. Summary of Ocean Receiving Water Results from Monitored Storm Events during the 2015-2016 Storm Season

Analyte	Units	Natural Water Quality	ASBS-SO1 Pre-Storm	ASBS-SO1 Post-Storm	ASBS-SO2 Pre-Storm	ASBS-SO2 Post-Storm	ASBS-SO1 Pre-Storm	ASBS-SO1 Post-Storm
		85th Percentile	1/3/2016	1/6/2016	1/3/2016	1/6/2016	3/4/2016	3/6/2016
General Chemistry								
Ammonia as N	mg/L	0.015	<0.02	0.15	<0.02	0.04J	<0.02	0.04J
Nitrate as N	mg/L	0.34	0.02J	0.04J	0.02J	0.03J	<0.01	0.08
Oil & Grease	mg/L	0.5	<1	<1	<1	<1	<1	1.1
Total Orthophosphate as P	mg/L	0.1	0.03	0.03	0.03	0.04	0.04	0.15
Total Suspended Solids	mg/L	48	57.6	10.7	4.5	35.2	5.6	52.7
Trace Metals								
Arsenic (As)	µg/L	1.8	1.525	1.551	1.437	1.592	1.414	2.061
Cadmium (Cd)	µg/L	0.15	0.036	0.028	0.028	0.108	0.052	0.091
Chromium (Cr)	µg/L	1.9	0.32	0.90	0.27	1.96	0.62	5.07
Copper (Cu)	µg/L	1.5	0.40	0.56	0.25	2.00	0.35	2.35
Lead (Pb)	µg/L	0.5	0.32	0.17	0.06	0.65	0.19	0.66
Mercury (Hg)	µg/L	0.0006	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012
Nickel (Ni)	µg/L	1.3	0.98	0.81	0.33	1.95	0.46	3.51
Selenium (Se)	µg/L	0.0025	0.02	0.012J	0.015	0.076	0.023	0.042
Silver (Ag)	µg/L	0.08	0.08	0.09	0.08	0.09	0.02	0.02
Zinc (Zn)	µg/L	18.6	0.4	1.1	1.5	5.3	1.0	10.4
Organophosphorus Pesticides								
Total OP Pesticides	ng/L	6	6	6	6	6	6	6
Polynuclear Aromatic Hydrocarbons								
Total PAHs	ng/L	12.5	12.5	12.5	12.5	35.2	12.5	18.8
Pyrethroids								
Bifenthrin	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyhalothrin, Total Lambda	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Esfenvalerate	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Esfenvalerate/Fenvalerate	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenvalerate	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Pyrethroids	ng/L	6.75	6.75	6.75	6.75	6.75	6.75	6.75

< - results less than the method detection limit.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Table 3-4. Field Parameter Measurements at Ocean Receiving Water Stations

Parameter	ASBS-SO1		ASBS-SO2		ASBS-SO1	
	Pre-storm	Post-storm	Pre-storm	Post-storm	Pre-storm	Post-storm
	1/3/2016	1/6/2016	1/3/2016	1/6/2016	3/4/2016	3/6/2016
	12:10	17:15	11:40	16:30	13:30	4:30
Temp (^{o}C)	14.97	12.6	14.8	13.71	17.45	15.27
Salinity (ppt)	33.24	32	32.62	32.1	33.28	14.74
Conductivity (μS)	50,665	49,120	49,842	49,140	50,685	24,211
pH (pH units)	8.26	7.82	7.97	7.88	8.04	7.87
Turbidity (NTU)	-0.5	2.0	0.2	3.6	2.7	41.3
DO (mg/L)	8.31	8.63	8.18	8.53	8.21	9.5

^{o}C = degrees Celsius, ppt = parts per thousand, μS = micro Siemens, NTU = Nephelometric turbidity units, mg/L = milligrams per Liter

3.2.2 General Chemistry

January 6, 2016 Storm Event

General chemistry constituents included ammonia as N, nitrate as N, oil and grease, total orthophosphate as P, and TSS. Post-storm ammonia concentrations at both ASBS-SO1 and ASBS-SO2 were above the 85th percentile reference threshold. Pre-storm samples were less than 0.02 mg/L at both ocean receiving water stations. However, because the ammonia concentration at ASBS-SO2 was an estimated value (J-flagged), it was not considered to be in exceedance of the 85th percentile reference threshold.

Pre-storm nitrate concentrations were estimated (J-flagged) at 0.02 mg/L for both ASBS-SO1 and ASBS-SO2 and increased only slightly to estimated values of 0.04 mg/L and 0.03 mg/L at ASBS-SO1 and ASBS-SO2, respectively, during the storm event. No oil and grease was detected in pre-storm or post-storm samples at either receiving water location. Total orthophosphate remained unchanged at ASBS-SO1 and increased only slightly from 0.03 mg/L to 0.04 mg/L at ASBS-SO2 during the storm event. The pre-storm TSS concentration was above the reference threshold at ASBS-SO1; however the post-storm TSS concentration was below the reference threshold. Although TSS increased during the storm event at ASBS-SO2 from the pre-storm concentration, it remained below the 85th percentile reference threshold value of 48 mg/L.

March 6, 2016 Storm Event

Post-storm concentrations of ammonia, oil and grease, total orthophosphate, and TSS were measured above 85th percentile reference threshold values at ASBS-SO1. However, because the ammonia concentration was an estimated value (J-flagged), it was not considered to be in exceedance of the 85th percentile reference threshold. Each of the general chemistry constituents had higher post-storm concentrations than pre-storm concentrations. The post-storm measurements of oil and grease and total orthophosphate were 1.1 mg/L and 0.15 mg/L, respectively, which were slightly above the oil and grease and total orthophosphate reference

thresholds of 0.5 mg/L and 0.1 mg/L, respectively. TSS was measured at 52.7 mg/L during the storm event, which slightly exceeded the 85th percentile reference threshold value of 48 mg/L.

3.2.3 Total Metals

January 6, 2016 Storm Event

In general, post-storm metals concentrations in ocean receiving water samples at ASBS-SO1 were either below the 85th percentile reference threshold values or were below pre-storm concentrations. Silver, which was the only metal that exceeded both criteria, had a pre-storm concentration of 0.08 µg/L and a post-storm concentration of 0.09 µg/L which was slightly above the threshold of 0.08 µg/L. While the post-storm selenium concentration was measured above the reference threshold, it was below the pre-storm concentration, and therefore not considered as an exceedance of natural water quality. At ASBS-SO2, concentrations of chromium, copper, lead, nickel, selenium, and silver were above 85th percentile reference threshold values.

March 6, 2016 Storm Event

During the March 6, 2016 storm event, concentrations of arsenic, chromium, copper, lead, nickel, and selenium at ASBS-SO1 were above 85th percentile reference threshold values. The pre-storm concentrations of selenium also exceeded 85th percentile reference threshold value at ASBS-SO1. Post-storm concentrations of arsenic, chromium, copper, lead, and nickel were 1.1, 2.7, 1.6, 1.3, and 2.7 times higher, respectively, than 85th percentile reference threshold values, while selenium had a post-storm concentration 16.8 times higher than the reference threshold value.

3.2.4 Polynuclear Aromatic Hydrocarbons

January 6, 2016 Storm Event

PAH concentrations were below the detection limit of 1 ng/L for 20 out of 25 analyzed PAHs during the January 6, 2016 storm event at ASBS-SO1. Eighteen PAHs (out of 25 that were analyzed) were detected in the post-storm sample from ASBS-SO2, but only five of these were above the reporting limit (5 ng/L) (Table 3-3). Low concentrations of PAHs were detected in pre-storm samples from both ocean receiving water locations but none of the concentrations were above reporting limits. The post-storm concentration of total PAHs at ASBS-SO2 (35.2 ng/L) was slightly above the 85th percentile reference threshold of 12.5 ng/L. The California Ocean Plan does not provide a total PAHs WQO for the protection of marine aquatic life. It should be noted that detected values that were below the reporting limit were summed as half the detection limit for comparison against the 85th percentile reference threshold. Individual PAH concentrations can be found in the chemistry reports provided in Appendix C.

March 6, 2016 Storm Event

Benzo(b)fluoranthene was the only PAH which was measured above the reporting limit in the post-storm sample collected from ASBS-SO1 on March 6, 2016. As a result, the total PAH

concentration of 18.8 ng/L was slightly above the 85th percentile reference threshold value of 12.5 ng/L.

3.2.5 Organophosphorus Pesticides

January 6, 2016 Storm Event and March 6, 2016 Storm Event

Pre-storm and post-storm concentrations of OP pesticides were below detection limits during both of the monitored storm events. The 85th percentile reference threshold value for total OP pesticides (6.0 ng/L) was not exceeded at either ASBS-SO1 or ASBS-SO2 during the monitored storm events.

3.2.6 Synthetic Pyrethroids

January 6, 2016 Storm Event and March 6, 2016 Storm Event

Pre-storm and post-storm concentrations of synthetic pyrethroid pesticides were below detection limits during each of the monitored storm events. The 85th percentile reference threshold value for total pyrethroids (6.75 ng/L) was not exceeded at either ASBS-SO1 or ASBS-SO2 during the January 6, 2016 storm event or at ASBS-SO1 during the March 6th storm event.

In the calculation of the total pyrethroid pesticides concentration, a subset of ten pyrethroid pesticides were totaled (in accordance with SCCWRP's method for establishing the 85th percentile reference threshold). A value of one-half of the method detection limit was used for non-detect values.

3.2.7 Toxicity

Toxicity samples were collected during each storm event from ocean receiving water locations while runoff from the outfall pipe was still flowing into the receiving water. Toxicity testing of ocean receiving water consisted of the following tests: *M. galloprovincialis* (bivalve) development, *S. purpuratus* (sea urchin) fertilization, and *M. pyrifera* (giant kelp) germination and growth. A summary of the toxicity results from these bioassay tests is presented in Table 3-5. The full toxicity reports for each storm event are provided in Appendix D.

January 6, 2016 Storm Event

Results indicate that there was no toxicity observed to *M. galloprovincialis* development, *S. purpuratus* fertilization, or *M. pyrifera* germination or growth in exposures to ocean receiving water from ASBS-SO1 and ASBS-SO2 during the Jaunary 6, 2016 storm event. This is supported by no observed effect concentration (NOEC) values of 100% and lowest observed effect concentration (LOEC) values of greater than 100% for each of the bioassay tests.

March 6, 2016 Storm Event

Results indicate that there was no toxicity observed to *M. galloprovincialis* development, *S. purpuratus* fertilization, or *M. pyrifera* germination or growth was observed in exposures to

ocean receiving water from ASBS-SO1 during the March 6, 2016 storm event. This is supported by NOEC values of 100% and LOEC values of greater than 100% for each of the bioassay tests.

Table 3-5. Summary of Ocean Receiving Water Monitoring Toxicity Results for Post-Storm Samples

Outfall	Storm Date	Toxicity Test	NOEC (%)	LOEC (%)	EC_{25} (%)	EC_{50} (%)	TU_c
ASBS-SO1	(January 6, 2016)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1
	(March 6, 2016)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1
ASBS-SO2	(January 6, 2016)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1

> = greater than.
NOEC = no observed effect concentration.
LOEC = lowest observed effect concentration.
EC_{25} = concentration producing a 25% response.
EC_{50} = concentration producing a 50% response, or median effective concentration.
TUc = toxic units chronic.

3.3 Flow Modeling and Pollutant Load Calculations

Flow modeling was performed previously for each monitored outfall during the 2012-2013 and 2013-2014 storm seasons. Modeled flows were verified by correlating actual flows measured in outfall pipes ASBS-016 and ASBS-028 to modeled flows. Because flow equipment was removed from the outfalls following the 2013-2014 storm season, no additional flow modeling or pollutant loading was performed for events monitored during the 2015-2016 storm season.

3.4 Determination of Compliance with Natural Water Quality

Compliance with natural water quality was assessed by comparing post-storm ocean receiving water data from wet weather monitoring in ASBS 24 to the pre-storm data from the same site and to the 85th percentile threshold of reference sample concentrations measured during Bight 2008 and Bight 2013. Compliance with natural water quality requires lower values of post-storm receiving water concentrations relative to the 85th percentile reference threshold and the pre-storm concentrations. The Bight data from 2013 were combined with previously collected data during Bight ’08 to determine the current 85th percentile constituent thresholds for natural water quality.

Concentrations of pollutants in post-storm receiving water were compared to those in pre-storm receiving water and to the 85th percentile threshold of reference sample concentrations. When

post-storm receiving water concentrations are greater than the 85th percentile threshold and are greater than pre-storm concentrations for two or more consecutive storm events, they are considered to be in exceedance of natural water quality in accordance with Special Protections. Since the monitoring performed in 2015-2016 was an addendum to the previous monitoring program from 2012-2013 and 2013-2014, the ocean receiving water stations were examined sequentially to determine compliance with Special Protections. Table 3-6 presents the results showing which analytes were in exceedance of the 85th percentile reference threshold for each monitored storm event since the 2012-2013 storm season.

During Storm 1 (2/19/2013), selenium and total PAHs concentrations at ASBS-SO2 were above the 85th percentile reference threshold and were also above the pre-storm concentration (Table 3-6). For Storm 2 (3/8/2013), concentrations of nitrate, chromium, copper, lead, nickel, selenium, zinc, and total PAHs at ASBS-SO2 were above the 85th percentile reference threshold and were also above the pre-storm concentrations. There was no data from ASBS-SO1 for these initial two storm events since no flow entered the receiving water from the linked storm drain outfall ASBS-016. During Storm 3 (2/28/2014), concentrations of TSS, total orthophosphate, mercury, selenium, silver, total pyrethroids, and total PAHs were above the natural water quality criteria at ASBS-SO2, and mercury, silver, and zinc concentrations were above the natural water quality criteria at ASBS-SO1. The storm on January 6, 2016 (Storm 4) resulted in concentrations of ammonia and silver that were in exceedance of the 85th percentile reference threshold values at ASBS-SO1 and concentrations of chromium, copper, lead, nickel, selenium, silver, and total PAHs that were in exceedance of reference threshold values at ASBS-SO2. During the storm on March 6, 2016 (Storm 5), oil and grease, total orthophosphate, TSS, arsenic, chromium, copper, lead, nickel, selenium, and total PAHs were above the 85th percentile reference threshold values at ASBS-SO1 (Storm 5 was not monitored for ASBS-SO2). It should be noted that while the ammonia concentration (0.04 mg/L) was technically measured above the 0.015 mg/L reference threshold value at ASBS-SO1 during Storm 5 and at ASBS-SO2 during Storm 4, these results were estimated values and therefore were not considered to be in exceedance of the 85th percentile reference threshold.

Thus, at ASBS-SO1 silver was the only analyte which exceeded the reference threshold during consecutive storm events (Storm 3 and 4). However, since silver did not exceed the reference threshold during Storm 5 at ASBS-SO1, it may be inferred that silver is not a chronic threat to the water quality of the ASBS at this location.

At ASBS-SO2, selenium, silver, and total PAHs exceeded the reference threshold during consecutive storm events. Selenium and total PAHs were in exceedance of the reference threshold at ASBS-SO2 during four consecutive storm events, whereas silver was in exceedance of the reference threshold during two consecutive storm events. It should be noted that although selenium and silver exceeded the value assigned to natural water quality based on reference site monitoring, the selenium concentration in the ocean receiving water was over three orders of magnitude below the COP Imax.

Table 3-6. Constituents that Exceeded the 85th Percentile Reference Threshold

SO1					SO2			
Storm 1	**Storm 2**	**Storm 3**	**Storm 4**	**Storm 5**	**Storm 1**	**Storm 2**	**Storm 3**	**Storm 4**
2/19/2013	**3/8/2013**	**2/28/2014**	**1/6/2016**	**3/6/2016**	**2/19/2013**	**3/8/2013**	**2/28/2014**	**1/6/2016**
No Flow	**No Flow**		Ammonia					
				Oil and grease			TSS	
				Total orthophosphate		Nitrate		
				TSS		Chromium		Chromium
				Arsenic		Copper		Copper
				Chromium		Lead		Lead
				Copper			Mercury	
				Lead		Nickel		Nickel
		Mercury			Selenium	Selenium	Selenium	Selenium
				Nickel			Silver	Silver
				Selenium		Zinc		
		Silver	Silver		Total PAHs	Total PAHs	Total PAHs	Total PAHs
		Zinc					Total pyrethroids	
				Total PAHs			Total orthophosphate	

Shaded cells indicate analytes that exceeded the 85th percentile reference threshold for two consecutive storm events including the most recent storm events.

4.0 SUMMARY AND DISCUSSION

Special Protections Monitoring for ASBS 24 during the 2015-2016 storm season consisted of monitoring two outfalls and their linked ocean receiving water stations. Monitoring was comprised of chemical analyses of PAHs, pyrethroids, metals, OP pesticides, ammonia, nitrate, oil and grease, TSS, and total orthophosphate for each of the outfalls and the two ocean receiving water stations. Toxicity testing was also performed on ocean receiving water samples (three species during each storm event). Results from the two monitoring events are discussed below.

Ocean Receiving Water Monitoring

Ocean receiving water samples were collected from ASBS-SO1 during two storm events and from ASBS-SO2 during one storm event. Ocean receiving water post-storm chemistry results revealed that ammonia and silver were above the 85th percentile reference threshold at ASBS-SO1 during the January 6, 2016 storm event and oil and grease, total orthophosphate, TSS, total PAHs, and six metals (arsenic, chromium, copper, lead, nickel, and selenium) were above the 85th percentile reference threshold at ASBS-SO1 during the March 6, 2016 storm event. At ASBS-SO2, six metals (chromium, copper, lead, nickel, selenium, and silver) and total PAHs were above the 85th percentile reference threshold in post-storm samples from the January 6, 2016 storm event. Several constituents, such as TSS, selenium and silver had pre-storm concentrations that exceeded or equaled the 85th percentile reference threshold at one or both stations. Of these, concentrations of TSS and selenium from the January 6, 2016 storm event at ASBS-SO1 were higher in the pre-storm sample than in the post-storm sample.

Toxicity results from ocean receiving water collected at the receiving water sites ASBS-SO1 (associated with outfall ASBS-016) and ASBS-SO2 (associated with outfall ASBS-028) indicate that no toxicity was observed in any of the three test species from receiving water collected during the January 6, 2016 storm event. Similarly, no toxicty was observed in any of the three test species to receiving water collected from ASBS-SO1 during the March 6, 2016 storm event.

Core Discharge Monitoring

Core discharge water samples were collected from ASBS-016 during two storm events and from ASBS-028 during one storm event. During the January 6, 2016 storm event, the effluent from outfalls ASBS-016 and ASBS-028 was generally similar in concentration for most metals while constituents such as nitrate, TSS, and oil and grease varied somewhat between the two sites. No OP pesticides or synthetic pyrethroids were detected at ASBS-016, and no OP pesticides were detected at ASBS-028. Five different pyrethroids, were detected at ASBS-028, and were comprised predominantly by bifenthrin. Total PAHs were approximately ten times higher at ASBS-028 than at ASBS-016.

During the March 6, 2016 storm event, general chemistry concentrations at ASBS-016 were similar to those measured during the January 6, 2016 storm event. Metals concentrations, however, were all lower at ASBS-016 during the March 2016 storm event than during the January 6, 2016 storm event. Similar to the January 6, 2016 storm event, no OP pesticides or synthetic pyrethroid pesticides were detected at ASBS-016 during the March 6, 2016 storm event, and total PAHs were nearly identical in concentration (223 ng/L in January 2016 vs. 227 ng/L in March 2016).

Link between Outfall Concentrations and Receiving Water Concentrations

The link between the concentrations measured at outfalls ASBS-016 and ASBS-028 to concentrations measured at their respective ocean receiving water stations was explored. As previously mentioned, selenium, silver, and total PAHs at ASBS-SO2 were the only recurring constituents in the ocean receiving water that were elevated above background concentrations (pre-storm concentrations) and were above the 85th percentile reference threshold for two or more consecutive storm events.

ASBS-028 and ASBS-SO2

Table 4-1 presents the list of constituents which had either pre-storm or post-storm exceedances of 85th percentile reference threshold values at ASBS-SO2 for the storm event monitored on January 6, 2016. Table 4-1 also includes information used to determine whether effluent from outfall ASBS-028 may have contributed to these exceedances.

Total PAHs

During the January 6, 2016 storm event, the post-storm concentration of total PAHs was measured slightly above the 85th percentile reference threshold at ASBS-SO2. Although the outfall total PAH concentration at ASBS-028 was substantially higher than the pre-storm ocean receiving water total PAH concentration, there is not a COP Imax value established for total PAHs for the protection of marine aquatic life. Because of this, it is difficult to quantify the level of management actions that would need to be undertaken.

PAHs can occur naturally from forest and grass fires, oil seeps, volcanic eruptions, and chlorophyllus plants, fungi, and bacteria. Anthropogenic sources of PAHs include the incomplete combustion of organic matter from manufacturing facilities, as well as from petroleum processing, power generation, waste incineration, home heating, lubricating materials, tar and asphalt. Internal combustion engines used in automobiles, railways, ships, and aircraft are also leading sources of PAH emissions in the environment (ATSDR 1995). The PAH sources in the watershed of ASBS-028 in the ocean receiving water would include some combination of motor oil, automobile exhaust emissions, ash from recent forest fires, tar and asphalt, and construction activities. Observed on-going construction on Malibu Cove Colony Drive has the potential to contribute to PAH contamination in the receiving water via oil leaks from contractor trucks and generators.

Selenium

Both the pre-storm and post-storm concentrations of selenium were measured above the 85th percentile reference threshold value at ASBS-SO2 for the January 6, 2016 storm event. Although the outfall total selenium concentration at ASBS-028 was higher than the pre-storm ocean receiving water concentration, it remained over three orders of magnitude below the COP Imax value established for the protection of marine aquatic life.

Selenium occurs naturally in the environment, often found in association with sulfide ores of copper, iron, zinc, and in natural coal deposits. (http://www.clw.csiro.au/publications/waterforahealthycountry/2010/wfhc-contaminants-domestic-wastewater.pdf). Selenium is widely used in the electronics industry, as well as in the

manufacture of ceramics, semiconductors, glass and pigments, alloys, catalysts, personal hygiene products, and animal feeds. The selenium sources in the ASBS-028 watershed and in the ocean receiving water may include some combination of naturally occurring selenium in the soil that has been exposed through construction activity or natural erosion and anthropogenic sources.

Silver

Silver was measured above the 85th percentile reference threshold during the January 6, 2016 storm event. During this event, the effluent concentration in outfall ASBS-028 was estimated to be 0.01 µg/L (J-flagged) and the ocean receiving water concentration at ASBS-SO2 was 0.09 µg/L. Since the ocean receiving water concentration was greater than the outfall concentration, and was only slightly greater than the pre-storm ocean receiving water concentration (0.08 µg/L), it seems unlikely that the effluent from ASBS-028 contributed to the ocean receiving water concentration at ASBS-SO2. The incremental difference of 0.01 ug/L between the pre-storm and post-storm ocean receiving water concentration can likely be explained by normal grab sample variability and suggests that the source of the detected silver measured in the Escondido Beach receiving water originates outside of the ASBS-028 watershed. It should be noted that similar silver concentrations in the ocean receiving water were also detected in pre-storm samples collected at ASBS-SO1 along Zuma Beach.

Silver is a rare but naturally occurring element that is most commonly found in its pure form in ores or as a compound in the form of silver sulfide. In industry, silver is used in the manufacture of silver nitrate, silver bromide and other photographic chemicals, water distillation equipment, mirrors, silver plating equipment, special batteries, table cutlery, jewelry, dental medical and scientific equipment including amalgams (Smith and Carson 1977). Silver is tightly bound by sewage sludge, and elevated silver concentrations in sediments are often characteristic of areas near sewage outfalls. Silver in oxidized sediments is closely associated with oxides of iron and with humic substances (Bryan & Langston, 1992).

Table 4-1. Comparison of ASBS-028 Outfall Concentrations to Pre-storm and Post-storm Ocean Receiving Water Concentrations for ASBS-SO2

Parameter	Units	COP IMAX	Natural Water Quality 85th Percentile	Outfall ASBS-028	Ocean Receiving Water ASBS-SO2	
				Outfall (1-6-16)	Pre-storm (1-3-16)	Post-storm (1-6-16)
Total PAHs	ng/L		12.5	2161.2	12.5	35.2
Selenium	µg/L	150	0.0025	1.48	0.015	0.076
Silver	µg/L	7	0.08	0.01J	0.08	0.09

J- Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Compliance with Natural Water Quality

Compliance with natural water quality was determined by comparing post-storm receiving water data from wet weather monitoring conducted since the 2012-2013 storm season for ASBS 24 to pre-storm receiving water data and to the 85th percentile threshold of reference sample concentrations calculated from data collected during Bight 2008 and Bight 2013.

Based on the results of five storm events and four storm events that were monitored at ASBS-SO1 and ASBS-SO2, respectively, since 2012-2013 storm season, no analytes were in

exceedance of the 85th percentile reference threshold at ASBS-SO1 and three analytes were in exceedance of the reference threshold at ASBS-SO2. The three analytes that exceeded 85th percentile reference threshold at SO2 were total PAHs, selenium, and silver. Total PAHs and selenium concentrations were above the reference threshold in four consecutive storm events whereas silver was above the reference threshold in the two most recent storm events.

4.1 Recommendations

As previously discussed, there were three constituents which had concentrations that were outside of established compliance parameters for natural water quality in the receiving water at ASBS-SO2: selenium, silver, and total PAHs.

- An evaluation of the potential load reduction required for selenium to be in compliance with the Special Protections document is provided in Area of Special Biological Significance 24 Compliance Plan for the County of Los Angeles and the City of Malibu (Weston, 2014).
- The most recent monitoring data supports no action to be taken regarding reducing the silver concentration in storm drain effluent from ASBS-028. This is based upon the measured outfall concentrations of the two most recent storm events being substantially lower than the measured ocean receiving water concentrations.
- Total PAHs has no established COP Imax value to determine necessary management actions. As a result, no additional BMP recommendation is provided other than those actions provided in the ASBS Compliance Plan.

5.0 LITERATURE CITED

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APPENDIX A

Special Protections Document

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2012-0012

APPROVING EXCEPTIONS TO THE CALIFORNIA OCEAN PLAN FOR SELECTED DISCHARGES INTO AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE, INCLUDING SPECIAL PROTECTIONS FOR BENEFICIAL USES, AND CERTIFYING A PROGRAM ENVIRONMENTAL IMPACT REPORT

WHEREAS:

1. The State Water Resources Control Board (State Water Board) adopted the California Ocean Plan (Ocean Plan) on July 6, 1972 and revised the Ocean Plan in 1978, 1983, 1988, 1990, 1997, 2000, 2005, and 2009.

2. The Ocean Plan prohibits the discharge of waste to designated Areas of Special Biological Significance (ASBS).

3. ASBS are designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

4. Under the Marine Managed Areas Improvement Act, all ASBS are designated as a subset of state water quality protection areas and require special protection as determined by the State Water Board pursuant to the Ocean Plan and the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan).

5. In state water quality protection areas, waste discharges must be prohibited or limited by special conditions, in accordance with the Porter-Cologne Water Quality Control Act, California Water Code §13000 et seq., and implementing regulations, including the Ocean Plan and Thermal Plan.

6. The Ocean Plan authorizes the State Water Board to grant an exception to Ocean Plan provisions where the board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served.

7. On October 18, 2004, the State Water Board notified a number of parties that they must cease the discharge of storm water and nonpoint source waste into ASBS or request an exception to the Ocean Plan.

8. The State Water Board has now received 27 applications for an exception to the Ocean Plan prohibition against waste discharges into an ASBS. The applicants, who are listed in Attachment A to this resolution, discharge storm water and nonpoint source waste into ASBS.

9. The State Water Board finds that granting the requested exceptions will not compromise protection of ocean waters for beneficial uses, provided that the applicants comply with the prohibitions and special conditions that comprise the Special Protections contained in this resolution. The prohibitions and special conditions in the Special Protections, contained in Attachment B to this resolution, are intended to ensure that storm water

and nonpoint source discharges are controlled to protect the beneficial uses of the affected ASBS, including marine aquatic life and habitat, and to maintain natural water quality within ASBS. The Special Protections are also intended to maintain the natural hydrologic cycle and coastal ecology by allowing the flow of clean precipitation runoff into the ocean, while preserving coastal slope stability and preventing anthropogenic erosion.

10. The State Water Board finds that granting the requested exceptions is in the public interest because the various discharges are essential for flood control, slope stability, erosion prevention, and maintenance of the natural hydrologic cycle between terrestrial and marine ecosystems, public health and safety, public recreation and coastal access, commercial and recreational fishing, navigation, and essential military operations (national security).

11. The State Water Board staff conducted scoping meetings on August 1, 8, and 15, 2006. The comment period for CEQA scoping closed August 15, 2006. The State Water Board heard a status report on ASBS at the April 1, 2008 meeting.

12. The State Water Board staff prepared and circulated a Program Environmental Impact Report for the proposed exceptions, in accordance with the California Environmental Quality Act (CEQA) and implementing regulations.

13. The State Water Board held a public hearing on May 18, 2011, to receive comments on the proposed exceptions and the Program Environmental Impact Report. The written comment period ended on May 20, 2011. The State Water Board staff has considered the comments and prepared written response. The State Water Board finds, based on the whole record, including the applications, Draft Program Environmental Impact Report, comments, and responses, that there is no substantial evidence that approval of the exceptions will have a significant effect on the environment because of the terms and conditions incorporated into the project. The Program Environmental Impact Report reflects the State Water Board's independent judgment and analysis.

14. Granting the exceptions is consistent with federal and state antidegradation policies, in 40 C.F.R. §131.12 and State Water Board Resolution No. 68-16, respectively. The terms, special conditions, and prohibitions that comprise these Special Protections will not authorize a lowering of water quality, but rather will improve water quality conditions in the affected ASBS.

15. This resolution only grants an exception from the Ocean Plan prohibition against waste discharges into ASBS to the applicants listed in Attachment A. It does not authorize waste discharges to state waters. In order to legally discharge waste into an ASBS, the applicants must have both coverage under this resolution and an appropriate authorization to discharge. Authorization to discharge for point source waste discharges to navigable waters consists of coverage under the National Pollutant Discharge Elimination System (NPDES) permit program. Nonpoint source discharges of waste must be regulated under waste discharge requirements, a conditional waiver, or a conditional prohibition.

16. The exceptions will be reviewed during the next triennial review of the Ocean Plan. If the State Water Board finds cause to revoke or re-open the exceptions, the board may do so during the triennial review or at any other time. During the next triennial review period staff will also evaluate those aspects of the exception that are successfully protecting beneficial uses, to make recommendations on a potential Ocean Plan amendment to address storm runoff into ASBS.

17. The State Water Board's record of proceedings in this matter is located at 1001 I Street, Sacramento, California, 95814 and the custodian is the Division of Water Quality.

THEREFORE BE IT RESOLVED THAT:

The State Water Board:

1. The State Water Board certifies that the Final EIR has been completed in compliance with CEQA. The State Water Board has reviewed and considered the information contained in these documents, which reflect the State Water Board's independent judgment and analysis.

2. Approves the exceptions to the Ocean Plan prohibition against waste discharges to ASBS for discharges of storm water and nonpoint source waste by the applicants listed in Attachment A to this resolution provided that:

    a. The discharges are covered under an appropriate authorization to discharge waste to the ASBS, such as an NPDES permit and/or waste discharge requirements;
    b. The authorization incorporates all of the Special Protections, contained in Attachment B to this resolution, which are applicable to the discharge; and
    c. Only storm water and nonpoint source waste discharges by the applicants listed in Attachment A to this resolution are covered by this resolution. All other waste discharges to ASBS are prohibited, unless they are covered by a separate, applicable Ocean Plan exception.

3. Authorizes the Executive Director or designee to file the Notice of Determination with the Governor's Office of Planning and Research.

4. Authorizes the Executive Director or designee to transmit the exceptions to the United States Environmental Agency (U.S. EPA) for concurrence.

5. Directs staff to consider development of, and make recommendations for, an Ocean Plan amendment to address storm runoff into ASBS, during the next triennial review period.

6. Directs staff to propose for Board consideration up to $1 million from the Proposition 50 Coastal Nonpoint Source (CNPS) program for additional ASBS Regional Monitoring, starting in the fall of 2012.

7. Directs staff, pending budget authority, to propose for Board consideration the use of CNPS funds (approximately $10 million) in conjunction with the remaining Proposition 84 ASBS funds ($3.6 million) for additional ASBS BMP projects.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on March 20, 2012.

AYE:	Chairman Charles R. Hoppin Vice Chair Frances Spivy-Weber Board Member Tam M. Doduc
NAY:	None
ABSENT:	None
ABSTAIN:	None

Jeanine Townsend
Clerk to the Board

Attachment A – Applicants

Applicant	ASBS
Carmel by the Sea, City of	Carmel Bay
Connolly-Pacific Company	Southeast Santa Catalina Island
Department of Parks and Recreation	Redwoods National Park, Trinidad Head, King Range, Jughandle Cove, Gerstle Cove, James V. Fitzgerald, Año Nuevo, Carmel Bay, Point Lobos, Julia Pfeiffer Burns, Laguna Point to Latigo Point, Irvine Coast
Department of Transportation (CalTrans)	Redwoods National Park, Saunders Reef,James V. Fitzgerald, Año Nuevo, Carmel Bay, Point Lobos, Julia Pfeiffer Burns, Salmon Creek Coast, Laguna Point to Latigo Point, Irvine Coast
Humboldt County	King Range
Humboldt Bay Harbor District	King Range
Irvine Company	Irvine Coast
Laguna Beach, City of	Heisler Park
Los Angeles County	Laguna Point to Latigo Point
Los Angeles County Flood Control District	Laguna Point to Latigo Point
Malibu, City of	Laguna Point to Latigo Point
Marin County	Duxbury Reef
Monterey, City of	Pacific Grove
Monterey, County of	Carmel Bay
Newport Beach, City of, and on behalf of the Pelican Point Homeowners	Robert E. Badham And Irvine Coast
Pacific Grove, City of	Pacific Grove
Pebble Beach Company, and on behalf of the Pebble Beach Stillwater Yacht Club	Carmel Bay
San Diego, City of	La Jolla
San Mateo County	James V. Fitzgerald
Santa Catalina Island Company, and on behalf of the Santa Catalina Island Conservancy	Northwest Santa Catalina Island And Western Santa Catalina Island
Sea Ranch Association	Del Mar Landing
Trinidad, City of	Trinidad Head
Trinidad Rancheria	Trinidad Head
U.S. Dept. of Interior, Point Reyes National Seashore	Point Reyes Headlands, Duxbury Reef
U.S. Dept. of Interior, Redwoods National and State Park	Redwoods National Park
U.S. Dept. of Defense, Air Force	James V. Fitzgerald
U.S. Dept. of Defense, Navy	San Nicolas Island & Begg Rock
U.S. Dept. of Defense, Navy	San Clemente Island

Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). “Existing storm water outfalls” are those that were constructed or under construction prior to January 1, 2005. “New contribution of waste” is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) (i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone

compliance plan for ASBS discharges. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within four (4) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider, and use where feasible, LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site, if LID practices would be the most effective at reducing pollutants from entering the ASBS.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger shall submit a draft written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type. The final ASBS Compliance Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe

the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency’s budgetary process, and a demonstration that funding was unavailable or inadequate.

B. NONPOINT SOURCE DISCHARGES

1. General Provisions for Nonpoint Sources

   a. Existing nonpoint source waste discharges are allowed into an ASBS only under the following conditions:

      (1) The discharges are authorized under waste discharge requirements, a conditional waiver of waste discharge requirements, or a conditional prohibition issued by the State Water Board or a Regional Water Board.

      (2) The discharges are in compliance with the applicable terms, prohibitions, and special conditions contained in these Special Protections.

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only existing nonpoint source waste discharges are allowed. “Existing nonpoint source waste discharges” are discharges that were ongoing prior to January 1, 2005. “New nonpoint source discharges” are defined as those that commenced on or after January 1, 2005. A change to an existing nonpoint source discharge, in terms of relocation or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges from nonpoint sources (those not subject to an NPDES Permit) are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

f. At the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

g. At the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

h. All other nonpoint source discharges not specifically authorized above are prohibited.

2. Planning and Reporting

a. The nonpoint source discharger shall develop an ASBS Pollution Prevention Plan, including an implementation schedule, to address storm water runoff and any other nonpoint source discharges from its facilities. The ASBS Pollution Prevention Plan must be equivalent in contents to an ASBS Compliance Plan as described in I (A)(2) in this document. The ASBS Pollution Prevention Plan is subject to approval by the Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements).

b. The ASBS Pollution Prevention Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff that are necessary to comply with these special conditions, will be achieved through Management Measures and associated Management Practices (Management Measures/Practices). Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director or Regional Water Board Executive Officer that such installation would pose a threat to health or safety. Management Measures to control storm water runoff during a design storm shall achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within four (4) years of the effective date.

c. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff or other nonpoint source pollution is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and the Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents that alter natural water quality and the sources of these constituents.

(2) The report shall describe Management Measures/Practices that are currently being implemented, Management Measures/Practices that are identified in the ASBS Pollution Prevention Plan for future implementation, and any additional Management Measures/Practices that may be added to the Pollution Prevention Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the Management Measures/Practices.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements), the discharger shall revise its ASBS Pollution Prevention Plan to incorporate any new or modified Management Measures/Practices that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised ASBS Pollution Prevention Plan, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger~~s~~ shall submit a draft written ASBS Pollution Prevention Plan to the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) that describes its strategy to comply with these special conditions, including the requirement to maintain natural ocean water quality in the affected ASBS. The Pollution Prevention Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls to comply with these special conditions for inclusion in the discharger's Pollution Prevention Plan. The final ASBS Pollution Prevention Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these Special Protections shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Pollution Prevention Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with parks and recreation facilities shall comply with the following:

A. The discharger shall include a section in an ASBS Compliance Plan (for NPDES dischargers) or an ASBS Pollution Prevention Plan (for nonpoint source dischargers) to address storm water runoff from parks and recreation facilities.

1. The plan shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The plan shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or

Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The plan shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The plan shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of these Special Protections and identify the ASBS boundaries.

5. The plan shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being wind blown and periodically emptying the receptacles to prevent overflows.

6. The plan shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the discharger shall develop a Waterfront and Marine Operations Management Plan (Waterfront Plan). This plan shall contain appropriate Management Measures/Practices to address nonpoint source pollutant discharges to the affected ASBS.

1. The Waterfront Plan shall contain appropriate Management Measures/Practices for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Plan shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Plan shall include Management Practices to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The management practices shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Plan shall include Management Practices to address the prohibition against trash discharges to ASBS. The Management Practices shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate Management Practices to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate Management Practices include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The discharger shall submit its Waterfront Plan to the by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the discharger anticipates that the discharger will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the discharger shall submit a technical report as soon as practicable to the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board or the Regional Water Board may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and at approximately the same time when post-

storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates); and

      (3) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

b. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. Ocean Receiving Water and Reference Area Monitoring Program

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled prior to (pre-storm) and during (or immediately after) the same storm (post storm). Post storm sampling shall be during the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents pre-storm and post-storm, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,

pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)

listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

Glossary

At the point of discharge(s) – Means in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

Areas of Special Biological Significance (ASBS) – Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit.

Development – Relevant to reference monitoring sites, means urban, industrial, agricultural, grazing, mining, and timber harvesting land uses.

Higher threat discharges - Permitted storm drains discharging equal to or greater than 18 inches, industrial storm drains, agricultural runoff discharged through an MS4, discharges associated with waterfront and marina operations (e.g., piers, launch ramps, mooring fields, and associated vessel support activities, except for passive discharges defined below), and direct discharges associated with commercial or industrial activities to ASBS.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.

Marine Operations – Marinas or mooring fields that contain slips or mooring locations for 10 or more vessels.

Management Measure (MM) - Economically achievable measures for the control of the addition of pollutants from various classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. For example, in the "marinas and recreational boating" land-use category specified in the Plan for California's Nonpoint Source Pollution Control Program (NPS Program Plan) (SWRCB, 1999), "boat cleaning and maintenance" is considered a MM or the source of a specific class or type of NPS pollution.

Management Practice (MP) - The practices (e.g., structural, non-structural, operational, or other alternatives) that can be used either individually or in combination to address a specific MM class or classes of NPS pollution. For example, for the "boat cleaning and maintenance" MM, specific MPs can include, but are not limited to, methods for the selection of environmentally sensitive hull paints or methods for cleaning/removal of hull copper anti-fouling paints.

Municipal Separate Storm Sewer System (MS4) – A municipally-owned storm sewer system regulated under the Phase I or Phase II storm water program implemented in compliance with Clean Water Act section 402(p). Note that an MS4 program's boundaries are not necessarily congruent with the permittee's political boundaries.

Natural Ocean Water Quality - The water quality (based on selected physical, chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of: (a) man-made constituents (*e.g.,* DDT); (b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial), and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and (c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man. Discharges "*shall not alter natural ocean water quality*" as determined by a comparison to the range of constituent concentrations in reference areas agreed upon via the regional monitoring program(s). If monitoring information indicates that *natural ocean water quality* is not maintained, but there is sufficient evidence that a discharge is not contributing to the alteration of natural water quality, then the Regional Water Board may make that determination. In this case, sufficient information must include runoff sample data that has equal or lower concentrations for the range of constituents at the applicable reference area(s).

Nonpoint source – Nonpoint pollution sources generally are sources that do not meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, agricultural drainage, marine/boating operations or hydrologic modification. Nonpoint sources, for purposes of these Special Protections, include discharges that are not required to be regulated under an NPDES permit.

Non-storm water discharge – Any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

Non-structural control – A Best Management Practice that involves operational, maintenance, regulatory (e.g., ordinances) or educational activities designed to reduce or eliminate pollutants in runoff, and that are not structural controls (i.e. there are no physical structures involved).

Physical impossibility - Means any act of God, war, fire, earthquake, windstorm, flood or natural catastrophe; unexpected and unintended accidents not caused by discharger or its employees' negligence; civil disturbance, vandalism, sabotage or terrorism; restrain by court order or public authority or agency; or action or non-action by, or inability to obtain the necessary authorizations or approvals from any governmental agency other than the permittee.

Representative sites and monitoring procedures – Are to be proposed by the discharger, with appropriate rationale, and subject to approval by Water Board staff.

Sheet-flow – Runoff that flows across land surfaces at a shallow depth relative to the cross-sectional width of the flow. These types of flow may or may not enter a storm drain system before discharge to receiving waters.

Storm Season – Also referred to as rainy season, means the months of the year from the onset of rainfall during autumn until the cessation of rainfall in the spring.

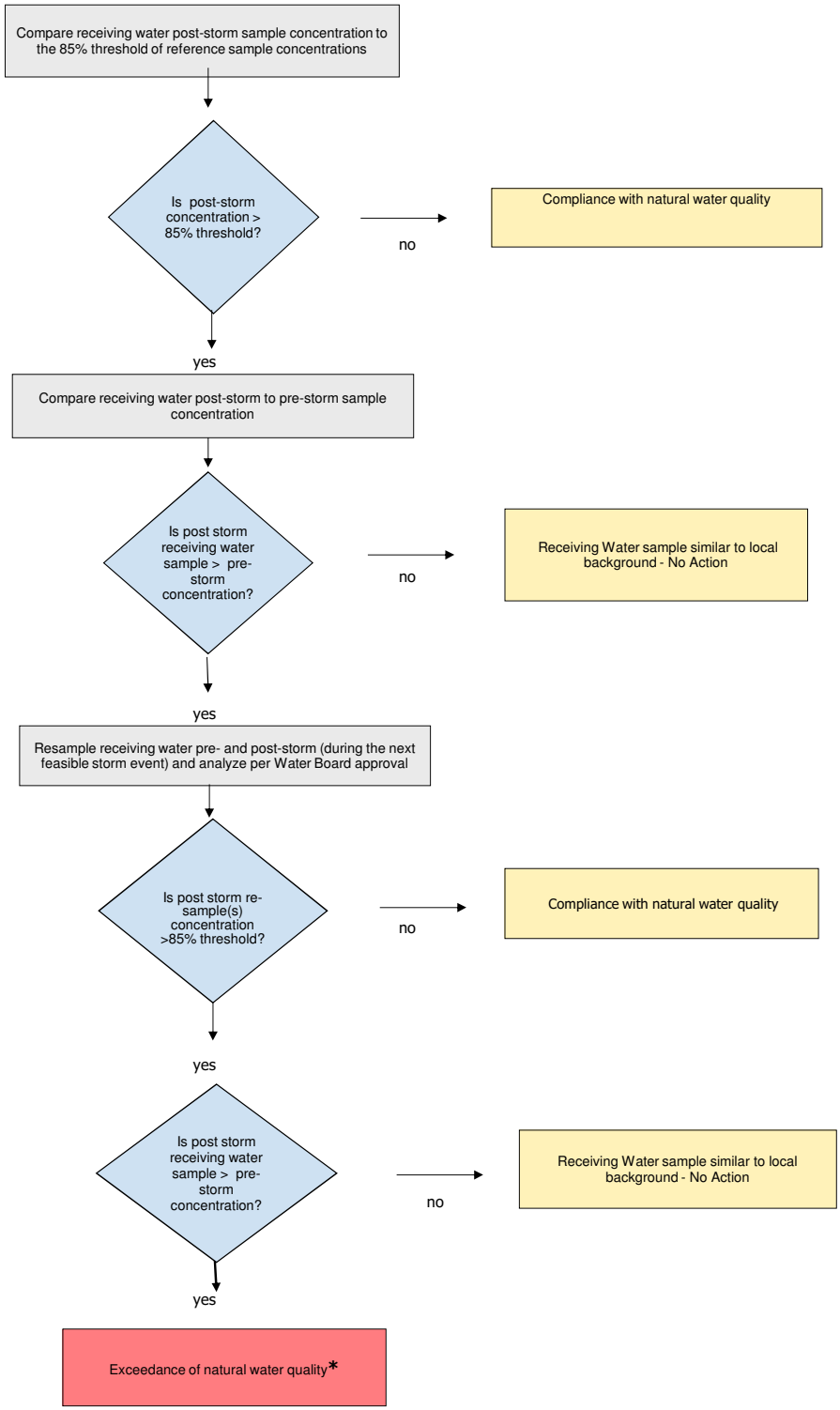
Structural control – A Best Management Practice that involves the installation of engineering solutions to the physical treatment or infiltration of runoff.

Surf Zone - The surf zone is defined as the submerged area between the breaking waves and the shoreline at any one time.

Surface Water Ambient Monitoring Program (SWAMP) comparable – Means that the monitoring program must 1) meet or exceed 2008 SWAMP Quality Assurance Program Management Plan (QAPP) Measurement Quality Objectives, or 2) have a Quality Assurance Project Plan that has been approved by SWAMP; in addition data must be formatted to match the database requirements of the SWAMP Information Management System. Adherence to the measurement quality objectives in the Southern California Bight 2008 ASBS Regional Monitoring Program QAPP and data base management comprises being SWAMP comparable.

Waterfront Operations - Piers, launch ramps, and cleaning stations in the water or on the adjacent shoreline.

Attachment 1
Special Protections Sections I(A)(3)(e) and I(B)(3)(e)
Flowchart to Determine Compliance with Natural Water Quality



*** When an exceedance of natural water quality occurs, the discharger must comply with section I.A.2.h (for permitted storm water) or section I.B.2.c (for nonpoint sources). Note, when sampling data is available, end-of-pipe effluent concentrations will be considered by the Water Boards in making this determination.**

APPENDIX B

2014 Malibu ASBS Special Protections Monitoring Final Report

Los Angeles County Flood Control District and Los Angeles County Unincorporated Areas: Areas of Special Biological Significance Special Protections Monitoring

2012-2013 and 2013-2014 Seasons

Final Monitoring Report

Prepared For:

Los Angeles County Department of Public Works
Watershed Management Division
900 S. Fremont Ave.
Alhambra, California 91803

November 2014

Los Angeles County Flood Control District and Los Angeles County Unincorporated Areas: Areas of Special Biological Significance Special Protections Monitoring

2012-2013 and 2013-2014 Seasons

FINAL MONITORING REPORT

Prepared For:

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November 2014

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LIST OF ACRONYMS

ASBS	area of special biological significance
AV	areal velocity
BMPs	best management practices
COP	California Ocean Plan
County	Los Angeles County Unincorporated Areas
DO	dissolved oxygen
Dup	duplicate
EC_{25}	effect concentration 25: concentration which causes an effect in 25% of test organisms
EC_{50}	effect concentration 50: concentration which causes an effect in 50% of test organisms
Imax	Instantaneous Maximum concentration provided in California Ocean Plan
LACFCD	Los Angeles County Flood Control District
LC_{50}	lethal concentration which kills 50% of bioassay test organisms
LOEC	lowest observable effect concentration
NOEC	no observable effect concentration
OP	organophosphorus
PAH	polynuclear aromatic hydrocarbons
Public Works	Los Angeles County Department of Public Works
SCCWRP	Southern California Coastal Water Research Project
State Board	State Water Resources Control Board
Storm 1	storm event of February 19, 2013
Storm 2	storm event of March 8, 2013
Storm 3	storm event of February 28, 2014
TSS	total suspended solids
TUc	toxic units chronic
USEPA	United States Environmental Protection Agency
WMMS	Watershed Management Modeling System
WQOs	water quality objectives

LIST OF SYMBOLS AND MEASUREMENTS

>	greater than
<	less than
%	percent
A	cross-sectional area
^{o}C	degrees Celsius
cfs	cubic feet per second
ft	feet
g	gram
L	liter
mg	milligram
mS	microSiemens
n	Manning roughness coefficient
ng	nanogram
NTU	nephelometric units
P	wetted perimeter
ppt	Parts per thousand
Q	flow
R	hydraulic radius
s	second
S	hydraulic slope
µg	microgram
WMMS	Watershed Management Modeling System

1.0 INTRODUCTION

The Area of Special Biological Significance (ASBS) 24, also referred to as the Laguna Point to Latigo Point ASBS, was established in 1974 by the State Board to preserve sensitive marine habitat (State Board, 1976). The ASBS stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. Approximately 500 direct discharges and 31 natural streams drain to ASBS 24. The boundary of ASBS 24 extends out from the mean high tide line at Laguna Point in Ventura County to either 1000 ft from shore or to the 100-ft isobath (whichever is greater) in a southwesterly direction to Latigo Point in Malibu, Los Angeles County. Water depth within the conservation area ranges from 0 ft to approximately 100 ft and includes sloping sandy habitat, a rocky intertidal reef complex, and subtidal reef and kelp forest habitat. A wide range of sandy substrate, rocky reef, and coastal pelagic species can be found within the Laguna Point to Latigo Point ASBS.

Since 1983, the California Ocean Plan (COP) has prohibited the discharge of waste into ASBS along the California Coast, unless the State Water Resources Control Board (State Board) grants an exception to dischargers. The southern and central portions of ASBS 24 that are located in Los Angeles County are subject to direct discharges from roads, urban landscape runoff, homes, and small businesses. In general, the near coast storm water runoff along ASBS 24 within Los Angeles County is conveyed through storm drain systems before it is discharged at multiple locations along the beach. On December 30, 2004, the Los Angeles County Department of Public Works (Public Works) requested an exception for storm water discharges to ASBS 24 from the State Board on behalf of the County and the Los Angeles County Flood Control District (LACFCD). The State Board received applications from numerous other applicants for an exception to the Ocean Plan. In 2012 the State Board adopted a General Exception to the COP. As part of the General Exception, the State Board produced guidance for monitoring discharges to ASBS entitled *Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges* (State Board, 2012) (Appendix A). The Special Protections document is intended to define the terms and conditions that limit storm water discharges to the ASBS for applicants along the California Coast (34 ASBSs have been designated throughout the state). Storm drain discharge pipes along the Malibu coastline fall under various jurisdictions including LACFCD, the Los Angeles County Unincorporated Areas (County), City of Malibu, and the California Department of Transportation (Caltrans).

There are 31 storm drain outfalls 18 inches in diameter or larger located in the County. The storm drain outfalls discharge storm water runoff that reaches ASBS 24; therefore, in accordance with the Special Protections document, described in more detail in Section 2, the outfalls under the jurisdiction of the County and LACFCD were identified for monitoring during the 2012-2013 and 2013-2014 storm seasons by Public Works. Public Works proposes to monitor 20 storm drains along ASBS 24, nine of which are operated by the LACFCD and 11 of which are operated

by the County. Additionally, Caltrans will monitor 11 storm drains located along Zuma Beach as a participant in the regional monitoring program. Figure 1-1 shows the ASBS 24 along the County shoreline and the identified outfalls.

As part of the exception process, Public Works participated in the Bight ’08 and Bight ‘13 ASBS Planning Committee with the State Board, the Southern California Coastal Water Research Project (SCCWRP), and other General Exception applicants. Together, the Committee developed a Regional ASBS Work Plan as part of the Southern California Bight 2008 and Bight 2013 Regional Monitoring Surveys. The Regional ASBS Work Plan is based on the Special Protections document and is intended to provide compliance guidance for the majority of ASBS dischargers in southern California that wish to be part of a regional monitoring effort.

The ASBS Special Protections monitoring described in this document was performed during the 2012 to 2013 and 2013 to 2014 wet weather seasons in ASBS 24 for Public Works and LADFCD. This Special Protections Monitoring Study complies with all monitoring requirements of the Regional ASBS Program through the identification of water quality impacts to ASBS 24 during storm events.

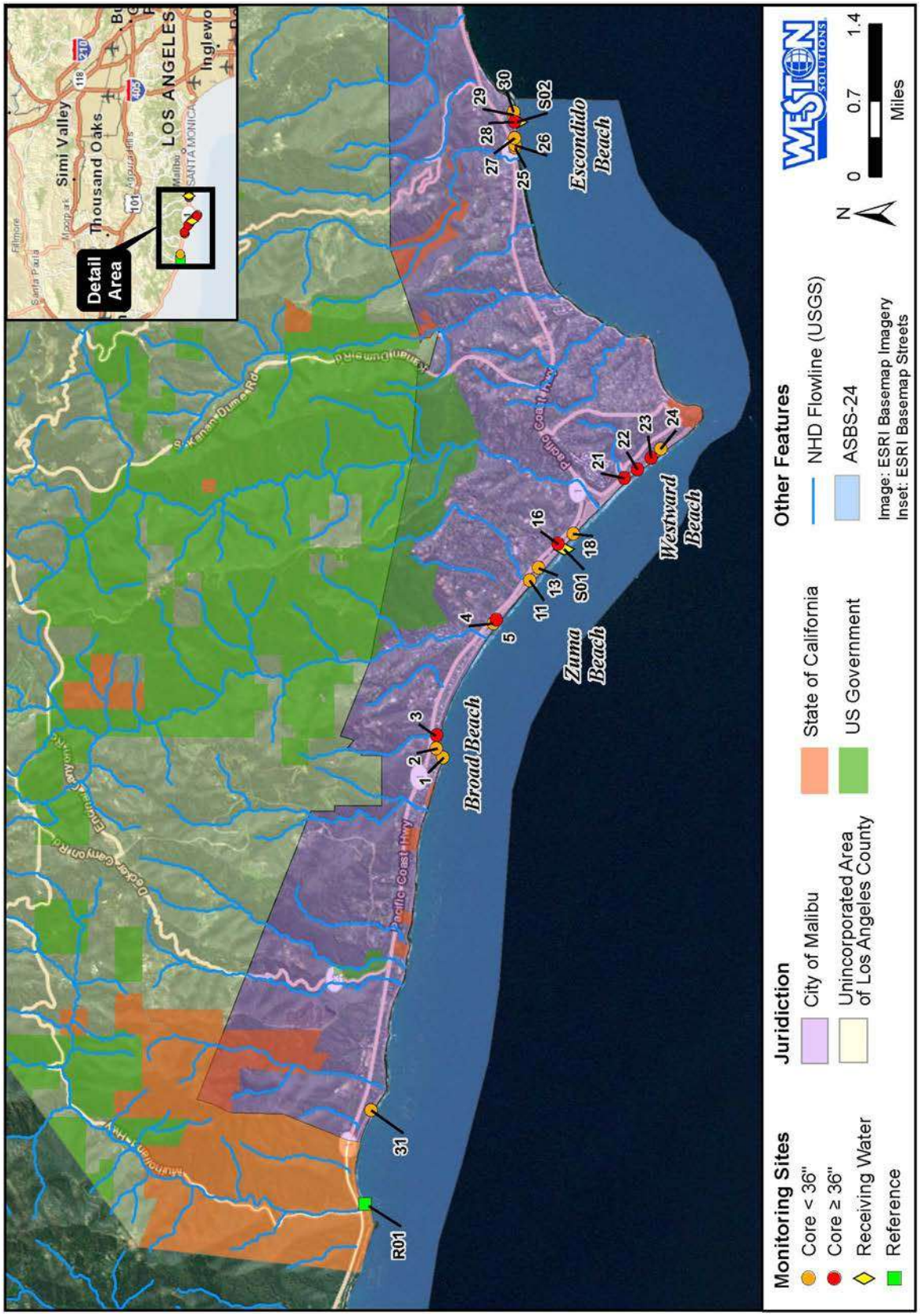


Figure 1-1. Core, Ocean Receiving Water, and Reference Monitoring Locations along ASBS 24 in Malibu, CA

1.1 Study Objectives

The ASBS 24 Special Protections Monitoring Study was designed to comply with the storm water monitoring requirements set forth in Attachment B of the State Water Resources Control Board Resolution No. 2012-0012, Approving Exceptions to the California Ocean Plan for Selected Discharges into Areas of Special Biological Significance, Including Special Protections for Beneficial Uses, and Certifying a Program Environmental Impact Report (hereafter referred to as "Special Protections"). The special protections document provides descriptions of the following two types of monitoring programs:

1. **Core Discharge Monitoring** – collecting and analyzing wet weather runoff from the discharge during a storm event.
2. **Ocean Receiving Water Monitoring** – collecting and analyzing samples from the ocean before and after a storm event at two locations (i.e., directly in front of the discharge and at a reference site removed from the discharge).

Monitoring requirements set forth in Special Protections are intended to help answer the following questions.

1. **What are the conditions of storm water effluent in the storm drains prior to being discharged into the ocean receiving waters? And what is the range of natural conditions at reference locations?**

2. **What are the conditions of the ocean receiving water directly in front of large storm drain outfalls both prior to, and immediately following, storm events? And how do these conditions compare to natural conditions at reference locations?**

3. **What are the estimated pollutant loads that are being transported into ASBS 24 from storm drains that fall under the jurisdiction of the County and the LACFCD?**

Specifically, Study Questions 1 and 2 were answered by monitoring water quality in ocean receiving water (ASBS 24) and in storm drain effluent associated with storm drains that are equal to, or larger than 18 inches in diameter that discharge to ASBS 24. Flow monitoring equipment installed into two of the largest storm drains that flow into ASBS 24 provided information that was used to answer Study Question 3 by accurately estimating the volume of storm water runoff flowing to the beach and into the receiving water during storm events. Pollutant loads entering ASBS 24 were calculated based upon flow measurements and results of chemical analyses from three storm events during the 2012-2013 and 2013-2014 Wet Weather Seasons.

By answering these three questions, the magnitude of any water quality issues associated with storm water runoff within both the ocean receiving water and within the 20 drainage areas that flow into the monitored storm drains will be better understood. Results from this study will enable the County and LACFD to conform to regional compliance monitoring requirements and will help prioritize potential Best Management Practices (BMPs) for the purpose of reducing pollutant loading to the ASBS.

This report presents and summarizes data collected from sampling events that occurred during the 2012–2013 and 2013-2014 storm seasons. It should be noted that monitoring was initially scheduled to occur only during the 2012-2013 storm season. However, because only a limited number of storms met monitoring criteria during the 2012-2013 storm season, monitoring was extended into the 2013-2014 storm season. Details of the monitoring design are given below.

2.0 STUDY DESIGN

The ASBS Compliance Monitoring Program was designed to be consistent with a broader Regional ASBS Work Plan created by a planning committee as part of the Southern California Bight 2013 Regional Monitoring Survey and the State Board Special Protections document. The Monitoring Plan for Public Works is designed to conform to the elements described in these documents for ASBS 24, which stretches from Latigo Point to Laguna Point along the coastline of Malibu and into Ventura County. The scope of monitoring for Public Works, however, is confined to the area between Latigo Point and the Los Angeles County line, just north of Nicholas Canyon. The Regional ASBS Work Plan is based on the State Board Special Protections for Selected Storm Water and Nonpoint Source Discharges into Areas of Special Biological Significance (State Board, 2008). Monitoring for this study consisted of both Core Discharge Monitoring and Ocean Receiving Water Monitoring.

2.1 Core Discharge Monitoring

Core Discharge Monitoring consisted of sampling and analysis (water chemistry and toxicity) of wet weather discharges from 20 storm drains (greater than 18 inches in diameter) that discharge to ASBS 24. Table 2-1 details the characteristics of the 20 storm drains that were monitored as part of the Core Discharge Monitoring and the analytes that were measured for each outfall. For storm drain outfalls that are greater than 18 inches and less than 36 inches in diameter, oil and grease and total suspended solids (TSS) were measured for each storm event, whereas for storm drains that are either 36 inches or larger in diameter or are linked with an ocean receiving water site, oil and grease, TSS, total metals, polynuclear aromatic hydrocarbons (PAHs), pyrethroids, organophosphate (OP) pesticides, ammonia, nitrate as N, and total phosphorus were analyzed for each storm event. Additionally, during one storm event at each outfall, chronic toxicity was measured using bivalve embryos.

Table 2-1. Core Monitoring Program Stations, Outfall Dimensions, Ownership, and Required Analyses

Monitoring	Beach Location	Site Name	LACDPW Storm Drain Tag	Pipe diameter (in)	Ownership		Analyses and number of storms required	Toxicity Testing and Number of Storms Required
					Flood Control District	LA County		
Core Monitoring	Broad Beach	ASBS-001	PD 363 Line A	24	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-002	PD 363 Line B	18	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-003	PD 2053	51	x		**Full List*- 3 storms**	1 species**, 1 storm
	Zuma Beach	ASBS-004	PD 291	24		x	TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-005	Zuma #U02	36		x	**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-011	Zuma #U06	24		x	TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-013	Zuma #U08	18		x	TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-016	Zuma Open Channel	60		x	**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-018	Zuma #U11	24		x	TSS, oil and grease- 3 storms	1 species**, 1 storm
	Westward Beach	ASBS-021	PD 1184 Line B	48		x	**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-022	Westward #001	36		x	**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-023	Westward #U15	42		x	**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-024	Westward #U16	24		x	TSS, oil and grease- 3 storms	1 species**, 1 storm
	Escondido Beach	ASBS-025	MTD 622 Line 1	18	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-026	MTD 622 Line 2	24	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-027	MTD 622 Line 3	24	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-028	MTD 622 Line 4	36	x		**Full List*- 3 storms**	1 species**, 1 storm
		ASBS-029	MTD 622 Line 5	18	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
		ASBS-030	MTD 622 Line 6	18	x		TSS, oil and grease- 3 storms	1 species**, 1 storm
	Nicholas Beach	ASBS-031	Nicholas #U01	22		x	TSS, oil and grease- 3 storms	1 species**, 1 storm

Yellow highlighting indicates Core Monitoring sites that underwent full chemical analyses based on pipe size (36 inches or greater in diameter) and/or linkage to Ocean Receiving Water site.
*Full constituent list comprises TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate, and total phosphorus.
**Toxicity species includes bivalve embryos.

2.1.1 Sampling Locations

Monitoring locations of the storm drain outfalls are shown on Figure 2-2 through Figure 2-5. A brief description of the storm drain outfall pipes is presented below for each beach from north to south along the Malibu coastline. A more thorough description of each storm drain outfall, including latitude and longitude coordinates, inlet locations, and photographs, is provided in Appendix B. The monitoring locations are as follows:

- **Broad Beach and Nicholas Beach —** Three outfalls occur on Broad Beach (ASBS-001 through ASBS-003) and one outfall occurs on Nicholas Beach (ASBS-031) (Figure 2-2). Of these four outfalls, three of the pipes are between 18 inches and 36 inches in diameter, and one (ASBS-003) is 36 inches or larger in diameter. Each of the pipes along Broad Beach is inaccessible during high tide and, as a result, storm water monitoring from the beach could only occur during a tidal height of approximately 2 ft or less. ASBS-001 was difficult to access even during low tide, due to its location behind a rocky intertidal outcropping. Stormwater sampling of ASBS-001 was performed from a storm drain manhole located off Point Lechuza Drive, approximately 140 ft from the outfall.

Public Access Point to Broad Beach	**Broad Beach at High Tide**	**Broad Beach Outlet of Storm Drain ASBS-003**
Figure 2-1. Broad Beach Sampling Locations		

Figure 2-2. Core Discharge Locations along Broad Beach and Nicholas Beach, and Ocean Receiving Water Reference Monitoring Location at the Mouth of Arroyo Sequit Creek

- **North Zuma Beach —** Four outfalls under the jurisdiction of the County or LAFCD are located along north Zuma Beach (ASBS-004, ASBS-005, ASBS-011 and ASBS-013) (Figure 2-3). Three of the outfall pipes are between 18 inches and 36 inches in diameter, and one of the outfall pipes (ASBS-005) is 36 inches or larger in diameter. Each of the outfalls is accessible during high tide. For safety purposes, during the summer period, the pipes are buried. These buried pipes are then excavated prior to the storm season to ensure stormwater flows are not impeded. The elevation of the surrounding beach sand, however, was approximately 1 to 3 meters above the elevation of the excavated outfalls at most North Zuma Beach sites; thus, during storm events, storm water effluent tended to pond at the outfall sites.

Zuma Beach Outlet of Storm Drain ASBS-004	**Zuma Beach Outlet of Storm Drain ASBS-005**	**Sand Plugged Zuma Beach Outlet of Storm Drain ASBS-011**

Figure 2-3. Core Discharge Monitoring Locations along North Zuma Beach

- **South Zuma Beach and Westward Beach —** Six outfalls are situated on south Zuma Beach (ASBS-016 and ASBS-018) and Westward Beach (ASBS-021 through ASBS-024) (Figure 2-4). Two of the outfall pipes are between 18 inches and 36 inches in diameter and four of the outfall pipes (ASBS-016, ASBS-021, ASBS-022, and ASBS-023) are 36 inches or larger in diameter. Each of the outfalls is accessible during high tide. Similar to North Zuma Beach, during the summer period the two pipes along South Zuma Beach were buried for safety purposes and then excavated prior to the storm season to ensure stormwater flows were not impeded. The elevation of the surrounding beach sand, however, was approximately 1 to 3 meters above the elevation of the excavated outfalls at ASBS-016 and ASBS-018; thus, during storm events, storm water effluent tended to pond at these outfall sites.

Zuma Beach Box Culvert Outlet of Storm Drain ASBS-016	**Zuma Beach Outlet of Storm Drain ASBS-018**	**Westward Beach Outlet of Storm Drain ASBS-021**

Figure 2-4. Core Discharge and Ocean Receiving Water Monitoring Locations along South Zuma Beach and Westward Beach

- **Escondido Beach —** Six outfalls occur on Escondido Beach (ASBS-025 through ASBS-030) (Figure 2-5). Five of the outfall pipes are between 18 inches and 36 inches in diameter, whereas one of the outfall pipes (ASBS-028) is 36 inches or larger in diameter. These pipe outfalls are located beneath elevated houses along Escondido Beach and as a result of their proximity to the ocean, are not accessible during tides greater than 3 ft (Figure 2-5). Flow monitoring equipment was installed at a curb inlet for ASBS-028 located along Malibu Cove Colony Drive.

Escondido Beach Outlet of Storm Drain ASBS-025	**Escondido Beach Outlet of Storm Drain ASBS-028**	**Escondido Beach Outlet of Storm Drain ASBS-030**

Figure 2-5. Core Discharge and Ocean Receiving Water Monitoring Locations along Escondido Beach

2.2 Ocean Receiving Water Monitoring

The Ocean Receiving Water Monitoring Program was designed to compare conditions in the ASBS near major discharges to "natural" or reference conditions, both prior to and immediately following a storm event. Reference sites located at the mouths of streams in un-urbanized watersheds along the Southern California coast were used to define "natural water quality," based on criteria identified in the Regional ASBS Work Plan. The conditions monitored in this program included water chemistry, water toxicity, and biological integrity.

To achieve its goals, the Ocean Receiving Water Monitoring Program is focused on the following five basic elements:

1. Pre-Storm Monitoring of water chemistry,
2. Post-Storm Monitoring of water chemistry and toxicity,
3. Biological Monitoring of intertidal habitat,
4. Bioaccumulation Monitoring, and
5. Plume Tracking

The monitoring elements listed above were assessed using samples collected from ASBS ocean receiving water locations that were associated with storm water runoff. Methods and results for elements 1 and 2 are described within this report, whereas methods and results for elements 3, 4, and 5 were performed by SCCWRP on a region-wide basis as part of the Regional Monitoring Program and fall outside of the scope of this report.

Table 2-2 details the characteristics of the two ocean receiving water stations and their affiliated storm drains that were monitored as part of the Ocean Receiving Water Monitoring Program. Ocean receiving water was analyzed for oil and grease, TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate as N, and total phosphorus prior to and during each storm event. Additionally, during each storm event, chronic toxicity was measured using bivalve embryos, echinoderms, and kelp.

Table 2-2. Ocean Receiving Water Monitoring Program Station Locations, Outfall Dimensions, Ownership, and Required Analyses

Monitoring	Site ID	Location	Beach	Pipe diameter of Outfall	Ownership		Chemical Analyses and Number of Storms Required	Toxicity Testing and Number of Storms Required
					District	County		
Ocean Receiving Water Monitoring	ASBS-S01	Surfzone, offshore from Pipe ASBS-016	South Zuma	60	x		Full Analitical List*- 3 storms, Pre-storm and post-storm	3 species**, 3 storms-post-storm testing only
	ASBS-S02	Surfzone, offshore from Pipe ASBS-028	Escondido	36		x	Full Analitical List*- 3 storms, Pre-storm and post-storm	3 species**, 3 storms-post-storm testing only
Reference Monitoring	ASBS-R01	Surfzone, offshore from Mouth of Arroyo Sequit Creek	Broad	NA	NA	NA	Full Analitical List*- 3 storms, Pre-storm and post-storm	3 species**, 3 storms-post-storm testing only

*Full list= TSS, oil and grease, metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate and total phosphorus

**Toxicity species include: bivalves, echinoderms, and kelp

2.2.1 Sampling Locations

Receiving water sampling locations SO-1 and SO-2 were monitored to assess stormwater impacts to ocean receiving waters of ASBS 24. SO-1 is located directly in front of the outfall for ASBS-016, a 60-inch box culvert that conveys storm water into a natural channel and onto Zuma Beach (Figure 2-6). SO-2 is located in the ocean receiving water directly in front of ASBS-028, a 36-inch pipe that terminates at the southern end of Escondido Beach, below a residential house (Figure 2-7). Ocean receiving water sampling locations were located in the mixing zone of the Pacific Ocean, in approximately 1m of water depth. Both ASBS-016 and ASBS-028 outfalls were targeted to be monitored in the Regional ASBS Work Plan as a result of their size and their direct discharge to ASBS 24.

Figure 2-6. ASBS-016 Outfall (A) and ASBS-SO1 Receiving Water (B)

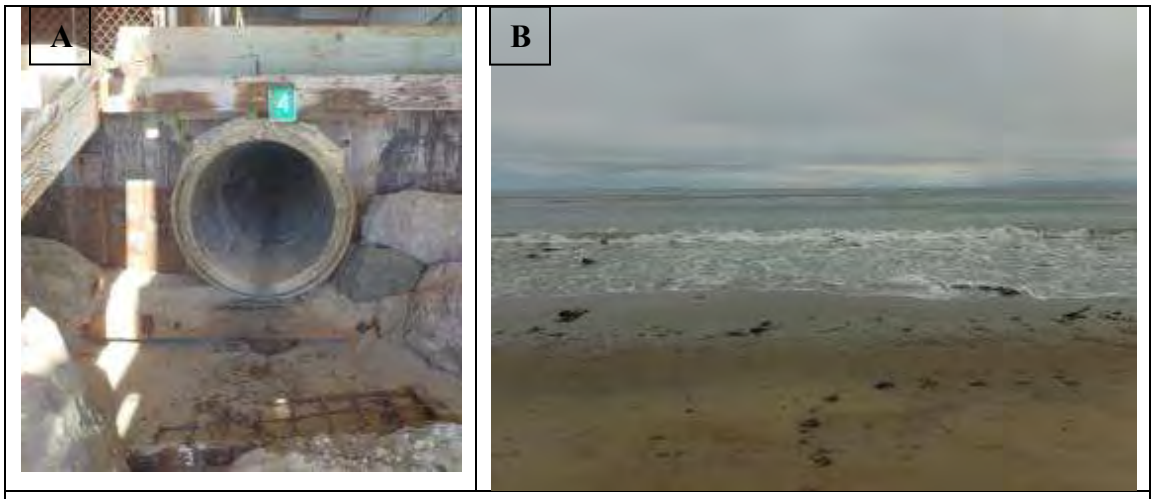


Figure 2-7. ASBS-028 Outfall (A) and ASBS-SO2 Receiving Water (B)

Arroyo Sequit Creek was selected as a reference site in the Regional ASBS Work Plan. The Arroyo Sequit watershed is approximately 95% undeveloped and is representative of a drainage

area that has received minimal anthropogenic impacts. The following is a brief description of the sampling locations for the Malibu ASBS 24 Special Protections Monitoring Study:

- **ASBS-016 Outfall and Receiving Water SO-1 —** ASBS-016 is located west of the Pacific Coast Highway (approximately 100 m south of Morning View Drive) along the Zuma Beach Access Road. The watershed draining to ASBS-016 is 115 acres and comprises the following mix of land uses: 33% public facilities, 25% rural residential, 19% vacant, 13% residential, 8% transportation, and 2% open space and recreation. Receiving water samples were collected at SO-1 in the ASBS mixing zone in approximately 1 m of water, directly in front of the Zuma Beach outfall of ASBS-016. During Storms 1 and 2, because no effluent reached the receiving waters, no ocean receiving water samples were collected. Samples were collected, however, during Storm 3.

- **ASBS-028 Outfall and Receiving Water SO-2—** ASBS-028 is located west of Malibu Cove Colony Drive on Escondido Beach. The watershed draining to ASBS-028 is 36 acres and comprises the following mix of land uses: 44% rural residential, 33% vacant, 9% residential, 8% agriculture, and 6% transportation. Receiving water samples were collected at SO-2 in the ASBS mixing zone in approximately 1 m of water directly in front of the Escondido Beach outfall of ASBS-028.

- **Arroyo Sequit Creek and Receiving Water (reference site) —** Arroyo Sequit Creek terminates at Leo Carrillo State Beach, located at the intersection of Pacific Coast Highway and Mulholland Highway, approximately 1 km south of the Ventura County line. Arroyo Sequit Creek's watershed is approximately 95% undeveloped. A sand berm typically prevents flow from Arroyo Sequit Creek from reaching the receiving waters of the ASBS during dry weather. Receiving water samples were to be collected by SCCWRP personnel in the ASBS mixing zone in approximately 1 m of water directly in front of the mouth of Arroyo Sequit Creek; however, no ocean receiving water samples were collected from this reference site during the 2012-2013 or 2013-2014 storm seasons because the sand berm at the mouth of the creek effectively blocked all flow from reaching the receiving waters. A composite of results from reference sites located near ASBS along the California coastline was used to develop natural water quality ranges.

Sand berm at mouth of Arroyo Sequit Creek at Leo Carrillo State Beach

2.3 Sampling Methods

2.3.1 Water Collection

Core discharge samples were collected at the base of each monitored beach outfall unless it was unsafe to do so. Sampling at ASBS-001 was performed from a manhole just upstream of the beach outfall due to safety reasons. Samples were collected in certified clean laboratory bottles appropriate for the analyses to be conducted. Following sampling, samples were placed on ice in a cooler and delivered within the required holding times to Physis Environmental Laboratories, Inc.

Sampling of ocean receiving water was performed prior to each storm's arrival and again during, or immediately following the storm while storm water runoff was flowing to the receiving water. Ocean receiving water samples were collected in the ocean directly in front of the storm drain outfall by submerging a clean 4-L glass container just below the surface of the water in the mixing zone. Water from the glass sampling container was then evenly distributed to each of seven certified clean, pre-labeled laboratory bottles as well as to plastic cubitainers used for toxicity analyses to fill each of the bottles and cubitainers to approximately 25% of capacity. The glass sampling container was then refilled in the same manner as previously described and the collected water re-distributed to each of the laboratory bottles and cubitainers. This process continued until all containers were filled. The water depth was approximately 1 m at the sample collection point.

Samples were collected in bottles appropriate for the analysis to be conducted. After retrieval, the samples were placed on ice in a cooler and delivered within the required holding times for analysis to Physis Environmental Laboratories, Inc. for chemical testing and to ABC Laboratory for toxicity testing.

Chemical and biological analysis methods, detection limits, reporting limits, and applicable Ocean Plan water quality objectives (WQOs) for constituents that were measured in the 2012–2013 and 2013-2014 Ocean Receiving Water Sampling are listed in Table 2-3.

2.3.2 Field Water Quality

During each sampling event, several water quality parameters were measured in the ocean receiving water with a handheld YSI multi-probe water quality meter (Model 650MDS). The meter was submerged in the surf zone at the location of the receiving water monitoring. The following parameters were measured and recorded on field data sheets: water temperature, salinity, pH, conductivity, turbidity, and dissolved oxygen (DO). In addition, the following observations were recorded on the field data sheets: weather and ocean conditions, beach characteristics, runoff characteristics, and flow estimation (using the area-velocity method). Photographs were taken and recorded where appropriate.

2.3.3 Sample Analyses - Water

After collection, core discharge and ocean receiving water samples were submitted to Physis Environmental Laboratories, Inc. for the analyses shown on Table 2-3.

Table 2-3. List of Constituents Analyzed for the 2012–2013 and 2013-2014 Core Discharge and Ocean Receiving Water Sampling Programs

Constituent	Method	MDL[1]	RL[2]	Units	COP[3]
Total suspended solids (TSS)*	SM 2540-D		5	mg/L	
Nitrate as N	SM4500-NO3 E		0.05	mg/L	
Ammonia	SM4500-NH3D		0.06	mg/L	6
Oil and grease*	EPA[4] 1664A		5	mg/L	
Total orthophosphate as P	SM4500-P E		0.02	mg/L	
Total and Dissolved Trace Metals					
Aluminum (Al)	EPA[4] 200.8(m)		8.25	µg/L	
Antimony (Sb)			0.015	µg/L	
Arsenic (As)			0.045	µg/L	80
Beryllium (Be)			0.1	µg/L	
Cadmium (Cd)			0.010	µg/L	10
Chromium (Cr)			0.25	µg/L	20*
Copper (Cu)			0.05	µg/L	30
Lead (Pb)			0.05	µg/L	20
Manganese (Mn)			0.45		
Mercury (Hg)			0.1	µg/L	0.4
Molybdenum (Mo)			0.1		
Nickel (Ni)			0.1	µg/L	50
Selenium (Se)			0.25	µg/L	150
Silver (Ag)			0.15	µg/L	7
Thallium (Tl)			0.05		
Zinc (Zn)			0.01	µg/L	200
Organophosphorus Pesticides					
Bolstar (sulprofos)	EPA[4] 625		4	ng/L	
Chlorpyrifos			2	ng/L	
Demeton			2	ng/L	
Diazinon			4	ng/L	
Dichlorvos			6	ng/L	
Disulfoton			2	ng/L	
Ethoprop (ethoprofos)			2	ng/L	
Fenchlorophos (eonnel)			4	ng/L	
Fensulfothion			2	ng/L	
Fenthion			4	ng/L	
Malathion			6	ng/L	
Methyl parathion			2	ng/L	
Mevinphos (phosdrin)			16	ng/L	
Phorate			12	ng/L	
Tetrachlorvinphos (stirofos)			4	ng/L	
Tokuthion			6	ng/L	
Trichloronate			2	ng/L	
Polynuclear Aromatic Hydrocarbons (PAHs)					
1-Methylnaphthalene	EPA[4] 625		5	ng/L	
1-Methylphenanthrene					
2,3,5-Trimethylnaphthalene					
2,6-Dimethylnaphthalene					
2-Methylnaphthalene					
Acenaphthene					
Acenaphthylene					
Anthracene					
Benz[a]anthracene					
Benzo[a]pyrene					

Constituent	Method	MDL[1]	RL[2]	Units	COP[3]
Benzo[b]fluoranthene					
Benzo[e]pyrene					
Benzo[g,h,i]perylene					
Benzo[k]fluoranthene					
Biphenyl					
Chrysene					
Dibenz[a,h]anthracene					
Dibenzothiophene					
Fluoranthene					
Fluorene					
Indeno[1,2,3-c,d]pyrene					
Naphthalene					
Perylene					
Phenanthrene					
Pyrene					
Pyrethroids					
Allethrin	EPA[4] 625 NCI		2	ng/L	
Bifenthrin			2	ng/L	
Cyfluthrin			2	ng/L	
Cypermethrin			2	ng/L	
Danitol (Fenpropathrin)			2	ng/L	
Deltamethrin/Tralomethrin			2	ng/L	
Esfenvalerate			2	ng/L	
Fenvalerate			2	ng/L	
Fluvalinate			2	ng/L	
L-Cyhalothrin			2	ng/L	
Permethrin			25	ng/L	
Prallethrin			2	ng/L	
Resmethrin			25	ng/L	

*Core discharge outfalls less than 36" in diameter were analyzed only for TSS and oil and grease. Outfalls greater than or equal to 36" in diameter, and ocean receiving water samples were analyzed for all constituents listed in Table 2-3.
[1]MDL = method detection limit.
[2]RL = reporting limit.
[3]COP = California Ocean Plan WQOs – instantaneous maximum concentration.
[4]EPA = United States Environmental Protection Agency.

Details of analytical chemistry methods used for Malibu ASBS Special Protections Monitoring are provided in Appendix C.

2.3.4 Flow Monitoring Methods

To accurately measure flow in streams/pipes there are three critical elements needed to develop rating curves, as follows:

- An accurate survey of the stream channel cross section/pipe geometry and longitudinal slope.
- Accurate level measurements based on a fixed point.
- Measurements of velocity and flows at several points throughout the rating curve including low flow, mid flow, and peak flow conditions. This includes utilizing an installed velocity sensor and calculating flows using area velocity method.

Flow monitoring data were collected continuously throughout the partial wet weather season in 2012-2013 (February through April) and the entire wet weather season in 2013-2014 at outfalls ASBS-016 and ASBS-028. Flow meters were installed in the ASBS-016 and ASBS-028 outfalls and data were collected via manual downloads during monthly site visits for maintenance and calibration purposes.

Stream ratings were determined using U.S. Geological Service (USGS) stream rating techniques. Pipe cross-section surveys were conducted at each site to derive stream discharge using the Manning Equation. The cross-section surveys involved measuring the inside diameter of each monitored pipe. A four-foot long steel level was used to measure the longitudinal gradient of each monitored pipe. Measurement were taken for a minimum of two level lengths (one length downstream of sensor and one upstream), and the average pipe slope was calculated from the survey data.

Rating curves were calculated using site-specific survey information and the Chézy–Manning formula (Linsley et al., 1982). The Chézy–Manning formula is an empirical formula for open channel flow, or flow driven by gravity, as follows:

$$Q = (1.486/n)AR^{2/3}S^{1/2}$$

where:

Q = flow
n = Manning Roughness coefficient
A = cross-sectional area
R = hydraulic radius
S = hydraulic slope

The hydraulic radius is derived as follows:

$$R = A/P$$

where:

A = cross-sectional area of flow (ft^2)
P = wetted perimeter (ft)

ASBS-016 Outfall Parameters	**ASBS-028 Parameters**
Type: 5-ft. Wide Rectangular Concrete Channel	Type: 36-Inch RCP Storm Drain
Slope = 3.75%	Slope = 6.1%
Manning's Roughness n = 0.018	Manning's Roughness n = 0.013

Each rating curve was calibrated by comparing the flow computed by Chézy–Manning formula (based on water level and pipe geometry, slope, and roughness) during the monitored events to the flow computed by utilizing water velocity data obtained by the installed equipment (velocity sensor) and the area of flow (based on water level). Field staff made water level observations during the storm event in order to verify the accuracy of the install water level sensors. For both pipes monitored, the Chézy–Manning formula flow and the area-velocity computed flows matched good. The event graphs are shown in the Results Section (Figure 3-10 and Figure 3-11). In general, the consistency and accuracy of velocity sensors varies throughout storm

events. For this reason, the Chézy–Manning formula flow calculations, as opposed to area-velocity method, were used to compute total storm volumes for the monitored sites.

2.3.5 Flow Modeling Methods

Storm event flows were estimated using the LACDPW Watershed Management Modeling System (WMMS) for outfalls sampled where monitoring equipment was not installed. The WMMS has been prepared by LACDPW to be a single, consistent model, to serve as a foundation for addressing watershed management needs within the County. Modeling of each outfall was accomplished by first determining the drainage delineation associated with each for outfall. Next, the appropriate land use types and areas were used as input into the model. The land use data was obtained from the LACDPW WMMS website (http://dpw.lacounty.gov/wmd/wmms/res.aspx), which includes impervious percentage associated with each type of land use. Rainfall data was obtained from nearby Fire Station 70. More information regarding the WMMS is included in the associated ASBS Compliance Plan as well as the LACDPW website.

In order to calibrate and validate the WMMS for this project, the outfalls where monitoring equipment was installed were also modeled, and the results were compared to the measured values for each storm. For the first two events the flows computed by the WMMS matched the flows obtained by the installed equipment well and no calibration was needed. For the third storm event (larger than the first two events), the WMMS underestimated the runoff for both monitored outfalls. The discrepancies were due to the WMMS underestimated by the runoff from the pervious areas of the each watershed. Thus, in order to calibrate the WMMS for this event, the fractions of rainfall that resulted in runoff within the pervious areas of the watersheds were adjusted so that the resulting total volumes matched those obtained by the flow monitoring methods. The portion of the total rainfall that resulted in runoff within the pervious areas of the Outfall ASBS-028 watershed (approximately 34 acres of pervious area) was estimated to be 29.1%, while for ASBS-016 (approximately 109 acres pervious area) it was estimated to be 5.3%. These runoff coefficients (runoff "C") were applied to the pervious areas of the drainage areas to the other outfall for the third storm (e.g., 5.3% for large drainage areas, 29.1% for small drainage areas, and linear interpolation for these values for drainages between 34 and 109 acres of pervious area).

The output from the WMMS provided the computed time step flow discharged from the applicable outfalls. The data were used to compute the total volume associated with each outfall for each event.

2.3.6 Pollutant Load Calculations

Pollutant loading calculations were performed for each of the monitored sites. A graphical representation, storm hydrograph, for each wet weather storm event was used to determine the length of wet weather runoff (typically to a point within 10% of the baseflow or after a clear recession and relatively steady water level, when compared to hydrograph rise and fall). Event volumes were calculated by summing the incremental flow values multiplied by the time elapsed between flows as follows:

$$Volume\ (cubic\ feet) = Flow\ \left(\frac{cubic\ feet}{second}\right) \times Incremental\ Time\ (seconds)$$

The loads for each site for each event were then calculated by applying the measured pollutant concentration to the site volume as follows:

$$Load(pounds) = Volume\ (cubic\ feet) \times Conc.\left(\frac{mg\ or\ \mu g}{liter}\right) \times conversion\ factors$$

Load calculations were based upon chemistry results and in-field flow measurements. Annual load estimates were made by extrapolating the pollutant load for the wet weather period based upon typical annual precipitation in the area.

2.3.7 Sample Analyses- Toxicity

Toxicity testing of three different marine species was also performed during each monitored storm event, as required by Special Protections. Toxicity testing was performed using the marine bivalve, *Mytilus galloprovincialis*, the purple sea urchin, *Strongylocentrotus purpuratus*, and the kelp, *Macrocystis pyrifera*. Toxicity test methods that were used included the following: chronic 48-hour bivalve development test, chronic 72-hour echinoderm fertilization test, and chronic 48-hour kelp germination and growth test. The marine bivalve test was performed using a modified method based on EPA 600/R-15-136 that was used for the Bight ’08 program, whereas the purple sea urchin and kelp tests were performed using EPA 600/R-15/136. Each of these methods is approved by the United States Environmental Protection Agency (USEPA) for testing toxicity in marine and estuarine waters of the United States. Details of toxicity test protocols used for Malibu ASBS Special Protections Monitoring are provided in Appendix D.

3.0 RESULTS

Core Discharge Monitoring and Ocean Receiving Water Monitoring were conducted during three storm events during the 2012–2013 and 2013-2014 Wet Seasons. Storm 1 occurred on February 19, 2013; Storm 2 occurred on March 7-8, 2013; and Storm 3 occurred on February 28, 2014. Monitoring was attempted at a total of 20 storm drain outfalls and two ocean receiving water sites. However, if no flow occurred at a core discharge site, no water samples were collected. Similarly, if storm water effluent from an outfall associated with an ocean receiving water site did not reach the receiving water, no receiving water samples were collected. Details of the analyses performed at each core discharge and ocean receiving water site are provided in Table 3-1.

Table 3-1. Summary of Core Discharge and Ocean Receiving Water Sample Collection

Event	Outfall	Storm 1 2-19-13		Storm 2 3-07-13		Storm 3 2-28-14	
		Chem	Tox	Chem	Tox	Chem	Tox
Pre-storm	ASBS-SO1	x		x		x	
	ASBS-SO2	x		x		x	
Storm	ASBS-001	x	x	x		x	
	ASBS-002	x	x	x		x	
	ASBS-003	x	x	x		x	
	ASBS-004	x		x	x	x	
	ASBS-005	x		x	x	x	
	ASBS-005-Dup	x					
	ASBS-008	not sampled		x	x	not sampled	
	ASBS-011	x		x	x	x	
	ASBS-013	no flow		no flow		x	x
	ASBS-016	no flow	no flow	x	x	x	
	ASBS-018	x		x	x	x	
	ASBS-021	x		x	x	x	
	ASBS-022	x		x	x	x	
	ASBS-023	x		x	x	x	
	ASBS-024	x		x	x	x	
	ASBS-025	x	x	x		x	
	ASBS-026	x	x	x		x	
	ASBS-027	x	x	x		x	
	ASBS-028	x	x	x		x	
	ASBS-029	x	x	x		x	
	ASBS-030	x	x	x		x	
	ASBS-031	no flow		no flow		no flow	
	ASBS-S01					x	x
	ASBS-S02	x	x	x	x	x	x

Yellow indicates full chemistry site
Green indicates ocean receiving water site

Storm Event: February 19, 2013

Pre-storm ocean receiving water samples were collected on February 18, 2013 between 13:00 and 15:00 from ASBS-S01 and ASBS-S02. The forecast storm arrived on February 19, 2013, and sampling began just after 18:00 and continued until 21:00. A total of 0.21 inches of rainfall were recorded at the Leo Carrillo beach rain gauge, whereas 0.31 inches of rainfall were recorded at the Point Dume rain gauge (http://raws.wrh.noaa.gov) and 0.12 inches of rainfall were recorded at the Fire Station 70 rain gauge (447C). In total, 17 of the 20 sites were successfully monitored, whereas three of the outfalls had no flow, and thus were not monitored. The sites that had no flow were ASBS-013, ASBS-016, and ASBS-031. It was unclear at the time why these three outfalls did not flow, but debris dams upstream of the outfall or in the outfall were suspected. Toxicity samples were collected from nine of the outfalls and at one ocean receiving water site (ASBS-028). Because ASBS-016 was not flowing, no receiving water chemistry or toxicity samples were collected.

Storm Event: March 7-8, 2013

Pre-storm ocean receiving water samples were collected on March 6, 2013 between 13:35 and 14:45 from ASBS-S01 and ASBS-S02. The forecast storm arrived on the night of March 7, 2013 and continued into the early morning on March 8, 2013. Sampling began at 21:50 on March 7, 2013 and continued until 01:53 on March 8, 2013. A storm total of 0.50 inches of rainfall were recorded at the Leo Carrillo beach rain gauge (http://raws.wrh.noaa.gov), while 0.74 inches of rainfall were recorded at the Fire Station 70 rain gauge. In total, 19 of the 21 sites were successfully monitored, whereas two of the outfalls had no flow, and thus were not monitored. The sites that had no flow were ASBS-013 and ASBS-031. An investigation following the previous storm event concluded that there was no flow in these outfalls due to the pipe being clogged at ASBS-013 and a likely debris dam around the outfall at ASBS-031. Toxicity samples were collected from 10 of the outfalls and at one ocean receiving water site (ASBS-SO1). Although there was some flow at the ASBS-016 outfall, since the water ponded on the beach and did not reach the receiving water, no receiving water chemistry or toxicity samples were collected.

Storm Event: February 28, 2014

Pre-storm ocean receiving water samples were collected on February 25, 2014 between 14:35 and 15:35 from ASBS-S01 and ASBS-S02. The forecast storm arrived on the morning of February 28, 2014 and continued throughout the day until approximately midnight. Sampling began at 12:16 on February 28, 2013 and continued until 15:43 on February 28, 2013. A storm total of 2.26 inches of rainfall were recorded at the Fire Station 70 rain gauge (http://raws.wrh.noaa.gov). In total, 19 of the 21 sites were successfully monitored, whereas one of the outfalls had no flow (ASBS-031), and one site was not monitored (ASBS-008). ASBS-031 also did not flow in the two previously monitored storm events. Toxicity samples were collected from one of the outfalls (ASBS-016) and at both ocean receiving water sites (ASBS-SO1 and ASBS-SO2). Ocean receiving water chemistry samples were also collected at ASBS-SO1 and ASBS-SO2.

3.1 Core Discharge Monitoring

Core discharge samples were collected manually using clean laboratory-certified containers supplied by the analytical laboratory. Grab samples were collected as the storm water effluent flowed from the pipe onto the sand, or in the case of ASBS-016, from the box culvert onto the natural channel that flowed to Zuma Beach. ASBS-001 was sampled from a manhole located approximately 140 ft above the beach outfall due to unsafe conditions along the beach. Constituent concentrations from core discharge samples were compared to the Instantaneous Maximum (maximum allowable concentration) listed in the California Ocean Plan for reference purposes. Sample water for toxicity testing was collected during one storm event for each outfall, provided there was flow at the outfall. Complete chemistry and toxicity reports for each storm event are provided in Appendices C and D, respectively. A summary of chemistry results is given in Table 3-2, Table 3-3, and Table 3-4, and is described in the following text. In the summary tables, only analytes that were measured above detection limits are listed under the categories organophosphorus pesticides, and synthetic pyrethroids. Values that are highlighted in yellow are above the California Ocean Plan Instantaneous Maximum (Imax) value.

Table 3-2. Summary of Core Discharge Results from Storm 1 Event and Comparison to the California Ocean Plan Instantaneous Maximum Criteria

Parameter	Units	California Ocean Plan	Outfall ASBS-																
			001	002	003	004	005	011	018	021	022	023	024	025	026	027	028	029	030
		Instantaneous Maximum	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013
General Chemistry																			
Ammonia as N	mg/L	6			1.47		1.12			0.78	1	0.68					0.64		
Nitrate as N	mg/L				10.15		5.57			4.48	8.24	12.45					7.02		
Oil & Grease	mg/L		1.3	1.4	1.6	4	1.6	<1	<1	<1	1.9	2.3	6	3.7	7	3.1	<1	<1	30.9
Total Orthophosphate as P	mg/L				0.53		0.6			0.22	0.35	0.63					0.28		
Total Suspended Solids	mg/L		270.7	53.8	584	284	186.5	1.8	75.5	22.5	38.7	63.2	453	90.5	870	218	16.3	133	61.3
Total Metals																			
Arsenic (As)	µg/L	80			2.13		1.66			1.15	0.95	2.23					0.88		
Cadmium (Cd)	µg/L	10			0.31		0.35			0.10	0.12	0.20					0.27		
Chromium (Cr)	µg/L	20			10.12		7.90			1.39	3.13	3.20					1.85		
Copper (Cu)	µg/L	30			63.56		30.47			11.43	84.93	266.16					13.14		
Lead (Pb)	µg/L	20			13.99		5.80			1.32	4.33	4.88					2.01		
Mercury (Hg)	µg/L	0.4			0.16		0.05			<0.0012	<0.0012	<0.0012					<0.0012		
Nickel (Ni)	µg/L	50			11.57		10.47			2.75	3.13	7.01					5.25		
Selenium (Se)	µg/L	150			0.794		0.102			0.138	0.151	0.355					0.435		
Silver (Ag)	µg/L	7			<0.01*		<0.01*			<0.01*	<0.01*	<0.01*					<0.01*		
Zinc (Zn)	µg/L	200			141.4		128.9			60.4	135.3	269.1					39.0		
Organophosphorus Pesticides																			
Malathion	ng/L				<3		<3			<3	<3	2868.9					<3		
All other OP pestcides were below Method Detection Limits																			
Polynuclear Aromatic Hydrocarbons																			
Total PAHs	ng/L				102		208.4			42	103.7	255.6					<1		
Pyrethroids																			
Bifenthrin	ng/L				700.8		<0.5			<0.5	320.9	1184.5					<0.5		
Cyfluthrin	ng/L				<0.5		<0.5			<0.5	<0.5	344.4					<0.5		
Esfenvalerate	ng/L				152.4		<0.5			<0.5	<0.5	<0.5					<0.5		
Fenvalerate	ng/L				29.3		<0.5			<0.5	<0.5	<0.5					<0.5		
All other Pyrethroid pesticides were below Method Detection Limits																			

< - results less than the method detection limit.
J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
*Method detection limit above the natural water quality.
Yellow highlighted cells indicate results above the natural water quality and the instantaneous maximum benchmark of the Ocean Plan.

Table 3-3. Summary of Core Discharge Results from Storm 2 Event and Comparison to the California Ocean Plan Instantaneous Maximum Criteria

Parameter	Units	California Ocean Plan	Outfall ASBS-																		
			001	002	003	004	005	008	011	016	018	021	022	023	024	025	026	027	028	029	030
		Instantaneous Maximum	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/7/2013
General Chemistry																					
Ammonia as N	mg/L	6			2.1		4.75			4.8		0.57	1.32	0.66					7.8		
Nitrate as N	mg/L				3.78		3.51			10.2		3.24	4.84	5.15					5.29		
Oil & Grease	mg/L		221.1	<1	1.1	83.4	<1	<1	<1	<1	<1	<1	<1	1.3	1.2	1.5	4.8	1.7	6.7	<1	1.2
Total Orthophosphate as P	mg/L				0.5		0.34			0.79		0.51	0.16	0.51					0.75		
Total Suspended Solids	mg/L		531	52.7	315.7	17.5	37.1	115.4	<0.5	782	58.1	64.1	10.7	33	63.6	64.3	660	17.9	616	29.7	32.4
Total Metals																					
Arsenic (As)	µg/L	80			2.51		1.43			3.738		2.13	2.257	2.158					7.287		
Cadmium (Cd)	µg/L	10			0.69		0.08			1.25		0.54	0.09	0.08					10.95		
Chromium (Cr)	µg/L	20			23.88		2.58			39.21		7.13	1.97	1.83					32.36		
Copper (Cu)	µg/L	30			41.56		27.15			33.87		20.48	35.04	116.98					198.50		
Lead (Pb)	µg/L	20			19.83		1.71			10.14		3.94	1.06	3.65					46.30		
Mercury (Hg)	µg/L	0.4			0.02		0.02			0.02		0.01	0.007J	<0.0012					0.06		
Nickel (Ni)	µg/L	50			22.30		4.53			47.83		10.48	2.07	3.49					77.08		
Selenium (Se)	µg/L	150			0.363		0.115			0.176		0.076J	0.521	0.151					1.004		
Silver (Ag)	µg/L	7			<0.01*		0.06			<0.01*		0.08	0.06	0.04					0.06		
Zinc (Zn)	µg/L	200			142.7		104.7			125.2		88.2	41.8	157.7					800.7		
Organophosphorus Pesticides																					
Malathion	ng/L				<3		<3			<3		<3	<3	4128.6					<3		
All other OP pesticides were below Method Detection Limits																					
Polynuclear Aromatic Hydrocarbons																					
Total PAHs	ng/L				694		53			231.3		131.8	18.5	251.4					1145.6		
Pyrethroids																					
Bifenthrin	ng/L				214		<0.5			<0.5		<0.5	74.6	167.5					203.9		
Cyfluthrin	ng/L				<0.5		21.6			<0.5		<0.5	<0.5	268.6					<0.5		
Cypermethrin	ng/L				<0.5		16.2			<0.5		<0.5	<0.5	<0.5					<0.5		
All other pyrethroid pesticides were below Method Detection Limits																					

< - results less than the method detection limit.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

*method detection limit above the natural water quality.

Yellow highlighted cells indicate results above the natural water quality and the instantaneous maximum benchmark of the Ocean Plan.

Table 3-4. Summary of Core Discharge Results from Storm 3 Event and Comparison to the California Ocean Plan Instantaneous Maximum Criteria

Parameter	Units	California Ocean Plan	Outfall ASBS-																		
			001	002	003	004	005	011	013	016	018	021	022	023	024	025	026	027	028	029	030
		Instantaneous Maximum	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014
General Chemistry																					
Ammonia as N	mg/L	6			4.95		0.37			0.68		0.43	1.51	<0.02					0.21		
Nitrate as N	mg/L				0.63		0.54			0.72		0.86	1.53	24.54					0.27		
Oil & Grease	mg/L		<1	<1	2.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	1.3	1J	<1	1.3
Total Orthophosphate as P	mg/L				1.08		0.2			0.86		0.83	0.84	0.94					0.27		
Total Suspended Solids	mg/L		79.2	296	5095	593	497	70.4	119	803	55.3	148	7.9	4.8	27.5	18.2	103.2	78.8	40.3	1.9	42.6
Total Metals																					
Arsenic (As)	µg/L	80			9.08		1.79			2.75		3.52	3.73	4.73					0.656		
Cadmium (Cd)	µg/L	10			3.82		0.55			1.41		0.55	0.18	0.28					0.1864		
Chromium (Cr)	µg/L	20			75.35		20.63			23.61		5.98	2.16	1.79					1.2621		
Copper (Cu)	µg/L	30			109.66		27.95			29.91		25.05	56.11	84.92					26.219		
Lead (Pb)	µg/L	20			71.78		6.11			8.13		5.73	2.11	0.54					17.5522		
Mercury (Hg)	µg/L	0.4			<0.0012		<0.0012			<0.0012		<0.0012	<0.0012	<0.0012					<0.0012		
Nickel (Ni)	µg/L	50			91.11		25.82			38.05		9.12	4.77	8.81					2.9016		
Selenium (Se)	µg/L	150			0.33		0.22			0.23		0.32	1.22	5.10					0.334		
Silver (Ag)	µg/L	7			0.17		0.08			0.10		0.07	0.21	0.06					0.01J		
Zinc (Zn)	µg/L	200			454.8		98.37			151.15		93.27	97.01	199.0					87.7		
Organophosphorus Pesticides																					
Chlorpyrifos	ng/L				67.6		<0.5			<0.5		<0.5	<0.5	<0.5					<0.5		
All other OP pesticides were below Method Detection Limits																					
Polynuclear Aromatic Hydrocarbons																					
Total PAHs	ng/L				7159.2		906.4			778		570.3	54.7	1982.1					812.2		
Pyrethroids																					
Bifenthrin	ng/L				694.4		43.4			5.4		80.3	16.9	188.7					1673.6		
Cyfluthrin	ng/L				33.1		<0.5			<0.5		6.7	5.9	19.9					<0.5		
Cypermethrin	ng/L				88.7		<0.5			8.2		<0.5	3.3	<0.5					<0.5		
Esfenvalerate	ng/L				15.6		<0.5			<0.5		1.5J	0.6J	<0.5					<0.5		
Fenvalerate	ng/L				7.4		<0.5			<0.5		0.9J	0.7J	<0.5					<0.5		
L-Cyhalothrin	ng/L				4.8		1.6J			1.1J		5	<0.5	<0.5					2.2		
Permethrin	ng/L				3845.8		<5			123.1		<5	76.7	<5					<5		
All other pyrethroid pesticides were below Method Detection Limits																					

< - results less than the method detection limit.
J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Yellow highlighted, bold, underlined cells indicate results above the natural water quality and the instantaneous maximum benchmark of the Ocean Plan.

3.1.1 General Chemistry

ASBS-028 was the only outfall that had a general chemistry constituent measured above the California Ocean Plan Instantaneous Maximum concentration (Imax) value. Ammonia was measured at a concentration of 7.8 milligrams per liter (mg/L) at ASBS-028 during Storm 2, which was slightly above the Imax of 6 mg/L. There are no established Imax values for nitrate, oil and grease, total orthophophate, and total suspended solids (TSS). Oil and grease and TSS were the only constitutents required to be measured at all outfalls. Oil and grease concentrations varied widely, ranging from from less than 5 mg/L at 89% of the outfalls to 221.1 mg/L at ASBS-001 during Storm 2. TSS concentrations also varied significantly among the outfalls, ranging from less than 0.5 mg/L at ASBS-011 during Storm 2 to 5095 mg/L at ASBS-003 during Storm 3.

Across the seven largest outfalls (equal to or greater than 36 inches in diameter), ammonia concentrations ranged from <0.02 mg/L at ASBS-023 during Storm 3 to 7.8 mg/L at ASBS-028 during Storm 2, whereas nitrate ranged from 0.27 mg/L at ASBS-028 during Storm 3 to 24.54 mg/L at ASBS-023 during Storm 3. Total orthophosphate concentrations ranged from 0.27 mg/L to 1.08 mg/L during all storm events at the monitored outfalls.

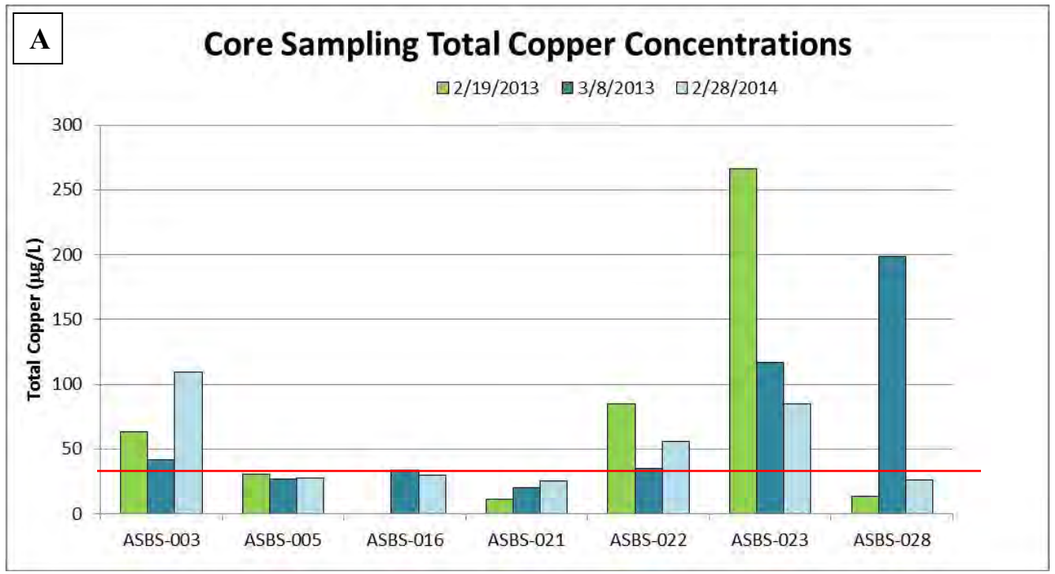
3.1.2 Metals

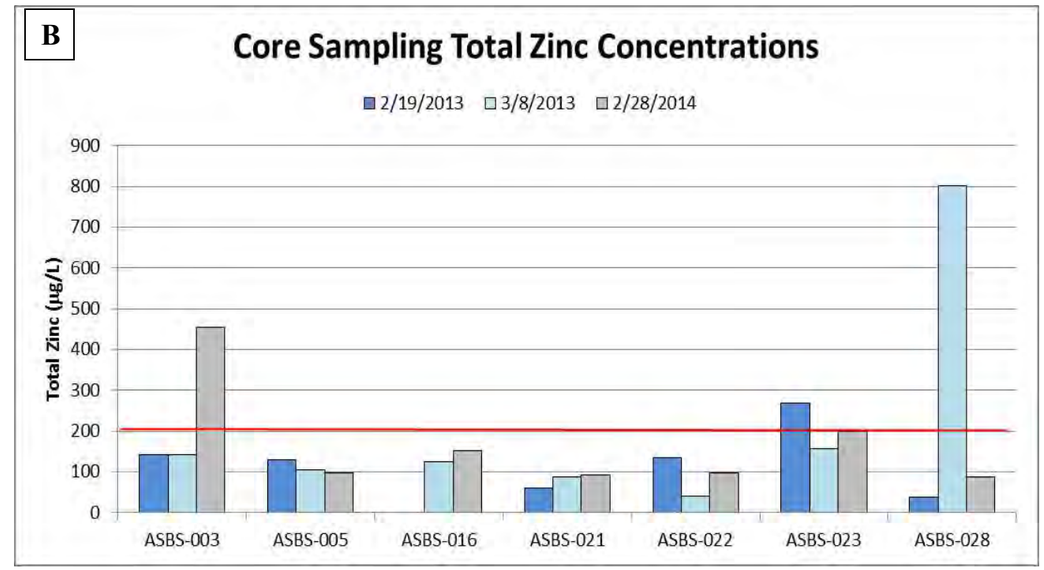
Total Metals

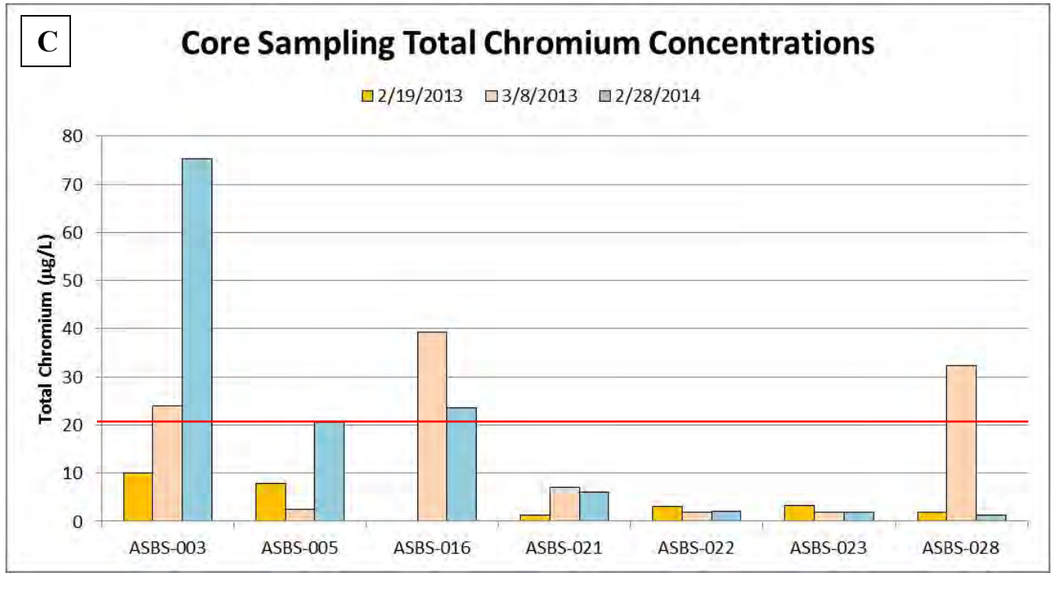
Concentrations of chromium, copper, and zinc were measured above the California Ocean Plan Imax concentration at one or more of the seven large outfalls that were monitored for metals during the 2012-2013 and 2013-2014 storm season (Figure 3-1).

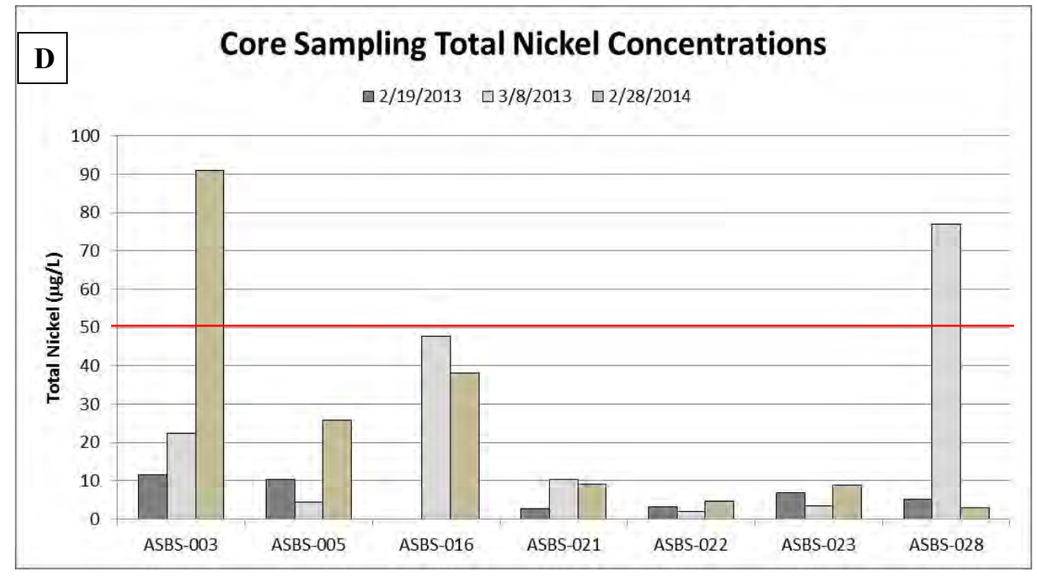
Analytical results from samples collected during Storm 1 (February 19, 2013) indicated that four storm drain outfalls had concentrations of total copper above the Imax, and that one storm drain outfall had total concentrations of total zinc above the Imax. Copper concentrations ranged from less than 1 to 8.9 times the Imax, whereas zinc concentrations ranged from less than 1 to 1.4 times the Imax.

During Storm 2 (March 7, 2013) concentrations of cadmium, chromium, copper, lead, nickel, and zinc were measured above the California Ocean Plan Imax concentration at one or more of the monitored outfalls (Figure 3-1 and Figure 3-2). Outfalls ASBS-003 and ASBS-016 had Imax concentrations of chromium and copper above the Imax, whereas outfalls ASBS-022 and ASBS-023 had copper concentrations above the Imax. Outfall ASBS-028 had concentrations of cadmium, chromium, copper, lead, nickel, and zinc above the Imax. With the exception of the chromium concentration at ASBS 016 and the silver concentration at ASBS-021, the highest concentrations of each of the analyzed metals were measured at ASBS-028. Copper concentrations were 6.6 times the Imax at ASBS-028 and 3.9 times the Imax at ASBS-023, whereas at all other outfalls, the concentration was less than 1.4 times the Imax. Zinc and lead concentrations at ASBS-028 were 4.0 and 2.3 times the Imax, respectively, whereas they were below the Imax at all other outfalls. Concentrations of cadmium, chromium, and nickel were less than 1.6 times the Imax at ASBS-028.



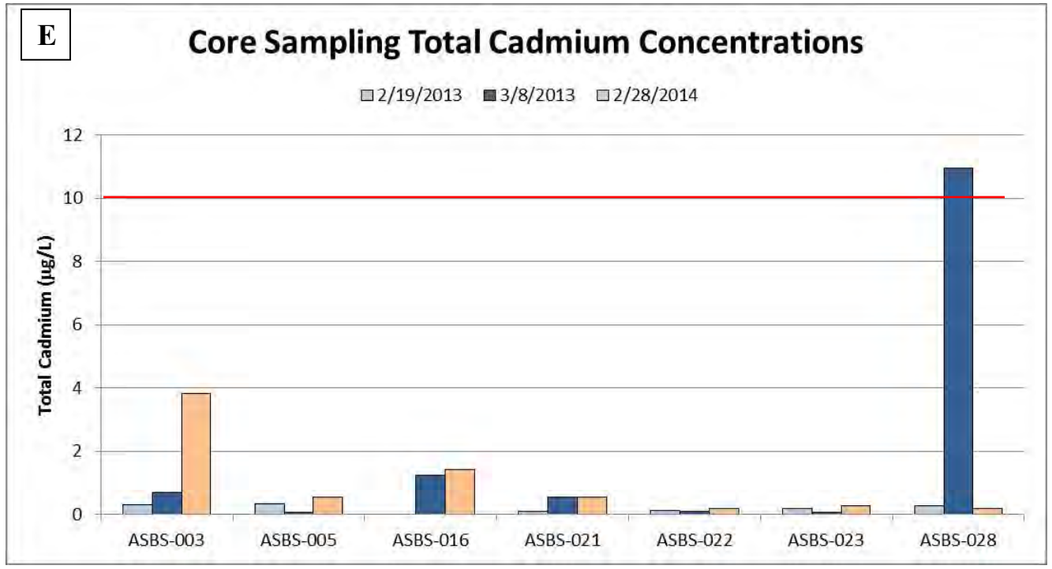


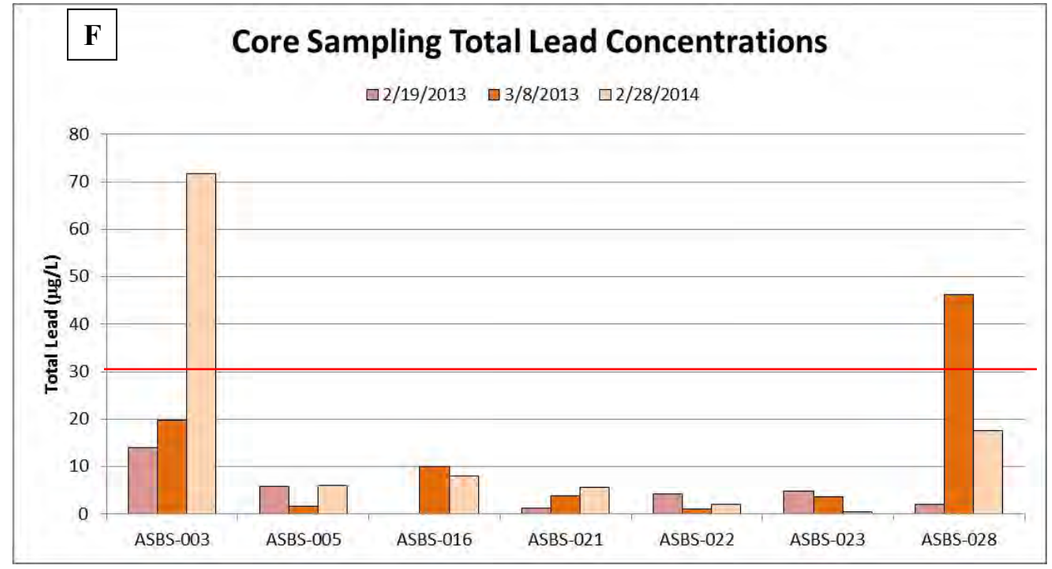




--- indicates California Ocean Plan Imax value

Figure 3-1. Total Copper (A), Zinc (B), Chromium (C), and Nickel (D) Concentrations at Large Storm Drain Outfalls





--- indicates California Ocean Plan Imax for zinc

Figure 3-2. Total Cadmium (E) and Lead (F) Concentrations at Large Storm Drain Outfalls

During Storm 3 (February 28, 2014), concentrations of chromium, copper, lead, nickel, and zinc were measured above the California Ocean Plan Imax concentration at one or more of the monitored outfalls (Figure 3-1 and Figure 3-2). Outfall ASBS-003 had five metals that were above Imax criteria, whereas ASBS-005, ASBS-016, ASBS-022 and ASBS-023 had only one metal above Imax criteria. Chromium concentrations were above Imax criteria at outfalls ASBS-003, ASBS-005, and ASBS-16, whereas copper concentrations were above Imax criteria at outfalls ASBS-003, ASBS-022 and ASBS-023. Lead, nickel, and zinc were also above Imax criteria at ASBS-003. With the exception of the selenium concentration at ASBS 022 and ASBS-023 and the silver concentration at ASBS-022, the highest concentrations of each of the analyzed metals were measured at ASBS-003. Copper, lead, and chromium concentrations ranged from 3.6 to 3.7 times the Imax at ASBS-003. Zinc concentrations were approximately 2.2 times the Imax at ASBS-003, whereas nickel was approximately 1.8 times the Imax. The copper concentration at ASBS-023 (2.8 times the Imax) was the only other constituent that was greater than 2 times the Imax concentration.

3.1.3 Polynuclear Aromatic Hydrocarbons

Total PAH concentrations varied substantially between storm events and between sites (Figure 3-3), though they were generally higher during Storm 3 across nearly all outfalls. Values for total PAHs during Storm 1 ranged from below the detection limit of 1 nanogram per liter (ng/L) at ASBS-028 during the Storm 1 to 255.6 ng/L at ASBS-023. During Storm 2, total PAHs ranged from 255.6 ng/L at ASBS-022 to 1146 ng/L at ASBS-028, whereas during Storm 3, total PAHs ranged from 54.7 ng/L at ASBS-022 to 7159 ng/L at ASBS-003. The California Ocean Plan does not provide a total PAHs WQO for the protection of marine aquatic life.

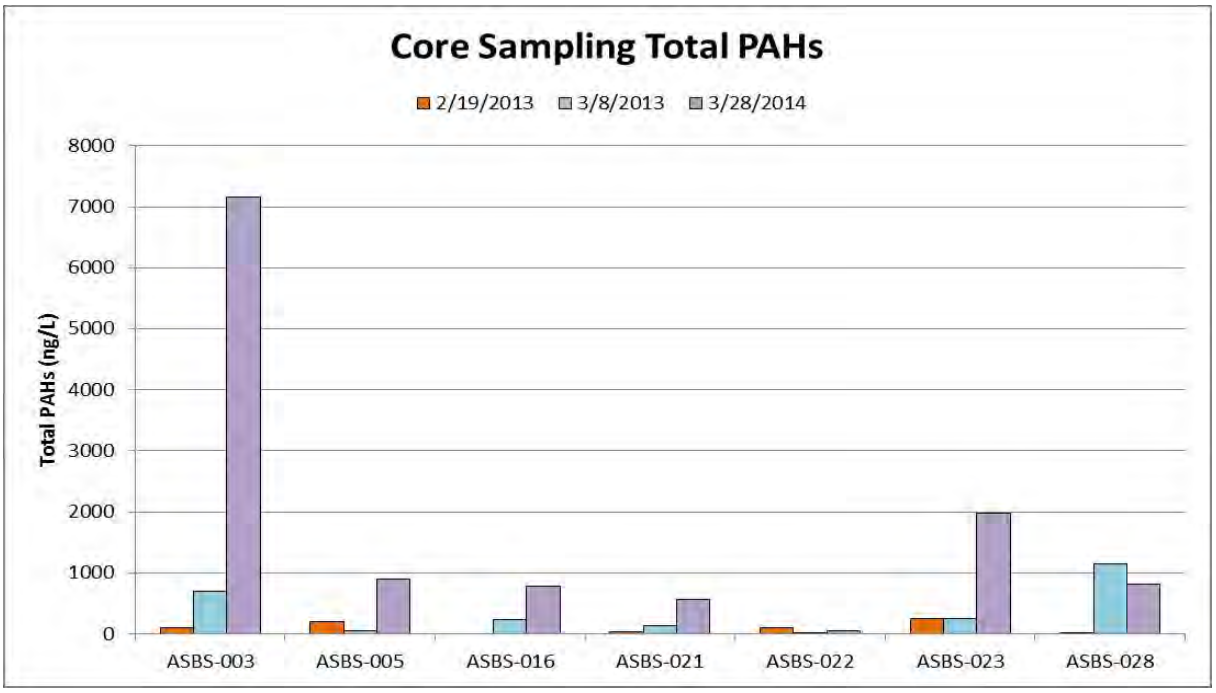


Figure 3-3. Total PAH Concentrations at Large Storm Drain Outfalls

3.1.4 Organophosphorus Pesticides

Malathion was detected at ASBS-023 during Storms 1 and 2 (Figure 3-4), whereas chlorpyrifos was detected at ASBS-003 during Storm 3. No other organophosphorus pesticides were detected from core discharge outfalls during the three monitored storm events over the 2012-2013 and 2013-2014 storm seasons. Malathion concentrations ranged from 2,869 ng/L to 4,129 ng/L at ASBS-023 during Storms 1 and 2, whereas chlorpyrifos had a concentration of 67.6 ng/L at ASBS-003 during Storm 3. Currently, no Imax values are provided in the California Ocean Plan for OP pesticides with regard to the protection of marine life. A literature review was conducted to determine whether previous toxicity studies had been performed using malathion exposures on marine invertebrate species. The lowest LC_{50} value (i.e., the concentration at which 50% of the test organisms expire) found in the literature review was an 83,000-ng/L malathion exposure to *Pagurus longicarpus* (an Atlantic species of hermit crab) (Verschueren, 1996) and an LC_{50} of 10,000 ng/L in *Ampelisca abdita* (a marine amphipod). The highest malathion concentration that was detected in any of the core discharge samples was substantially lower than the lowest LC_{50} value in the literature review, indicating that OP pesticides do not likely present a significant source of toxicity within the ASBS.

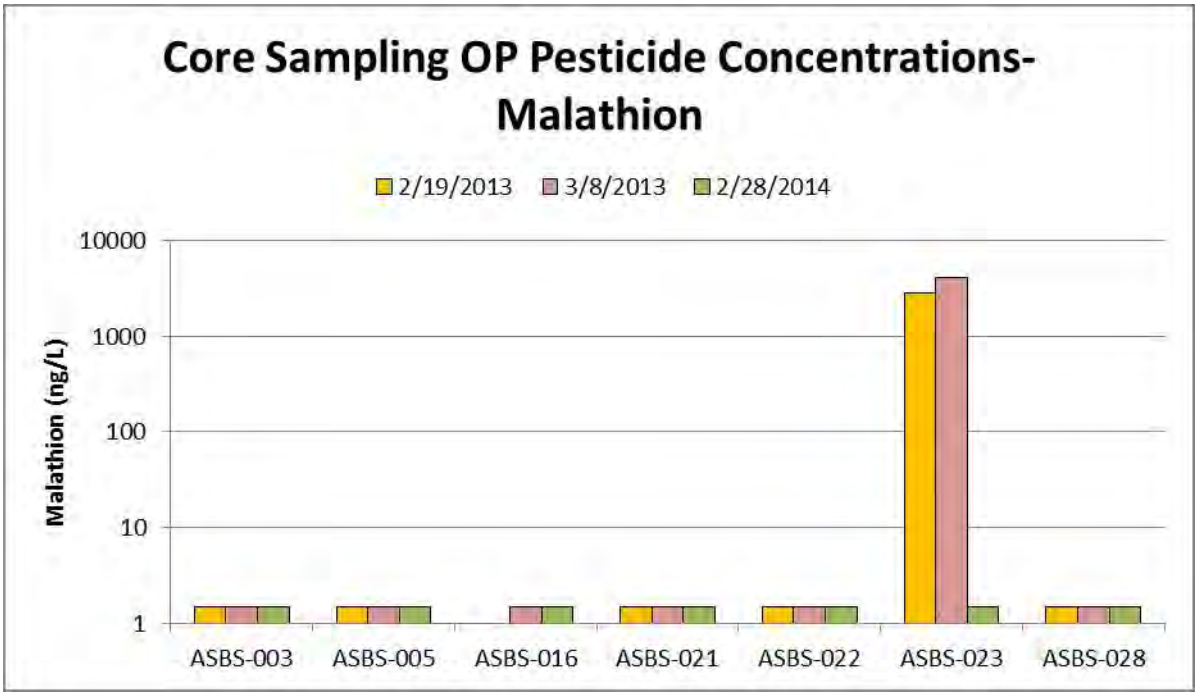


Figure 3-4. Orthophosphorus Concentrations at Large Storm Drain Outfalls

3.1.5 Synthetic Pyrethroids

The synthetic pyrethroids bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, fenvalerate, L-cyhalothrin, and permethrin were detected at one or more of the large storm drains during the three monitored storm events (Figure 3-5). Concentrations of bifenthrin were greater than 500 ng/L during Storm 1 at ASBS-003 and ASBS-023 and during Storm 3 at ASBS-003 and ASBS-028, whereas the concentration of permethrin was greater than 500 ng/L at ASBS-003 during Storm 3. The highest concentrations of pyrethroids were measured at ASBS-023 during

Storm 1 and Storm 2 and at ASBS-003 during Storm 3. Although the California Ocean Plan does not provide water quality criteria for pyrethroids, toxicity studies have been performed on the effects of bifenthrin, cyfluthrin, cypermethrin, and permethrin exposures to marine invertebrate shrimp species that are similar to native shrimp species living in the ocean receiving water. LC_{50} values of 3.97 ng/L, 2.42 ng/L, 27 ng/L, and 95 ng/L have been derived for the mysid shrimp (*Americamysis bahia*) in exposures to bifenthrin, cyfluthrin, cypermethrin, and permethrin respectively (USEPA, 2013; Cripe, 1994). Across all storm events, the highest Bifenthrin concentration (1673.6 ng/L) occurred at ASBS-028 during Storm 3, whereas the highest cyfluthrin concentration (344.4 ng/L) occurred at ASBS-023 during Storm 1. The highest Cypermethrin (88.7 ng/L) and permethrin concentrations (3846 ng/L) occurred at ASBS-003 during Storm 3. LC_{50} values for mysids exposed to fenvalerate range from 8.0 to 32.0 ng/L (USEPA, 2013). Fenvalerate concentrations were below the detection limit at all outfalls evaluated except ASBS-003, which had a concentration of 29.3 ng/L. No data related to mysid mortality is available for esfenvalerate; however, an LC_{50} value of 60 ng/L has been derived for the marine grass shrimp *Palaemonetes pugio* (USEPA, 2013). Esfenvalerate concentrations were below the detection limit at all outfalls evaluated except ASBS-003, which had a concentration of 152.4 ng/L during Storm 1 and a concentration of 15.6 ng/L during Storm 3.

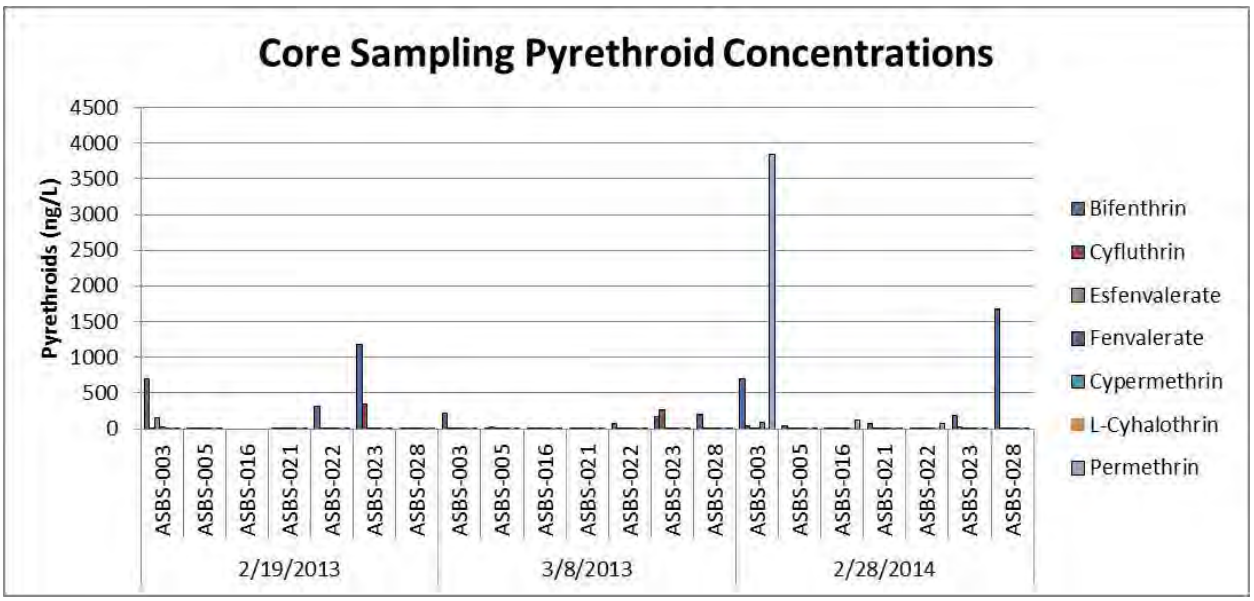


Figure 3-5. Pyrethroid Concentrations at Large Storm Drain Outfalls

3.1.6 Toxicity

Toxicity samples were collected from each storm drain outfall (provided there was flow) one time over the course of the three monitored storm events (Table 3-1). In total, toxicity samples were collected from nine outfalls during the February 19, 2013 storm event (Storm 1), from 10 outfalls during the March 8, 2013 storm event (Storm 2), and one outfall during the February 28, 2014 storm event (Storm 3). Toxicity testing consisted of *Mytilus galloprovincialis* (bivalve) development tests which are on the approved list of test species for chronic toxicity testing in the COP. A summary of toxicity results is presented in Table 3-5.

Results indicate that slight toxicity to *M. galloprovincialis* development was observed in samples collected at five of the outfalls. During Storm 1, toxicity was observed in samples from ASBS-002, ASBS-026, and ASBS-028. ASBS-002 and ASBS-026 samples resulted in no observed effect concentrations (NOECs) of 50 percent (%) and chronic toxic unit (TUc) values of 2, whereas the ASBS-028 sample had a NOEC of 25% and a TUc of 4. During Storm 2, slight toxicity was observed in samples from ASBS-004 and ASBS-022. The sample from ASBS-004 had a NOEC of 50% and a TUc of 2 and the sample from ASBS-022 had a NOEC of 25% and a TUc of 4. The concentrations resulting in 25% (EC_{25}) and 50% (EC_{50}) reductions in normality values for all samples were greater than 100%.

Table 3-5. Summary of Core Discharge Toxicity Results

Storm Date	Outfall	NOEC (%)	LOEC (%)	EC_{25} (%)	EC_{50} (%)	Tu_c
February 19, 2013	ASBS-001	100	>100	>100	>100	1
	ASBS-002	50	100	>100	>100	2
	ASBS-003	100	>100	>100	>100	1
	ASBS-025	100	>100	>100	>100	1
	ASBS-026	50	100	>100	>100	2
	ASBS-027	100	>100	>100	>100	1
	ASBS-028	25	50	>100	>100	4
	ASBS-029	100	>100	>100	>100	1
	ASBS-030	100	>100	>100	>100	1
March 8, 2013	ASBS-004	50	100	>100	>100	2
	ASBS-005	100	>100	>100	>100	1
	ASBS-008	100	>100	>100	>100	1
	ASBS-011	100	>100	>100	>100	1
	ASBS-016	100	>100	>100	>100	1
	ASBS-018	100	>100	>100	>100	1
	ASBS-021	100	>100	>100	>100	1
	ASBS-022	25	50	>100	>100	4
	ASBS-023	100	>100	>100	>100	1
	ASBS-024	100	>100	>100	>100	1
February 28, 2014	ASBS-013	100	>100	>100	>100	1

Grey shading indicates potential toxicity.
NOEC = no observed effect concentration.
LOEC = lowest observed effect concentration.
EC_{25} = concentration producing a 25% response.
EC_{50} = concentration producing a 50% response, or median lethal concentration.

3.2 Ocean Receiving Water

Ocean receiving water samples were collected at S01 in front of ASBS-016 and at S02 in front of ASBS-028 within 48 hours prior to, and during, or immediately following the storm while effluent runoff was still flowing into the receiving water. The three monitored storm events occurred on February 19, 2013 (Storm 1), March 7-8, 2013 (Storm 2), and February 28, 2014 (Storm 3). Constituent concentrations from ocean receiving water samples were compared to reference threshold concentrations as well as to the California Ocean Plan objectives. Reference threshold concentrations are defined as the 85th percentile of sample concentrations taken from reference sites in Southern California. Estimated values (J-flagged values) measured above the detection limit but below the reporting limit were not considered to be in exceedance of reference thresholds. Complete chemistry and toxicity reports for each storm event are provided in Appendices C and D, respectively. A summary of chemistry results is given in Table 3-6, and is described in the following text.

3.2.1 Field Water Quality

Field measurements were collected using a YSI probe for conductivity, temperature, salinity, DO, pH, and turbidity during both pre-storm and post-storm monitoring. No post-storm measurements were taken at SO1 during Storms 1 and 2 because the flow from outfall ASBS-016 never reached the receiving water. Pre-storm and post-storm conductivity measurements were nearly identical during Storm 1 and Storm 3 at SO2, whereas post-storm measurements were slightly less than pre-storm measurements during Storm 2 at SO2. The pH varied little, ranging from 7.77 pH units to 7.99 pH units during pre-storm and post-storm monitoring for each of the storm events. Salinity, which was not measured during Storm 1 due to an instrument malfunction, was slightly higher during pre-storm monitoring than during post-storm monitoring during Storms 2 and 3. Water temperature dropped several degrees during Storm 1 post-storm monitoring at SO2; however, this drop may have been at least partially due to the post-storm monitoring occurring at night rather than in the day. During Storm 2, water temperature was nearly the same during pre-storm and post-storm monitoring, while during Storm 3, water temperature dropped nearly 4°C at SO1 and 1°C at SO2. Turbidity measurements varied somewhat between pre-storm and post-storm conditions. Increased wave size during the Storm 1 post-storm sampling may have caused a spike in turbidity between the pre-storm (34.8 nephelometric turbidity units [NTU]) and post-storm (232 NTU) field measurements at SO2. Storm 2 pre-storm turbidity ranged from 18.7 NTU to 24.0 NTU, whereas post-storm turbidity was 45.4 NTU. Storm 3 pre-storm turbidity ranged from 16.4 to 26.4 NTU, whereas post-storm turbidity ranged from 4.1 to 15.0 NTU.

Table 3-6. Results Summary of Pre-Storm and Post-Storm Ocean Receiving Water Sampling

Parameter	Units	California Ocean Plan Instantaneous Maximum	Natural Water Qualty 85% Percentile Reference Threshold	S01-PRE 2/18/2013	S02-PRE 2/18/2013	S02-POST 2/19/2013	S01-PRE 3/6/2013	S02-PRE 3/6/2013	S02-POST 3/8/2013	S01-PRE 2/25/2014	S01-POST 2/28/2014	S02-PRE 2/25/2014	S02-POST 2/28/2014
Field Measurements													
Conductivity	mS			52.74	52.16	52.35	51.82	51.87	48.73	Not measued	53.463	53.034	52.535
Dissolved Oxygen	mg/L			8.40	9.92	8.34	8.49	8.40	Not measued	8.65	4.10	7.89	7.76
pH	pH units			7.85	7.77	7.86	7.86	7.80	7.80	7.93	7.99	7.93	7.92
Salinity	ppt			Not measured	Not measured	Not measured	34.06	34.11	33.60	Not measued	35.32	34.90	34.65
Temperature	°C			14.24	16.05	13.25	13.80	14.19	13.92	19.14	15.25	17.22	16.34
Turbidity	NTU			28.2	34.8	232.0	24.0	18.7	45.4	26.4	4.1	16.4	15.0
General Chemistry													
Ammonia as N	mg/L	6	0.015	0.09	0.04J	<0.02	0.04J	0.03J	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate as N	mg/L		0.34	0.51	0.38	0.25	0.48	0.49	0.54	0.03J	0.02J	0.02J	<0.01
Oil & Grease	mg/L		0.5	14.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Orthophosphate as P	mg/L		0.10	0.02	0.02	0.03	0.03	0.03	0.06	0.02	0.02	0.02	0.18
Total Suspended Solids	mg/L		48	5.2	7.9	40.5	3.8	14.9	33.3	19.5	25.2	87.7	150
Total Metals													
Arsenic (As)	µg/L	80	1.8	1.72	1.47	1.39	1.56	1.56	1.58	1.47	1.28	6.60	4.12
Cadmium (Cd)	µg/L	10	0.15	0.02	0.06	0.06	0.03	0.06	0.14	0.02	0.02	0.51	0.26
Chromium (Cr)	µg/L	20	1.9	0.32	0.54	0.64	0.24	0.65	2.52	1.11	0.39	**26.01**	4.96
Copper (Cu)	µg/L	30	1.5	0.15	0.32	0.45	0.16	0.38	2.92	0.68	0.22	6.00	2.29
Lead (Pb)	µg/L	20	0.5	0.05	0.10	0.19	0.03	0.16	1.04	0.24	0.06	7.27	1.55
Mercury (Hg)	µg/L	0.4	0.0006	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	0.0046J	<0.0012J	0.01	<0.0012	0.03
Nickel (Ni)	µg/L	50	1.3	0.27	0.51	0.77	0.28	0.63	1.86	0.87	0.36	21.57	4.24
Selenium (Se)	µg/L	150	0.0025	0.007J	0.02	0.03	0.008J	0.02	0.05	0.02	0.011J	0.08	0.16
Silver (Ag)	µg/L	7	0.08	0.03	0.01J	<0.01	<0.01	0.01J	<0.01	0.09	0.18	0.03	0.14
Zinc (Zn)	µg/L	200	18.6	1.04	1.20	12.28	2.70	37.88	54.10	5.35	21.05	41.71	12.02
Organophosphorus Pesticides													
Total OP pesticides	ng/L		6	6	6	6	6	6	6	6	6	6	6
Polynuclear Aromatic Hydrocarbons													
Total PAHs	ng/L		12.5	12.5	12.5	41.1	12.5	12.5	57.0	12.5	12.5	17.8	53.0
Pyrethroids													
Bifenthrin	ng/L			<0.5	<0.5	<0.5	<0.5	<0.5	8.4	<0.5	<0.5	<0.5	2.5
Deltamethrin/Tralomethrin	ng/L			<0.5	<0.5	<0.5	10.6	26.6	<0.5	<0.5	<0.5	<0.5	<0.5
Esfenvalerate	ng/L			1.1J	<0.5	0.8J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
All other Pyrethroids	ng/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Pyrethroids	ng/L		6.75	6.75	6.75	6.75	17.35	33.35	15.15	6.75	6.75	6.75	9.25

< - results less than the method detection limit.

J-Analyte was detected at a concentration below the RL and above the MDL. Reported value is estimated. J-flagged values were not considered to exceed reference thresholds since they are estimated values.

Grey highlighted cells indicate results above the natrual water quality.

Grey highlighted, bold, underlined cells indicate results above the natural water quality and the instantaneous maximum benchmark of the Ocean Plan.

For non-detect values and J-values, 0.5 times the detection limit was used to compare against Natural WQ criteria

3.2.2 General Chemistry

General chemistry constituents included ammonia as N, nitrate as N, oil and grease, total orthophosphate as P, and TSS. Ammonia concentrations were less than 0.02 mg/L in post-storm samples from S02 for all storm events and from S01 during Storm 3. Pre-storm samples ranged from less than 0.02 mg/L to 0.09 mg/L across all storm events at both ocean receiving water stations. Concentrations of ammonia were greater than the 85th percentile reference threshold (0.015 mg/L) in the Storm 1 and Storm 2 pre-storm samples from S01 and in the Storm 1 pre-storm sample from S02. All ammonia values were well below the California Ocean Plan Imax of 6 mg/L.

Nitrate concentrations ranged from less than 0.01 mg/L to 0.54 mg/L in post-storm samples from S02 across all storm events. Nitrate pre-storm concentrations at SO1 and SO2 were above the 85th percentile reference threshold (0.374 mg/L) during Storm 1 and Storm 2. However, only the post-storm nitrate concentration at SO2 during Storm 2 was above the reference threshold and the pre-storm concentration. There is no established California Ocean Plan Imax value for nitrate.

Oil and grease concentrations were less than 1 mg/L in all samples with the exception of the Storm 1 pre-storm sample from S01, which was measured at 14.1 mg/L. Total orthophosphate concentrations ranged from 0.02 in both S01 and S02 Storm 1 pre-storm samples to 0.18 in the Storm 3 post-storm sample from S02. The Storm 3 post-storm concentration of total orthophosphate (0.18 mg/L) was above the reference threshold (0.114 mg/L). Post-storm TSS concentrations at SO2 varied, ranging from 33.3 mg/L during Storm 2 to 150 mg/L during Storm 3; the post-storm concentration of TSS at S01 was 25.2 during Storm 3. TSS concentrations were greater in post-storm samples than pre-storm samples during each of the monitored storm events. During Storm 3, the SO2 pre-storm and post-storm concentrations (87.7 mg/L and 150 mg/L, respectively) were greater than the 85th percentile reference threshold value of 55.4 mg/L.

3.2.3 Metals

Total Metals

Post-storm metals concentrations in ocean receiving water samples were generally either below the 85th percentile reference threshold values (where applicable) or were below pre-storm concentrations. All metals concentrations, with the exception of the pre-storm chromium concentration in Storm 3, were below the California Ocean Plan Imax values. Concentrations of metals with at least one exceedance of the 85th percentile threshold are presented in Figure 3-6 and Figure 3-7.

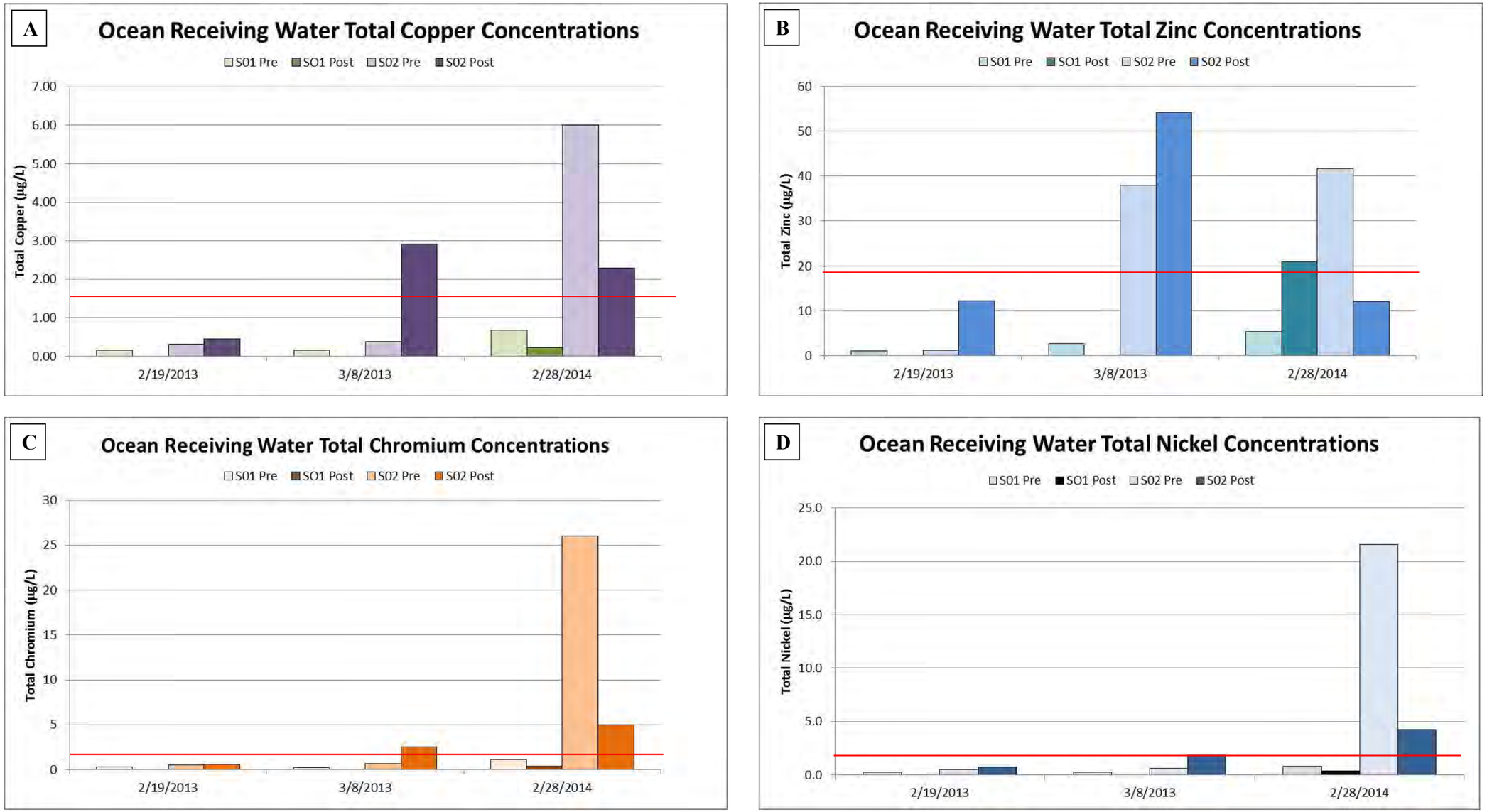
For Storm 1 at S02, selenium was measured at concentrations that were slightly above the 85th percentile reference threshold in both pre-storm and post-storm samples. No other metal concentrations exceeded reference threshold criteria during Storm 1.

During Storm 2 at SO2, selenium and zinc were measured above their respective 85th percentile values in the pre-storm sample. The selenium pre-storm concentration was approximately 10 times the reference threshold value (0.0025 µg/L), and the pre-storm zinc concentration was approximately 2 times the reference threshold value (18.6 µg/L). In the post-storm sample at SO2, chromium, copper, lead, nickel, selenium, and zinc were measured at concentrations

greater than their 85th percentile values. Post-storm metals concentrations for Storm 2 at S02 were greater than pre-storm concentrations with the exception of silver, which was estimated at 0.01 µg/L in the pre-storm sample and was less than the detection limit of 0.01 µg/L in the post-storm sample. The post-storm arsenic concentration was nearly the same as the pre-storm concentration, whereas post-storm concentrations of the remaining metals ranged from 1.4 times the pre-storm concentration for zinc to 7.7 times the pre-storm concentration for copper.

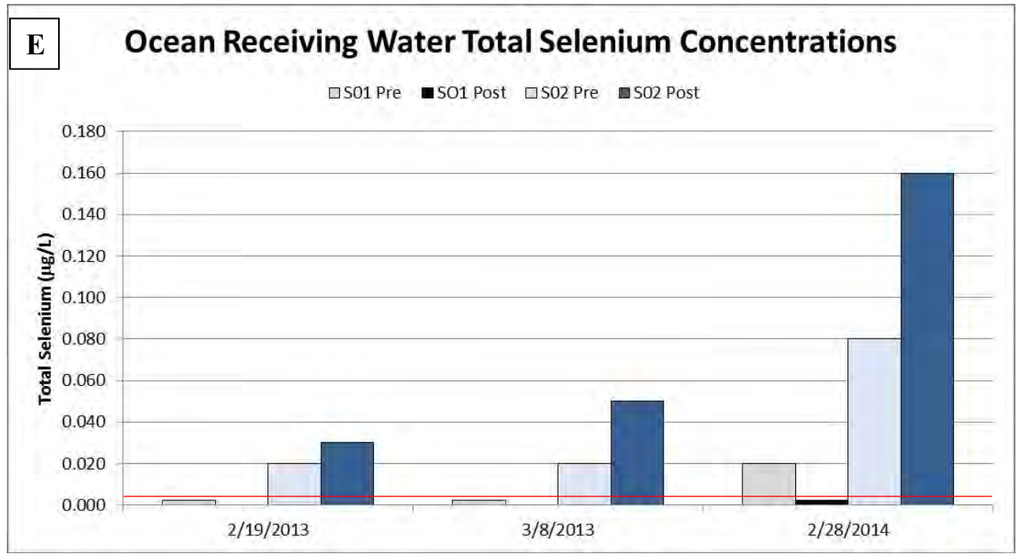
During Storm 3 at SO1, silver and selenium were measured above the 85th percentile reference threshold value during pre-storm monitoring, whereas mercury, silver, and zinc were above 85th percentile values during post-storm monitoring. Post-storm concentrations of zinc, mercury, and silver were measured above reference threshold criteria and were also above pre-storm concentrations.

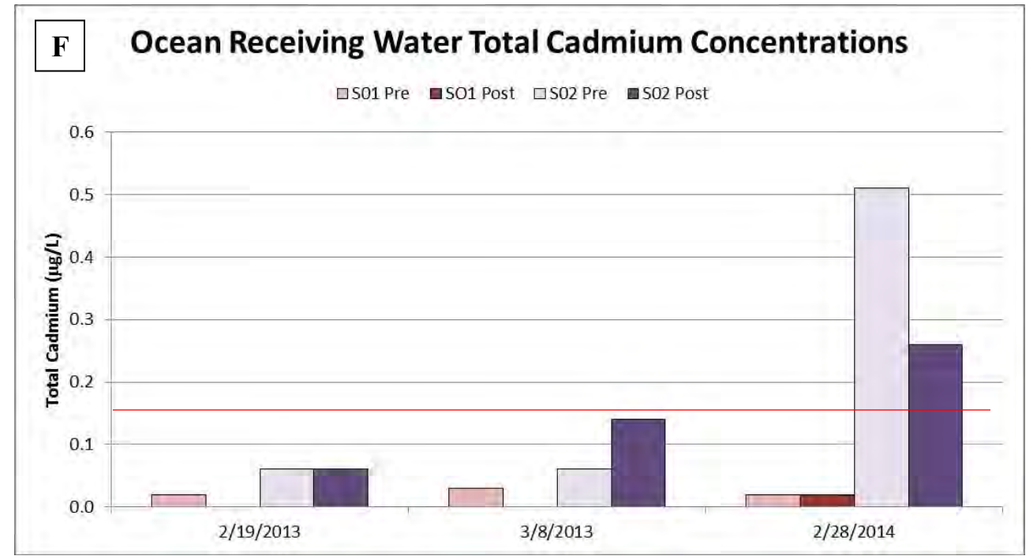
At SO2, all analyzed metals, with the exception of mercury, silver, and zinc had pre-storm and post-storm concentrations that were above the 85th percentile reference threshold values during Storm 3. SO2 pre-storm concentrations of arsenic, cadmium, chromium, copper, lead, nickel, and zinc were higher than post-storm concentrations. Post-storm concentrations of mercury, selenium, and silver were measured above reference threshold criteria and were also above pre-storm concentrations. The pre-storm concentration of chromium at SO2 was the only metal during any of the storm events that was measured above the COP Imax value.

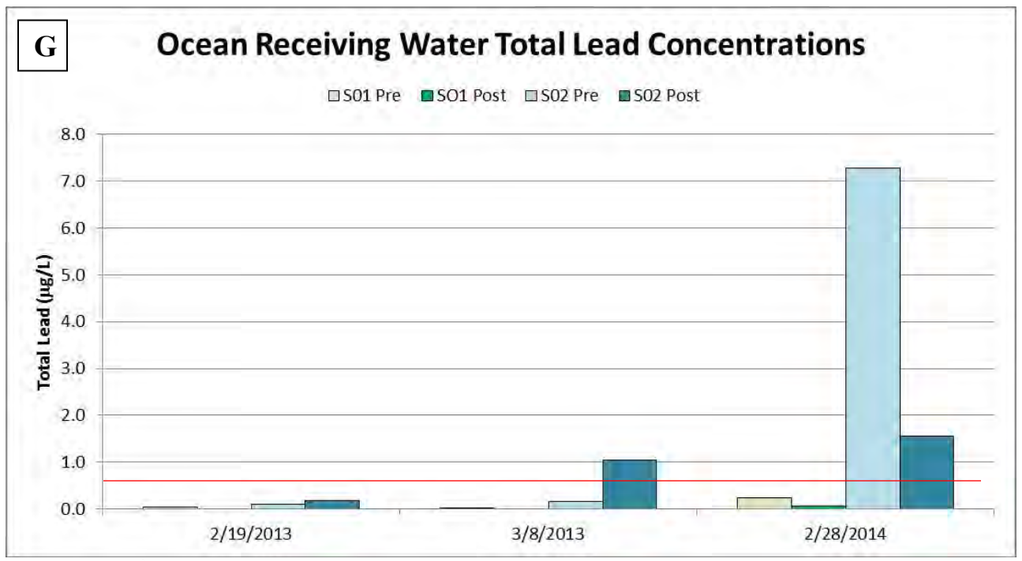


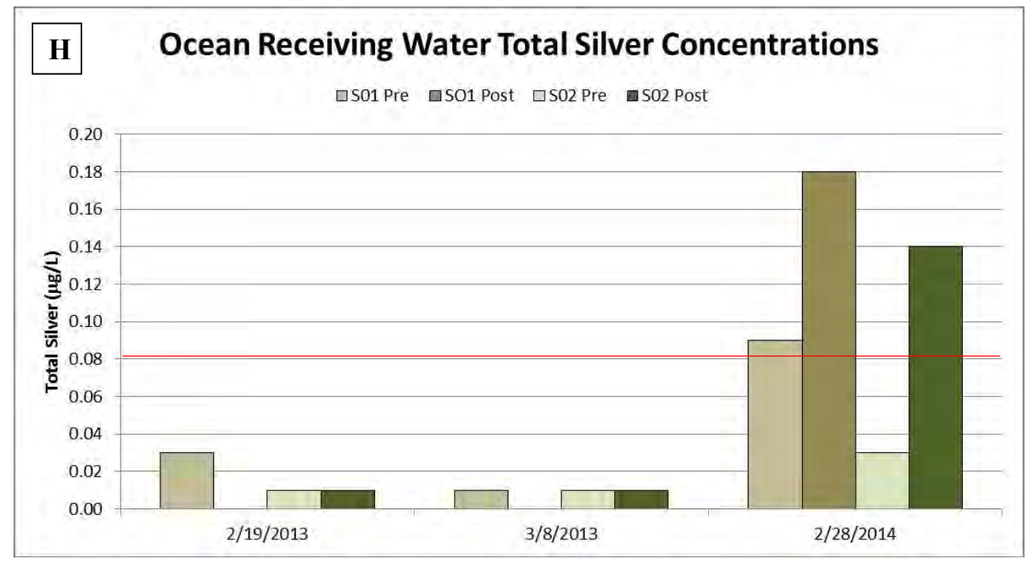
--- indicates 85th percentile reference threshold value

Figure 3-6. Total Copper (A), Zinc (B), Chromium (C), and Nickel (D) Concentrations in Ocean Receiving Water Samples







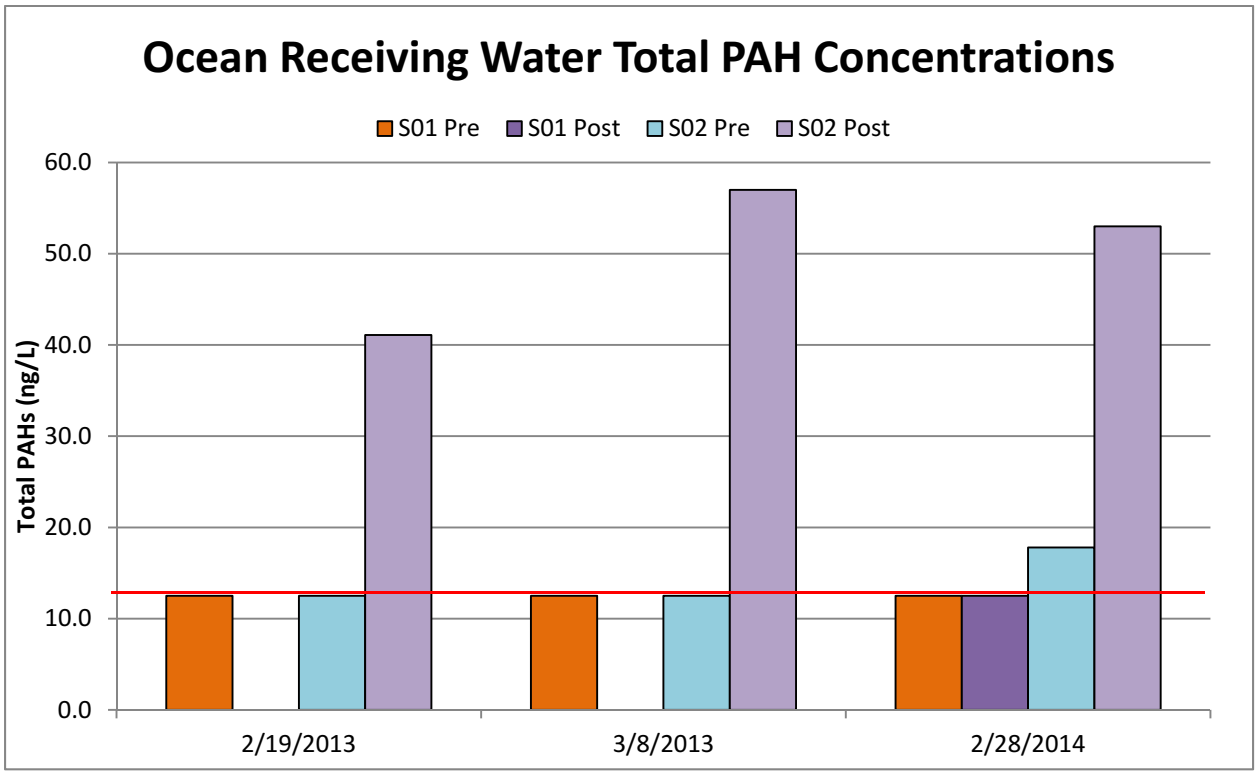


--- indicates 85th percentile reference threshold value

Figure 3-7. Total Arsenic (E), Cadmium (F), Lead (G) and Silver (H) Concentrations in Ocean Receiving Water Samples

3.2.4 Polynuclear Aromatic Hydrocarbons

PAH concentrations were below the detection limit of 1 ng/L for 24 out of 25 analyzed PAHs during Storm 1 post-storm sampling at SO2. Seven PAHs (out of 25 that were analyzed) were detected in the post-storm sample from SO2 during Storm 2. In post-storm sampling during Storm 3, 4 different PAHs were detected in the ocean receiving water at SO1 and 17 different PAHs were detected in the ocean receiving water at S02. Total PAH concentrations are presented in Figure 3-8 for each storm event. Because there was no flow from the linked storm drain outfall at SO1, post-storm samples were not collected in the ocean receiving water during Storms 1 and 2. Total PAH concentrations were greater than the 85th percentile reference threshold value (12.5 ng/L) at SO2 during Storms 1, 2, and 3. Pre-storm total PAH concentrations at SO2 during Storm 3 also exceeded the reference threshold value. The California Ocean Plan does not provide a total PAHs WQO for the protection of marine aquatic life. It should be noted that detected values that were below the reporting limit were summed as half the detection limit for comparison against the 85th percentile reference threshold.



--- indicates 85th percentile reference threshold value

Figure 3-8. Total PAH Concentrations in Ocean Receiving Water

3.2.5 Organophosphorus Pesticides

Pre-storm and post-storm concentrations of organophosphorus pesticides were below the detection limit of 2 ng/L during all three of the monitored storm events. The 85th percentile reference threshold value for total organophosphorus pesticides (6.0 ng/L) was not exceeded

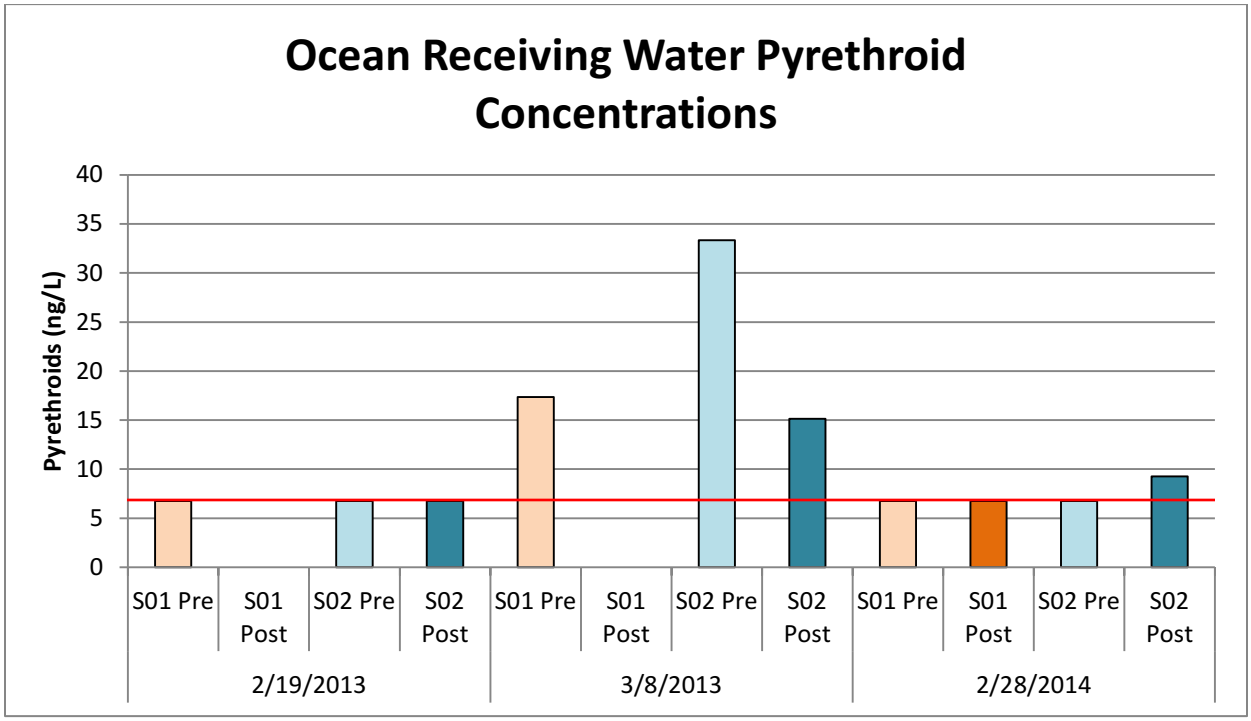
during any of the monitored storm events. There are no California Ocean Plan Imax values for OP pesticides.

3.2.6 Synthetic Pyrethroids

The synthetic pyrethroids bifenthrin, deltamethrin/tralomethrin, and esfenvalerate were detected in one or more ocean receiving water samples. Pyrethroids were either not detected or were detected at concentrations between the detection limit and the reporting limit during Storm 1. During Storm 2, bifenthrin was detected in the S02 post-storm sample and deltamethrin/tralomethrin was detected in the S01 and S02 pre-storm samples, whereas during Storm 3, bifenthrin was the only pyrethroid detected (post-storm sample at SO2).

The 85th percentile reference threshold value for total pyrethroids is 6.75 ng/L and there are no established California Ocean Plan Imax values for synthetic pyrethroids. Estimated concentrations (J-flagged values) were summed in the same fashion as non-detect values at ½ the detection limit for the purpose of comparing to the 85th percentile reference threshold. The post-storm concentration of total pyrethroids at SO2 during Storm 1 was at the 6.75 ng/L threshold value since esfenvalerate was the only pyrethroid detected and was at a concentration below the reporting limit. During Storm 2, pre-storm concentrations of total pyrethroids at SO1 and SO2 and the post-storm concentration at SO2 were each above the reference threshold value of 6.75 ng/L. However, the post-storm concentration of total pyrethroids during Storm 2 at SO2 (15.2 ng/L) was less than the pre-storm concentration (33.4 ng/L). During Storm 3, no pyrethroids were detected in pre-storm samples collected at SO1 and SO2 or post-storm samples at SO1. Bifenthrin was detected in the post-storm sample at SO2 during Storm 3 which elevated the total pyrethroids concentration above the reference threshold value. Total pyrethroid concentrations are presented in Figure 3-9.

Toxicity studies have been performed on the effects of bifenthrin, deltamethrin/tralomethrin, and esfenvalerate exposures to marine invertebrate species. An LC_{50} value of 3.97 ng/L has been derived for the mysid shrimp (*Americamysis bahia*) in exposures to bifenthrin (USEPA, 2013). A bifenthrin concentration of 8.4 ng/L (approximately two times greater than the LC_{50} value), was measured in the Storm 2 S02 post-storm sample. LC_{50} values for mysids exposed to deltamethrin range from 1.7 to 3.7 ng/L (USEPA, 2013). Deltamethrin/tralomethrin concentrations of 10.6 and 26.6 ng/L were measured in the Storm 2 pre-storm samples from S01 and S02, respectively. These concentrations are approximately six to seven times the LC_{50} value. No data related to mysid mortality are available for esfenvalerate; however, an LC_{50} value of 60 ng/L has been derived for the marine grass shrimp *Palaemonetes pugio* (USEPA, 2013). Esfenvalerate concentrations were detected in the Storm 1 pre-storm sample from S01 and the Storm 1 post-storm sample from S02. Both concentrations were estimated values that were between the detection limit and the reporting limit, and were well below 60 ng/L LC_{50} value.



--- indicates 85th percentile reference threshold value for total pyrethroids

Figure 3-9. Pyrethroid Concentrations in Ocean Receiving Water

3.2.7 Toxicity

Toxicity samples were collected during or immediately following each storm from each ocean receiving water location while runoff from the outfall pipe was still flowing to the receiving water. However, no post-storm samples were collected at S01 during Storm 1 and Storm 2 because the flow from outfall ASBS-016 never reached the receiving water. Post-storm samples were collected at SO1 during Storm 3 and at SO2 during Storms 1, 2, and 3 (Table 3-7). Ocean receiving water monitoring toxicity testing consisted of *M. galloprovincialis* development, *S. purpuratus* (sea urchin) fertilization, and *M. pyrifera* (kelp) germination and growth tests. A summary of toxicity results is presented in Table 3-7.

Results indicate that slight toxicity to *S. purpuratus* fertilization and *M. pyrifera* germination and growth was observed in Storm 1 post-storm samples from S02. The *M. pyrifera* germinaton tests resulted in a NOEC of 50 and a TUc value of 2. The *S. purpuratus* fertilization and *M. pyrifera* growth tests resulted in NOECs of 25% and TUc values of 4. EC_{25} and EC_{50} values were greater than 100% test substance for each of these toxicity tests. No toxicity was observed in Storm 2 post-storm samples from S02. No toxicity was observed in Storm 3 samples from SO1 or from SO2.

Table 3-7. Summary of Ocean Receiving Water Monitoring Toxicity Results for Post-Storm Samples

Outfall	Storm Date	Toxicity Test	NOEC (%)	LOEC (%)	EC_{25} (%)	EC_{50} (%)	TU_c
ASBS-SO1	**Storm 3** (February 28, 2014)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1
ASBS-SO2	**Storm 1** (February 19, 2013)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	25	50	>100	>100	4
		Kelp Germination	50	100	>100	>100	2
		Kelp Growth	25	50	>100	>100	4
	Storm 2 (March 8, 2013)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1
	Storm 3 (February 28, 2014)	Bivalve development	100	>100	>100	>100	1
		Sea Urchin Fertilization	100	>100	>100	>100	1
		Kelp Germination	100	>100	>100	>100	1
		Kelp Growth	100	>100	>100	>100	1

Grey shading indicates potential toxicity.
NOEC = no observed effect concentration.
LOEC = lowest observed effect concentration.
EC25 = concentration producing a 25% response.
EC50 = concentration producing a 50% response, or median lethal concentration.

3.3 Flow Modeling and Pollutant Load Calculations

Flow modeling was performed for each of the monitored outfalls for which flow was observed exiting the outfall pipe onto the beach. During smaller storm events (Storm 1 and Storm 2), storm water from some outfalls likely never reaches the ocean receiving water and instead pools on the sand at the base of the outfall. This scenario occurred predominantly at the outfall located along Zuma Beach and Westward Beach during Storm 1 and Storm 2. During larger storm events, such as Storm 3, it is possible that storm water from each of the outfall pipes, with the exception of outfall ASBS-031, which never flowed during any events, reaches the receiving water. Table 3-8 indicates which storm water outfalls were observed flowing to the ocean at the time of sampling during each monitored event.

Table 3-8. Flow Status of Outfalls during Sampling

Location	Outfall	Did flow reach receiving water?		
		Storm 1	Storm 2	Storm 3
		2/19/2013	3/8/2013	2/28/2014
Broad Beach	ASBS-001	Yes	Yes	Yes
	ASBS-002	Yes	Yes	Yes
	ASBS-003	Yes	Yes	Yes
Zuma Beach	ASBS-004	Yes	No	Yes
	ASBS-005	No	No	Yes
	ASBS-008	unknown	No	unknown
	ASBS-011	No	No	No
	ASBS-013	No	No	No
	ASBS-016	No	No	Yes
	ASBS-018	No	No	No
Westward Beach	ASBS-021	No	Yes	Yes
	ASBS-022	No	No	Yes
	ASBS-023	No	No	No
	ASBS-024	No	No	Yes
Escondido Beach	ASBS-025	Yes	Yes	Yes
	ASBS-026	Yes	Yes	Yes
	ASBS-027	Yes	No	Yes
	ASBS-028	Yes	Yes	Yes
	ASBS-029	Yes	No	Yes
	ASBS-030	No	No	Yes
Nicholas Beach	ASBS-031	No	No	No

Modeling was used to estimate flow volumes from each outfall pipe during the three monitored storm events (Table 3-9). Actual flows were measured at two of the largest outfalls and were used to calibrate the flow model. As mentioned above, because not all storm water effluent reached the receiving water, the flows shown in Table 3-9 are representative of flow that reached the beach but not necessarily the receiving water. Large sand berms in front of the outfalls along Zuma Beach and Westward Beach prevented storm water effluent from smaller events from

reaching the receiving water. In general, flow was approximately one order of magnitude higher during Storm 2 than during Storm 1 across all monitored storm drains. Storm 3 had the largest flows of any of the monitored events. Flows during Storm 3 were generally between 1.5 and 3 orders of magnitude higher than Storm 1 flows, and between 0.5 and 2 orders of magnitude higher than flows during Storm 2.

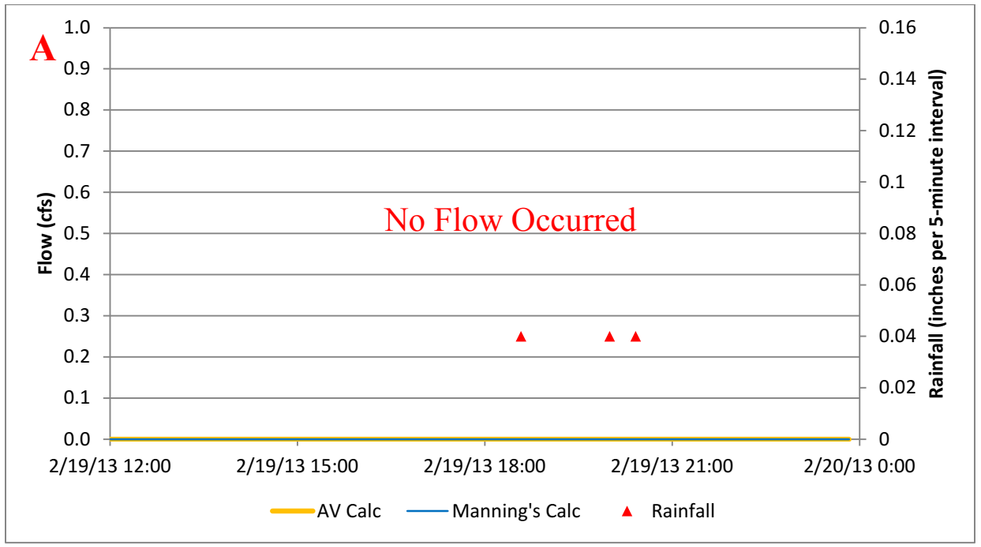
Table 3-9. Estimated Flow Volumes for All Monitored Outfalls during Each Storm Event

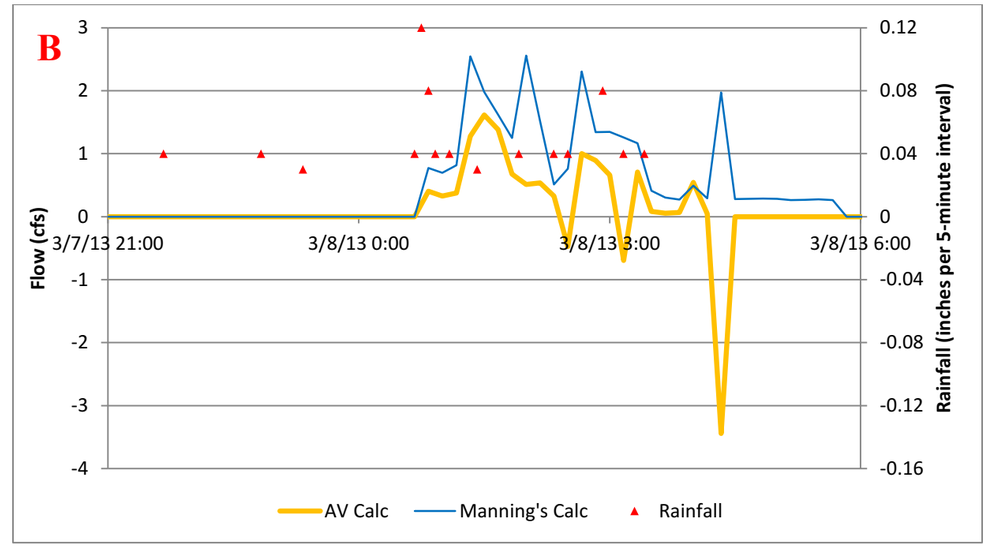
Location	Outfall	Flow Measurement	Total Volume (cf)		
			Storm 1	Storm 2	Storm 3
			2/19/2013	3/8/2013	2/28/2014
Broad Beach	ASBS-001	Modeled	598	6,090	36,127
	ASBS-002	Modeled	452	4,011	35,158
	ASBS-003	Modeled	1,082	8,071	78,539
Zuma Beach	ASBS-004	Modeled	207	1,962	27,600
	ASBS-005	Modeled	850	7,605	73,895
	ASBS-008	Modeled	Not monitored	9,906	Not monitored
	ASBS-011	Modeled	4,436	41,625	250,516
	ASBS-013	Modeled	0*	0*	28,972
	ASBS-016	Modeled	1,675	17,263	97,065
		Monitored	0*	17,023	96,999
	ASBS-018	Modeled	81	1,059	25,626
Westward Beach	ASBS-021	Modeled	4,462	41,400	196,481
	ASBS-022	Modeled	72	568	45,105
	ASBS-023	Modeled	147	1,509	46,718
	ASBS-024	Modeled	354	3,457	89,522
Escondido Beach	ASBS-025	Modeled	7	58	2,118
	ASBS-026	Modeled	44	425	6,882
	ASBS-027	Modeled	593	5,413	57,127
	ASBS-028	Modeled	591	6,442	99,483
		Monitored	991	5,877	99,560
	ASBS-029	Modeled	166	1,617	12,699
	ASBS-030	Modeled	81	645	22,651
Nicholas Beach	ASBS-031	Modeled	0*	0*	0*

*Field observations indicated no flow occurred.

As described in the Flow Monitoring Methods Section (Section 2.3.5), flow monitoring equipment stationed in outfalls ASBS-016 and ASBS-028 provided data and a method to compare flow computed by Chézy–Manning formula (Manning Calc.)(based on water level and pipe geometry, slope, and roughness) to flows computed by the area-velocity calculation (AV Calc.)(based on velocity sensor data and the area of flow. Graphs of AV Calc. flows versus Manning's Calc. flows for each storm event at these two monitored outfalls are shown in Figure 3-10 and Figure 3-11. The different methods of computing flow resulted in fairly similar peak flow rates, which indicates that the monitoring equipment deployed and methodologies utilized

accurately measured the flows discharged from the pipes during the storm events. In general, the consistency and accuracy of velocity sensor varies throughout storm events. For this reason, the Manning Calc. method, as opposed to AV Calc. method, were used to compute total storm volumes for the monitored sites.





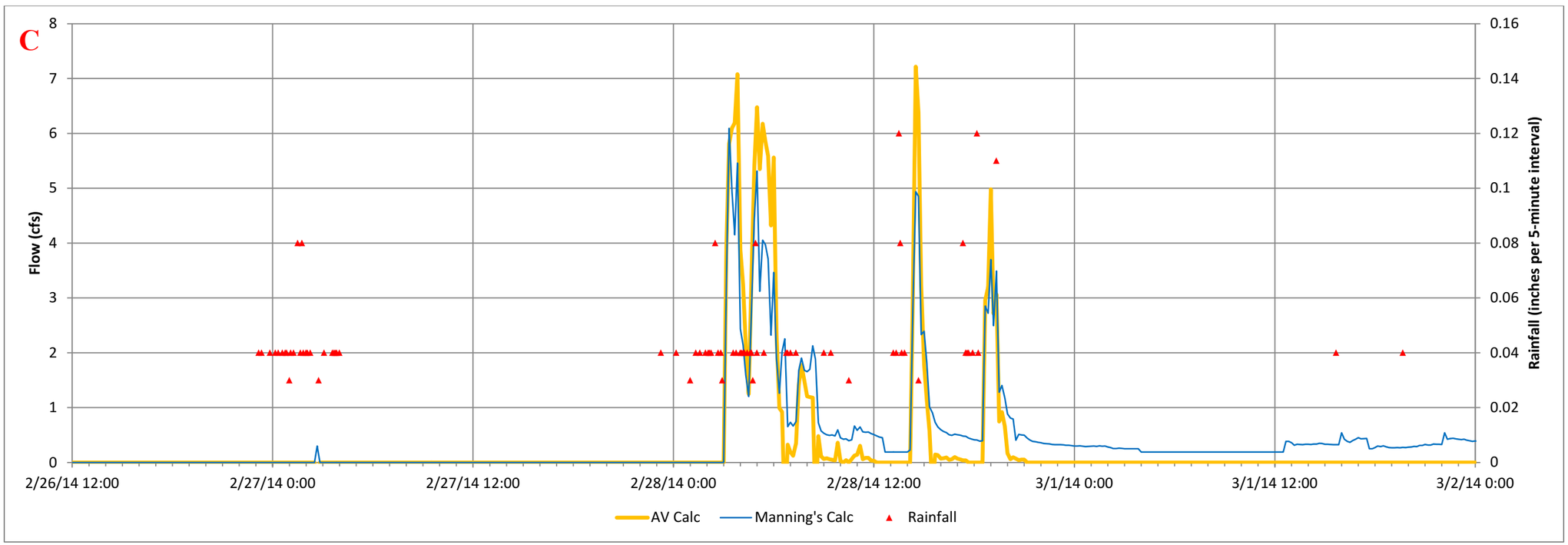


Figure 3-10. Comparison of Manning Calc. and AV Calc. at Station ASBS-016 during Storms 1 (A), 2 (B), and 3 (C)

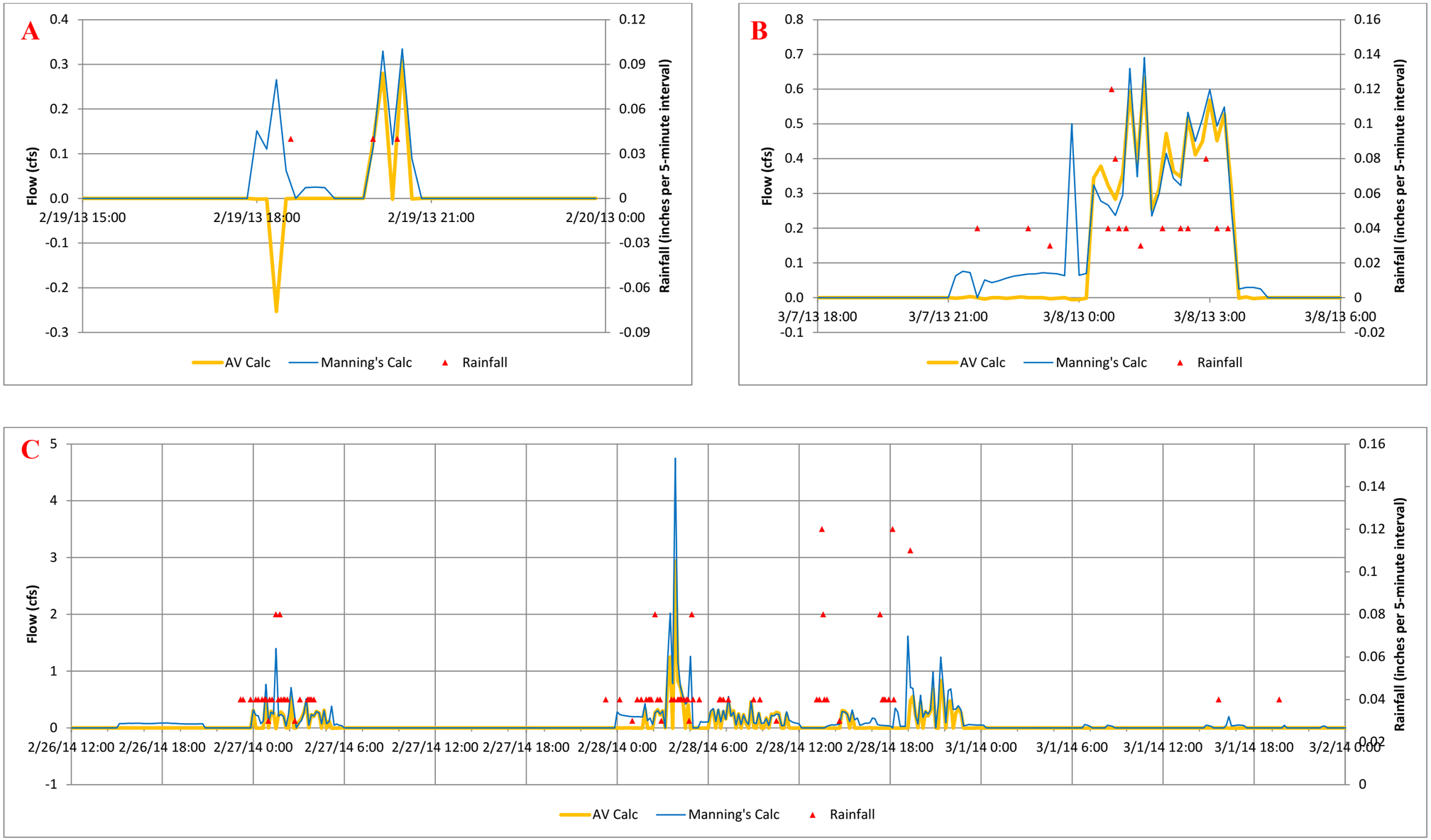


Figure 3-11. Comparison of Manning Calc. and AV Calc. at Station ASBS-028 during Storms 1 (A), 2 (B), and 3 (C)

Flow at ASBS-016

No flow was recorded at ASBS-016 during Storm 1, possibly due to a debris dam upstream of the storm drain's outfall on Zuma Beach. During Storm 2, the monitored flow lagged behind the modeled flow, likely as a result of the presumed debris dam. In general, however, the modeled flow during Storm 2 was fairly predictive of actual recorded flow during this relatively small rain event. Toward the end of Storm 2, negative flow was recorded, likely as a result of the water level falling below the instrument's ability to accurately measure flow. The area velocity sensors used to monitor flow for this project are highly accurate for medium to large rain events, but can become inaccurate at the end of a storm event if the water level at the sensor falls below 0.25 inches. During Storm 3, the monitored flow and the modeled flows were closely aligned, following an adjustment to the model to correct for runoff from pervious areas. Three large peaks in flow were recorded during this event, which spanned nearly 20 hours. The maximum flow during Storm 3 was over 7.0 cfs, recorded at approximately 14:00 on February 28, 2014.

Flow at ASBS-028

Monitored flow closely mirrored actual flow during most of Storm 1. Negative flow was recorded briefly at start of the storm event, likely as a result of the water level being right at the sensor's detection limit (0.25 inches in depth). Peak flows of approximately 0.3 cfs occurred during Storm 1 between 19:00 and 21:00 on February 19, 2013. During Storm 2, the monitored flow initially lagged behind the modeled flow, but then mirrored the modeled flow almost exactly for the remainder of the storm event. Flow during Storm 2 peaked at approximately 0.65 cfs between 01:00 and 02:00 on March 8, 2013. Similar to Storm 2, the actual flow during Storm 3 did not begin at the same time as the modeled flow. This could be a function of the sensor not detecting the initial flow due to low water depth in the storm drain. However, the monitored flow did align well with the modeled flow (following the calibration adjustment for pervious runoff) approximately two hours after the initial rainfall began. Actual flow peaked at 3.0 cfs at approximately 03:00 on February 28, 2014.

Estimated Flow at Unmonitored Outfalls

As described in Section 2.3.5, flow was estimated using the WMMS for sampled outfalls where monitoring equipment was not installed. For the first two events that resulted in total rainfall of 0.12 inches (Storm 1) and 0.74 inches (Storm 2), the WMMS output generally matched the monitored data at outfalls ASBS-016 and ASBS-028. As a result, the WMMS model was used without any calibration to model Storm 1 and Storm 2 at the 18 other outfalls for which flow monitoring equipment was not installed. Storm 3, which was considered a large storm (a total of 2.27 inches of rain was recorded in Malibu), the WMMS significantly underestimated both peak flow rates and total flow volumes for both ASBS-016 and ASBS-028 due to inappropriately estimating the runoff with the pervious areas of each drainage area. As a result, the WMMS output data was corrected to better represent the flows measured at these outfalls. The correction included applying a more accurate runoff coefficient to the pervious areas of each drainage area (runoff coefficient of 5.3% and 29% depending upon the acreage of pervious land. For more detailed information on the calibration process associated with Storm 3 see Section 2.3.5. Graphs of modeled flows for each outfall are provided in Appendix E.

Pollutant Load Estimates

Pollutant load estimates were calculated for each outfall based upon measured constituent concentrations and modeled flow estimates. Load tables were provided for each of the four beaches in which flow occurred (Table 3-10, Table 3-11, Table 3-12, and Table 3-13). No flow

occurred at Nicholas Beach outfall ASBS-031 during any of the storm events, so there was no load calculated. Outfalls that did not flow during a given storm event were not included in the load tables for that event. Because it was difficult to determine what percentage of the total flow actually reached the receiving water, the load estimates presented in the load tables are representative of the potential load to the ASBS rather than the actual load to the ASBS. If flow from a given outfall was observed to be ponded and there was no evidence of that flow reaching the receiving water, the pollutant load entering the receiving water was considered to be zero (calculated loads in Table 3-10 through Table 3-13 were shaded and italicized to indicate load did not reach receiving water). Pollutant loads of TSS and oil and grease were calculated for storm water outfalls less than 36 inches in diameter, whereas pollutant loads for constituents listed in Table B of the Ocean Plan were estimated for stormwater outfalls that were 36 inches or greater in diameter.

Broad Beach

Flow from the three monitored outfalls along Broad Beach reached the receiving water during each of the three storm events (Table 3-10). Pollutant loads at the largest outfall (ASBS-003) were higher by nearly an order of magnitude during Storm 3 than during Storms 1 and 2, due to the much greater flow volume. ASBS-001 and ASBS-002 had relatively low oil and grease and TSS loads during Storm 1. During Storm 2, TSS loads increased by nearly an order of magnitude across all three outfalls and oil and grease increased substantially at ASBS-001. Metal concentrations were approximately one order of magnitude higher during Storm 2 than during Storm 1 at ASBS-003. TSS and oil and grease loads were substantially higher during Storm 3 than during Storm 2 at ASBS-002 and ASBS-003, but were lower at ASBS-001 than during the previous event. The total TSS load at ASBS-003 was 11,331 grams (g), which was approximately 38 and 140 times higher than the TSS load at ASBS-002 and ASBS-001, respectively.

Zuma Beach

ASBS-004 was the only monitored outfall along Zuma Beach that flowed to the ocean receiving water during Storm 1. During Storm 2, no storm water effluent reached the ocean receiving water from any of the Zuma Beach outfalls. Storm water effluent did flow from most of the monitored outfalls along Zuma Beach during these first two storm events, but the effluent became ponded once it reached the beach and did not flow to the receiving water. Only trace amounts of TSS and oil and grease entered the receiving water during Storm 1 from ASBS-004. Calculated loads from the other flowing outfalls during Storm 1 and Storm 2 that reached the beach but not the receiving water were all relatively small with the exception of the load from ASBS-016 during Storm 2, which had moderate TSS and metals loads.

During Storm 3, three of the seven monitored outfalls (ASBS-004, ASBS-005, and ASBS-016) had flow that reached the receiving water (Table 3-11). Storm 3 pollutant loads at ASBS-016 were higher than loads from ASBS-004 and ASBS-005 for all measured constituents. The TSS load at ASBS-016 during Storm 3 was approximately two and four times higher than the TSS loads at ASBS-005 and ASBS-004, respectively. In general, metals and ammonia loads at ASBS-016 during Storm 3 were approximately two times higher than metals loads at ASBS-005.

Table 3-10. Calculated Load Estimates of Constituents Listed in Table B of California Ocean Plan for Outfalls Occurring Along Broad Beach

Parameter	Units	Broad Beach Outfalls								
		Storm 1- 2/19/13			Storm 2- 3/8/13			Storm 3- 2/28/14		
		ASBS-001	ASBS-002	ASBS-003	ASBS-001	ASBS-002	ASBS-003	ASBS-001	ASBS-002	ASBS-003
Total Flow	cubic ft	598	452	1,082	6,090	4,011	8,071	36,127	35,158	78,539
Ammonia as N	g			0.05			0.48			11.01
Oil and Grease	g	0.02	0.02	0.05	38.13	0.06	0.25	0.51	0.50	5.56
TSS	g	4.58	0.69	17.89	91.57	5.99	72.15	81.02	294.69	11331.22
Total Metals										
Arsenic	g			0.07			0.57			20.20
Cadmium	g			0.01			0.16			8.50
Chromium	g			0.31			5.46			167.58
Copper	g			1.95			9.50			243.89
Lead	g			0.43			4.53			159.64
Mercury	g			0.00			0.01			0.00
Nickel	g			0.35			5.10			202.63
Selenium	g			0.02			0.08			0.74
Silver	g			0.00			0.00			0.38
Zinc	g			4.33			32.62			1011.53
Did Flow Reach Receiving Water?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3-11. Calculated Load Estimates of Constituents Listed in Table B of California Ocean Plan for Outfalls Occurring Along Zuma Beach

Parameter	Units	Zuma Beach Outfalls															
		Storm 1- 2/19/13				Storm 2- 3/8/13						Storm 3- 2/28/14					
		ASBS-004	ASBS-005	ASBS-011	ASBS-018	ASBS-004	ASBS-005	ASBS-008	ASBS-011	ASBS-016	ASBS-018	ASBS-004	ASBS-005	ASBS-011	ASBS-013	ASBS-016	ASBS-018
Total Flow	cubic ft	207	850	4,436	81	1,962	7,605	9,906	41,625	17,023	1,059	27,600	73,895	250,516	28,972	96,999	25,626
Ammonia as N	g		*0.03*				*1.02*			*2.31*			0.77			1.87	
Oil and Grease	g	0.02	*0.04*	*0.06*	*0.00*	*4.63*	*0.11*	*0.14*	*0.59*	*0.24*	*0.01*	0.39	1.05	*3.55*	*0.41*	1.37	*0.36*
TSS	g	1.66	*4.49*	*0.23*	*0.17*	*0.97*	*7.99*	*32.37*	*0.29*	*376.96*	*1.74*	463.46	1039.96	*499.41*	*97.63*	2205.62	*40.13*
Total Metals																	
Arsenic	g		*0.04*				*0.31*			*1.80*			3.75			7.55	
Cadmium	g		*0.01*				*0.02*			*0.60*			1.14			3.87	
Chromium	g		*0.19*				*0.56*			*18.90*			43.17			64.84	
Copper	g		*0.73*				*5.85*			*16.33*			58.49			82.14	
Lead	g		*0.14*				*0.37*			*4.89*			12.79			22.33	
Mercury	g		*0.00*				*0.00*			*0.01*			0.00			0.00	
Nickel	g		*0.25*				*0.98*			*23.05*			54.04			104.51	
Selenium	g		*0.00*				*0.02*			*0.08*			0.46			0.62	
Silver	g		*0.00*				*0.01*			*0.00*			0.17			0.27	
Zinc	g		*3.10*				*22.54*			*60.36*			205.83			415.17	
Did Flow Reach Receiving Water?		Yes	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No	Yes	No

Shaded and italicized values indicate that there was flow from the outfall and a chemistry sample was collected, however, flow was ponded at the beach and did not reach the ocean receiving water

Westward Beach
Of the four monitored outfalls along Westward Beach, none flowed to the ocean receiving water during Storm 1, and only outfall ASBS-021 had flow that reached the receiving water during Storm 2. Pollutant loads from ASBS-021 during Storm 2 were calculated to be approximately 75 g TSS, 24 g copper, 12 g nickel, and 103 g zinc, based on the water sample chemistry concentrations and a total flow volume of 41,400 ft^3 (Table 3-12).

During Storm 3, three of the four monitored outfalls (ASBS-021, ASBS-022, and ASBS-024) had flow that reached the receiving water. Flow at ASBS-021 during Storm 3 was considerably higher than flow at ASBS-022 and ASBS-024. As a result, pollutant loads at ASBS-021 were also correspondingly higher than loads at the other outfalls for all measured constituents. The TSS load at ASBS-021 during Storm 3 was approximately 82 and 12 times higher than the TSS load at ASBS-022 and at ASBS-024, respectively. In general, metals loads at ASBS-021 during Storm 3 were between 2 and 15 times higher than metals loads at ASBS-022. The ammonia load was slightly higher at ASBS-021 than at ASBS-022, whereas oil and grease loads at ASBS-021 were two and four times higher than at ASBS-024 and ASBS-022.

Escondido Beach
Of the six monitored outfalls along Escondido Beach, five flowed to the ocean receiving water during Storm 1, three flowed to the ocean receiving water during Storm 2, and six flowed to the ocean receiving water during Storm 3 (Table 3-13). Oil and grease loads and TSS loads were generally low across all outfalls during Storm 1 and Storm 2. Ammonia and metals loads were also low at ASBS-028 during Storm 1, but increased nearly two orders of magnitude during Storm 2 as flow increased from 991 ft^3 (Storm 1) to 5877 ft^3 (Storm 2).

During Storm 3, flow at ASBS-028 was considerably higher than flow at all other Escondido Beach outfalls. Despite this, the TSS load was slightly higher at ASBS-027 than at ASBS-028 and substantially higher than the TSS loads at the other Escondido Beach outfalls. The oil and grease load was approximately 25% higher at ASBS-028 than at ASBS-027, and was more than four times higher than the oil and grease load from all other outfalls. Although the ASBS-028 flow volume was approximately 17 times higher during Storm 3 than its flow volume during Storm 2, the TSS loads for the two storm events were nearly the same and pollutant loads for constituents such as copper and zinc were only two times higher during Storm 3 than during Storm 2. Cadmium, nickel, and chromium had slightly higher loads during Storm 2 than during Storm 3.

TSS Loads
Pollutants typically become bound to particulates in storm water; therefore, it is important to understand which outfalls and storm events are associated with high levels of TSS, because these generally have the highest pollutant loads. TSS loads are presented in Figure 3-12 for each outfall that had flow reaching the ocean receiving water of the ASBS. Although the TSS value for ASBS-003 during Storm 3 was 11,331 g, the scale of Figure 3-12 ranged from 0 to 2500 g in order to retain the resolution needed for the smaller loads to be displayed. In general, the largest TSS loads occurred on Broad Beach and Zuma Beach at the larger outfalls, and on Westward Beach at ASBS-021. TSS loads at Escondido Beach were relatively small by comparion to the other beaches during Storm 3, a large storm event. However, ASBS-028 on Escondido Beach had the highest TSS load of any outfall during a smaller storm event (Storm 2).

Table 3-12. Calculated Load Estimates of Constituents Listed in Table B of California Ocean Plan for Outfalls Occurring Along Westward Beach

		Westward Beach Outfalls											
		Storm 1- 2/19/13				Storm 2- 3/8/13				Storm 3- 2/28/14			
Parameter	Units	ASBS-021	ASBS-022	ASBS-023	ASBS-024	ASBS-021	ASBS-022	ASBS-023	ASBS-024	ASBS-021	ASBS-022	ASBS-023	ASBS-024
Total Flow	cubic ft	4,462	72	147	354	41,400	568	1,509	3,457	196,481	45,105	46,718	89,522
Ammonia as N	g	*0.10*	*0.00*	*0.00*		0.67	*0.02*	*0.03*		2.39	1.93	*0.01*	
Oil and Grease	g	*0.06*	*0.00*	*0.01*	*0.06*	0.59	*0.01*	*0.06*	*0.12*	2.78	0.64	*0.66*	1.27
TSS	g	*2.84*	*0.08*	*0.26*	*4.54*	75.15	*0.17*	*1.41*	*6.23*	823.44	10.09	*6.35*	69.71
Total Metals													
Arsenic	g	*0.15*	*0.00*	*0.01*		2.50	*0.04*	*0.09*		19.60	4.77	*6.26*	
Cadmium	g	*0.01*	*0.00*	*0.00*		0.63	*0.00*	*0.00*		3.05	0.23	*0.37*	
Chromium	g	*0.18*	*0.01*	*0.01*		8.36	*0.03*	*0.08*		33.25	2.75	*2.37*	
Copper	g	*1.44*	*0.17*	*1.11*		24.01	*0.56*	*5.00*		139.39	71.66	*112.34*	
Lead	g	*0.17*	*0.01*	*0.02*		4.62	*0.02*	*0.16*		31.86	2.69	*0.71*	
Mercury	g	*0.00*	*0.00*	*0.00*		0.02	*0.00*	*0.00*		0.00	0.00	*0.00*	
Nickel	g	*0.35*	*0.01*	*0.03*		12.28	*0.03*	*0.15*		50.73	6.10	*11.65*	
Selenium	g	*0.02*	*0.00*	*0.00*		0.09	*0.01*	*0.01*		1.77	1.56	*6.75*	
Silver	g	*0.00*	*0.00*	*0.00*		0.09	*0.00*	*0.00*		0.39	0.27	*0.08*	
Zinc	g	*7.63*	*0.28*	*1.12*		103.39	*0.67*	*6.74*		518.93	123.90	*263.31*	
Did Flow Reach Receiving Water?		No	No	No	No	Yes	No	No	No	Yes	Yes	No	Yes

Shaded and italicized values indicate that there was flow from the outfall and a chemistry sample was collected, however, flow was ponded at the beach and did not reach the ocean receiving water

Table 3-13. Calculated Load Estimates of Constituents Listed in Table B of California Ocean Plan for Outfalls Occurring Along Escondido Beach

		Escondido Beach Outfalls																	
		Storm 1- 2/19/13						Storm 2- 3/8/13						Storm 3- 2/28/14					
Parameter	Units	ASBS-025	ASBS-026	ASBS-027	ASBS-028	ASBS-029	ASBS-030	ASBS-025	ASBS-026	ASBS-027	ASBS-028	ASBS-029	ASBS-030	ASBS-025	ASBS-026	ASBS-027	ASBS-028	ASBS-029	ASBS-030
Total Flow	cubic ft	7	44	593	991	166	81	58	425	5,413	5,877	1,617	645	2,118	6,882	57,127	99,560	12,699	22,651
Ammonia as N	g				0.02						1.30						0.59		
Oil and Grease	g	0.00	0.01	0.05	0.01	0.00	*0.07*	0.00	0.06	*0.26*	1.12	*0.02*	*0.02*	0.03	0.49	2.10	2.82	0.18	0.83
TSS	g	0.02	1.08	3.66	0.46	0.63	*0.14*	0.11	7.94	*2.74*	102.51	*1.36*	*0.59*	1.09	20.11	127.47	113.62	0.68	27.32
Total Metals																			
Arsenic	g				0.02						1.21						1.85		
Cadmium	g				0.01						1.82						0.53		
Chromium	g				0.05						5.39						3.56		
Copper	g				0.37						33.03						73.92		
Lead	g				0.06						7.70						49.48		
Mercury	g				0.00						0.01						0.00		
Nickel	g				0.15						12.83						8.18		
Selenium	g				0.01						0.17						0.94		
Silver	g				0.00						0.01						0.03		
Zinc	g				1.09						133.25						247.12		
Did Flow Reach Receiving Water?		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Shaded and italicized values indicate that there was flow from the outfall and a chemistry sample was collected, however, flow was ponded at the beach and did not reach the ocean receiving water

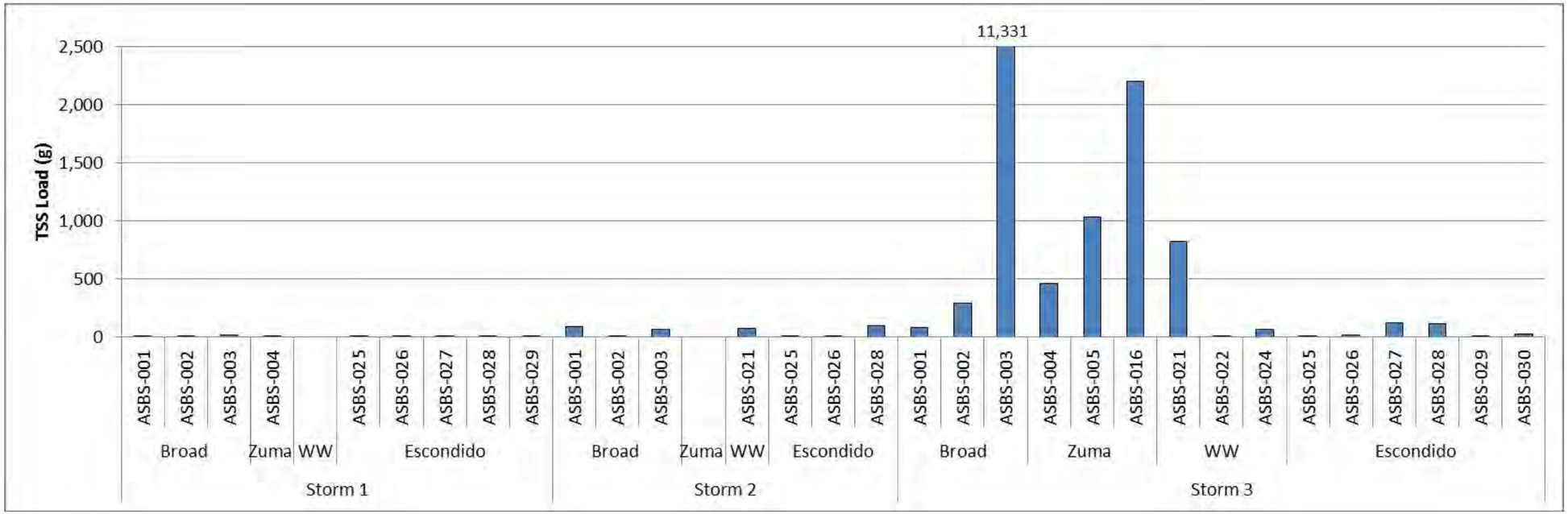


Figure 3-12. TSS Loads from All Sites That Flowed to the Receiving Water

3.4 Annual Load Estimates

Annual load estimates were calculated based on the calculated average load that reached the ocean during the three monitored events, the amount of rainfall that fell during these events, and the average annual rainfall amount for Malibu (15.5 inches, LADPW 2006). Estimates of annual loads for the monitored outfalls along the Malibu ASBS are presented in Table 3-14. Annual loads were categorized based on the percentage of the total load that was expected to reach the ASBS receiving water. A designation of "Full Discharge" indicates that 100% of the annual wet weather load is expected to reach the ocean receiving water because flow was observed reaching the receiving water during each of the three storm events. A designation of "Some Discharge" indicates that approximately 50% of the annual wet weather load is expected to reach the receiving water because effluent was observed reaching the receiving water during one or two of the storm events, but did not reach the receiving water during all of the storm events. A designation of "No Discharge" indicates that flow never reached the receiving water during the three monitored storms and therefore is unlikely to reach the receiving water during future storm events. Of the 21 monitored outfalls, six received a "Full Discharge" designation, whereas nine received a "Some Discharge" designation, and six received a "No Discharge" designation. All of the outfalls that received a "Full Discharge" designation occur on either Broad Beach or Escondido Beach and generally have only a short distance of beach to cross, if any, before reaching the receiving water of the ASBS.

3.5 Determination of Compliance with Natural Water Quality

Compliance with natural water quality was assessed by comparing post-storm receiving water data from wet weather monitoring recently conducted for ASBS 24 to the pre-storm data from the same site and to the 85th percentile threshold of reference sample concentrations measured during Bight 2008 and Bight 2013. Compliance with natural water quality requires lower values of post-storm receiving water concentrations relative to the 85th percentile reference threshold and the pre-storm concentrations. The Bight data from 2013 were combined with previously collected data during Bight '08 to determine the current 85th percentile constituent thresholds for natural water quality.

Concentrations of pollutants in post-storm receiving water were compared to those in pre-storm receiving water and to the 85th percentile threshold of reference sample concentrations. When post-storm receiving water concentrations are greater than the 85th percentile threshold and are greater than pre-storm concentrations for two or more consecutive storm events, they are considered to be in exceedance of natural water quality.

During Storm 1, the selenium concentration at SO2 was the only constituent that was above the 85th percentile reference threshold and was also above the pre-storm concentration. For Storm 2, concentrations of nitrate, copper, lead, selenium, zinc, and total PAHs at SO2 were above the 85th percentile reference threshold and were also above the pre-storm concentrations. Storm 3 had concentrations of TSS, mercury, selenium, and silver above the natural water quality criteria at SO2, and mercury, silver, and zinc concentrations above the natural water quality criteria at SO1.

Thus, at SO1 there is potentially an exceedance of natural water quality for mercury, silver, and zinc. However, because only one storm event had runoff that reached the receiving water, it is assumed to remain in compliance because a second storm event did not confirm these results. For SO2, there is an exceedance of natural water quality for selenium, mercury, and total PAHs.

Table 3-14. Estimates of Annual Loads from Monitored Outfalls along ASBS 24

		Outfall ASBS-																				
		Broad Beach			Zuma Beach							Westward Beach				Escondido Beach						Nicholas Beach
Parameter	Units	001	002	003	004	005	008	011	013	016	018	021	022	023	024	025	026	027	028	029	030	031
Ammonia as N	g			19.1		3.0				10.4		5.2	3.2	0.1					3.2			
Oil and Grease	g	63.9	0.9	9.7	8.3	2.0	0.7	6.9	2.0	4.0	0.6	5.7	1.1	1.2	2.4	0.1	0.9	4.0	6.5	0.3	1.5	not measured
TSS	g	292.9	498.3	18883.2	770.6	1740.0	160.6	826.5	484.2	6404.8	69.5	1490.4	17.1	13.3	133.1	2.0	48.2	221.3	358.1	4.4	46.4	not measured
Total Metals																						
Arsenic	g			34.5		6.8				23.2		36.8	7.9	10.5					5.1			
Cadmium	g			14.3		1.9				11.1		6.1	0.4	0.6					3.9			
Chromium	g			286.6		72.6				207.7		69.1	4.6	4.1					14.9			
Copper	g			422.2		107.6				244.2		272.6	119.7	195.8					177.4			
Lead	g			272.1		22.0				67.5		60.6	4.5	1.5					94.6			
Mercury	g			0.0		0.0				0.0		0.0	0.0	0.0					0.0			
Nickel	g			344.0		91.4				316.4		104.8	10.1	19.6					35.0			
Selenium	g			1.4		0.8				1.7		3.1	2.6	11.2					1.9			
Silver	g			0.6		0.3				0.7		0.8	0.4	0.1					0.1			
Zinc	g			1733.5		382.7				1179.3		1041.5	206.4	448.3					630.7			
Load entering ASBS Category		Full Discharge*	Full Discharge*	Full Discharge*	Some Discharge**	Some Discharge**	No Discharge***	No Discharge***	No Discharge***	Some Discharge**	No Discharge***	Some Discharge**	Some Discharge**	No Discharge***	Some Discharge**	Full Discharge*	Full Discharge*	Some Discharge**	Full Discharge*	Some Discharge**	Some Discharge**	No Discharge***

Full Discharge* indicates 100% of annual wet weather load is expected to reach ocean receiving water
Some Discharge** indicates approximately 50% of annual wet weather load is expected to reach ocean receiving water
No Discharge*** indicates 0% of annual load is expected to reach ocean receiving water

4.0 SUMMARY AND DISCUSSION

Special Protections Monitoring for ASBS 24 consisted of core monitoring of 21 outfall stations located along five beaches and ocean receiving water monitoring of two stations. Monitoring comprised chemical analyses of PAHs, pyrethroids, metals, OP pesticides, ammonia, nitrate, oil and grease, TSS, and total orthophosphate for core discharge stations with outfalls that were 36 inches or greater in diameter and for ocean receiving water stations. Monitoring of core discharge stations whose outfalls were less than 36 inches in diameter consisted of analysis of TSS and oil and grease. Toxicity testing was also performed on core discharge samples (one species during one storm event) and ocean receiving water samples (three species during each storm event). Results from the three monitoring events are discussed below.

Core Discharge Monitoring

Core discharge monitoring results revealed that TSS and oil and grease concentrations varied substantially among the monitored outfalls, with the highest concentrations of these pollutants occurring at outfalls along Broad Beach (ASBS-003 and ASBS-001, respectively). During Storm 1, copper was above the COP Imax value at four outfalls, whereas zinc was above the Imax at one outfall. During Storm 2, copper and chromium concentrations were above Imax values at five and three outfalls, respectively, whereas ammonia cadmium, lead, nickel and zinc were above Imax values at one outfall. In total, six metals and ammonia exceeded Imax values at ASBS-028 during Storm 2, whereas all other outfalls had two or less Imax exceedances. During Storm 3, ASBS-003 had five metals that exceeded Imax values; no other outfall had more than one metal exceed an Imax value. It should be mentioned that comparison to Imax values is for guidance purposes only and does not imply a breach of compliance.

Two OP pesticides were detected during the core discharge monitoring. Malathion was detected at ASBS-023 during two storm events, whereas chlorpyrifos was detected at ASBS-003 during one storm event. The highest malathion and chlorpyrifos concentrations that were detected in any of the core discharge samples were substantially lower than concentrations shown to cause toxicity in published literature, indicating that OP pesticides do not likely present a significant source of toxicity within the ASBS. Total PAHs varied considerably from storm to storm and outfall to outfall. The highest concentrations of total PAHs occurred at ASBS-023 during Storm 1, ASBS-028 during Storm 2, and ASBS-003 during Storm 3. The highest concentrations of pyrethroid pesticides occurred at ASBS-023 during Storm 1 and Storm 2, and at ASBS-003 during Storm 3. Across all outfalls and storm events, the pyrethroids bifenthrin and cyfluthrin occurred most frequently.

Toxicity testing was performed on 20 of 21 monitored outfalls (no testing was performed on effluent from ASBS-031 because it never flowed during any storm events). Results of toxicity analyses suggest that slight toxicity to *M. galloprovincialis* development occurred in exposure to water collected during Storm 1 at outfalls ASBS-002, ASBS-026, and ASBS-028 and in exposure to water collected during Storm 2 at ABS-004 and ASBS-022. Storm water from only one outfall underwent toxicity testing during Storm 3, and no toxicity was observed. No toxicity was observed at 15 of the 20 outfalls in which testing was performed.The slight toxicity observed resulted in a NOEC of 50% and a TUc value of 2 at ASBS-002, ASBS-004, and ASBS-026, and a NOEC of 25% and a TUc of 4 at ASBS-022 and ASBS-028.

Ocean Receiving Water Monitoring

Ocean receiving water samples were collected from SO2 during all three storm events and from SO1 during Storm 3 only, since no flow reached the receiving water during Storm 1 or Storm 2. Ocean receiving water chemistry results revealed that TSS, nitrate, several metals, total pyrethroids, and total PAHs were above the 85th percentile reference threshold. Several constituents, such as nitrate and ammonia during Storm 1 at SO2, and several metals during Storm 3 at SO2 and SO1, had higher concentrations in pre-storm samples than in post-storm samples. Post-storm concentrations of constituents that were above both pre-storm concentrations and reference thresholds are presented in Table 4-1. Selenium and total PAHs at SO2 were the only recurring constituents that were elevated above background concentrations (pre-storm concentrations) and the 85th percentile reference threshold for two consecutive storm events.

Table 4-1. Post-storm Ocean Receiving Water Concentrations that were above Pre-storm Concentrations and above 85th Percentile Reference Threshold

Storm 1		Storm 2		Storm 3	
SO1	SO2	SO1	SO2	SO1	SO2
	Selenium Total PAHs		Nitrate Chromium Copper Lead Nickel Selenium Zinc Total PAHs	Mercury Silver Zinc	Total orthophosphate TSS Mercury Selenium Silver Total pyrethroids Total PAHs

Toxicity results from exposure to ocean receiving water associated with receiving water site SO2 (associated with outfall ASBS-028) indicate that slight toxicity to *S. purpuratus* fertilization and *M. pyrifera* germination and growth occurred during Storm 1. No toxicity was observed for any test species or endpoint at SO2 during Storm 2 and Storm 3 or at SO1 during Storm 3. The slight toxicity observed during Storm 1 at SO2 resulted in a kelp germination NOEC of 50% and a TUc value of 2, and sea urchin fertilization and kelp growth NOECs of 25% and TUc values of 4.

Link between Outfall Concentrations and Receiving Water Concentrations

The link between the concentrations measured at outfalls ASBS-016 and ASBS-028 to concentrations measured at their respective ocean receiving water stations were explored. During Storm 1 and Storm 2, flow from outfall ASBS-016 never reached the ocean receiving water, so comparisons between outfall and receiving water during these events could only be made for outfall ASBS-028 and SO2.

As previously mentioned, Selenium and total PAHs at SO2 were the only recurring constituents in the ocean receiving water that were elevated above background concentrations (pre-storm concentrations) and were above the 85th percentile reference threshold for two consecutive storm events.

Total PAHs measured in effluent from outfall ASBS-028 during Storm 1 were 18.1 ng/L. The post-storm receiving water concentration at SO2 was measured at 41.1 ng/L, which was slightly above the reference threshold of 12.5 ng/L (Table 4-2). There is no Imax value for total PAHs. With the exception of naphthalene, all PAHs were measured below detection limits at both the outfall and in the ocean receiving water. Slightly higher naphthalene in the ocean receiving water may have come from an alternate source such as a motorized boat or nearby storm drain. It is also plausible that the low levels detected and small difference between the outfall and receiving water can be attributed to sample variability. Based on these data, the storm drain does not appear to be the cause for the exceedance of natural water quality observed in the receiving water.

The selenium concentration at outfall ASBS-028 during Storm 1 was over two orders of magnitude below the COP Imax value (Table 4-2). The post-storm receiving water concentration was three orders of magnitude below the COP Imax, but was slightly above the reference threshold criteria. The slight increase in selenium from the pre-storm concentration to the post-storm concentration within the receiving water may be attributable to sample variability or it may have been influenced by the somewhat higher outfall concentration. However, it should be noted that selenium is a naturally occurring element and is not toxic to marine aquatic life at the low concentrations observed in the post-storm receiving water.

Table 4-2. Storm 1 Comparison of Outfall and Ocean Receiving Water Concentrations

Parameter	Units	California Ocean Plan Instantaneous Maximum (Imax)	Natural Water Quality (85th Percentile)	Outfall	Ocean Receiving Water	
				028	S02-PRE	S02-POST
				2/19/2013	2/18/2013	2/19/2013
Total Metals						
Selenium (Se)	µg/L	150	0.017	0.435	0.015	0.031
Total PAHs	ng/L		12.5	18.1	12.5	41.1

grey highlighted cells indicate results above the natural water quality.

The total PAH concentration measured during Storm 2 at ASBS-028 was 1,758 ng/L. The post-storm receiving water concentration at SO2 was measured at 57.0 ng/L, which was slightly above the reference threshold of 12.5 ng/L and the pre-storm concentration of 12.5 ng/L (Table 4-3). Based on these data, the ocean receiving water concentration may have been influenced by the effluent from outfall ASBS-028. However, other outside sources of PAHs such as motorized boats, atmospheric deposition, or runoff from a nearby storm drain cannot be ruled out as potential contributors to the slightly higher post-storm total PAH level.

The selenium concentration at outfall ASBS-028 during Storm 2 was over two orders of magnitude below the COP Imax value (Table 4-3). The post-storm receiving water concentration was three orders of magnitude below the COP Imax, but was slightly above the reference threshold criteria. The slight increase in selenium from the pre-storm concentration to the post-storm concentration within the receiving water may be attributable to sample variability or it may have been influenced by the marginally higher outfall concentration. Selenium is a naturally occurring element and runoff from the surrounding land may have contributed to increased levels in the ocean receiving water. The trace concentrations measured in the ocean receiving water are not toxic to marine aquatic life.

Table 4-3. Storm 2 Comparison of Outfall and Ocean Receiving Water Concentrations

Parameter	Units	California Ocean Plan Instantaneous Maximum (Imax)	Natural Water Quality (85th Percentile)	Outfall	Ocean Receiving Water	
				028	S02-PRE	S02-POST
				2/19/2013	2/18/2013	2/19/2013
Total Metals						
Selenium (Se)	µg/L	150	0.017	1.004	0.017	0.052
Total PAHs	ng/L		12.5	1757.7	12.5	57.0

grey highlighted cells indicate results above the natrual water quality.

Post-storm receiving water concentrations at SO1 were above reference thresholds and above pre-storm concentrations for silver, zinc, and selenium (Table 4-4). Since Storm 3 was an exceptionally large storm event, it should not be surprising that a developed watershed would have effluent concentrations for some constituents that exceeded receiving water criteria of a reference watershed. Both silver and mercury had lower concentrations at the outfall than in the receiving water, indicating that the outfall is an unlikely source of the slight increase in concentration for these constituents in the receiving water. The measured difference in concentration may be the result of sample variability. The post-storm receiving water zinc concentration may have increased as a result of the somewhat higher outfall concentration at ASBS-016. However, this did not occur at SO2, as an elevated zinc concentration at outfall ASBS-028 resulted in a decreased zinc concentration in the receiving water.

Storm 3 outfall concentrations at ASBS-028 were above reference thresholds for total PAHs and selenium. The total PAH concentration measured during Storm 3 at ASBS-028 was 1,181 ng/L. The post-storm receiving water concentration at SO2 was measured at 84.1 ng/L, which was slightly above the reference threshold of 12.5 ng/L and the pre-storm concentration of 28.5 ng/L (Table 4-4). Based on these data, the ocean receiving water concentration may have been influenced by the effluent from outfall ASBS-028. However, other outside sources of PAHs such as motorized boats, atmospheric deposition, or runoff from a nearby storm drain cannot be ruled out as potential contributors to the slightly higher post-storm total PAH level.

The selenium concentration at outfall ASBS-028 during Storm 3 was over two orders of magnitude below the COP Imax value (Table 4-3). Both pre-storm and post-storm receiving water concentrations of selenium were above the reference threshold criteria, despite being approximately three orders of magnitude below the COP Imax. Given the selenium concentration of the outfall (approximately twice the concentration of the post-storm receiving water), it seems unlikely that the outfall would be entirely responsible for the increased selenium concentration of the receiving water, unless one assumes there was a dilution of only 1:2. A dilution this low would run counter to the findings of a dilution and dispersion study performed for the City of San Diego in 2013. In that study, it was determined that the median surf zone dilution for effluent entering a sandy beach in La Jolla Shores was 22:1 (AMEC 2013). Thus, the higher post-storm receiving water concentration of selenium at SO2 during Storm 3 may be attributable to other sources. It should be stressed, however, that the trace selenium concentrations measured in the ocean receiving water are not toxic to marine aquatic life.

Table 4-4. Storm 3 Comparison of Outfall and Ocean Receiving Water Concentrations

Parameter	Units	California Ocean Plan Instantaneous Maximum	Natural Water Quality (85th Percentile)	Outfall 016	Ocean Receiving Water S01-PRE	Ocean Receiving Water S01-POST	Outfall 028	Ocean Receiving Water S02-PRE	Ocean Receiving Water S02-POST
				2/28/14	2/25/14	2/28/14	2/28/14	2/25/14	2/28/14
Total Metals									
Mercury	µg/L	0.4	0.0006	<0.0012 J	<0.0012 J	0.014	<0.0012 J	<0.0012 J	0.0261
Silver	µg/L	7	0.08	0.10	0.09	0.18	0.01J	0.03	0.14
Zinc	µg/L	200	18.6	151.15	5.35	21.05	87.65	41.71	12.02
Selenium	µg/L	150	0.017	0.226	0.016	0.011J	0.334	0.083	0.155
Total PAHs	ng/L		12.5	1,088.7	12.5	12.5	1,181.3	28.5	84.1

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
grey highlighted cells indicate results above the natural water quality reference threshold.

Compliance with Natural Water Quality

Compliance with natural water quality was determined by comparing post-storm receiving water data from wet weather monitoring recently conducted for ASBS 24 to pre-storm receiving water data and to the 85th percentile threshold of reference sample concentrations calculated from data collected during Bight 2008 and Bight 2013.

In accordance with the *Special Protections* document, concentrations of pollutants in post-storm receiving water are compared to those in pre-storm receiving water and to the 85th percentile threshold of reference sample concentrations. When post-storm receiving water concentrations are greater than the 85th percentile threshold and are greater than pre-storm concentrations, results from the next storm are analyzed. If post-storm receiving water concentrations are again greater than the 85th percentile threshold and pre-storm concentrations, the constituent(s) are considered as exceedances of natural water quality.

During the 2012-2013 and 2013-2014 storm seasons, wet weather monitoring was performed at two receiving water locations: SO1 and SO2. Whereas SO2 was sampled during each of the three monitored storm events, SO1 was only sampled during Storm 3 as a result of a lack of connectivity between the effluent from storm drain ASBS-016 and the ocean receiving water. Based on the results from these three storm events, SO2 was outside of compliance with natural water quality for selenium and total PAHs, per the criteria set forth in *Special Protections*. However, it should be noted that all post-storm samples from SO1 and SO2 were below COP Imax concentrations during all storm events, and that several of the natural water quality exceedances in the receiving water can be attributed to either sample variability or sources other than effluent from the adjacent outfall. As an example, during Storm 3 at SO1, both silver and mercury had lower concentrations at the outfall than in the receiving water, indicating that the outfall is an unlikely source of the slight increase in concentration from pre-storm levels for these constituents in the receiving water.

Storm 3 post-storm samples from SO1 were above pre-storm concentrations and the 85th percentile reference threshold for the metals mercury, silver, and zinc; however, because data were able to be collected from only one storm event, compliance with natural water quality could not be determined.

4.1 Recommendations

For the evaluation on the potential load reductions required in accordance with the *Special Protections* document, see the Area of Special Biological Significance 24 Compliance Plan for the County of Los Angeles and the City of Malibu that is currently being drafted.

5.0 LITERATURE CITED

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APPENDIX C

Chemistry Results

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

March 02, 2016

Dan McCoy
Weston Solutions, Inc.
5817 Dryden Place
Carlsbad, CA 92008-

Project Name: LACDPW Malibu ASBS
Physis Project ID: 1210002-006

Dear Dan,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 1/3/2016. A total of 6 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Total Suspended Solids by SM 2540 D
Total Orthophosphate as P by SM 4500-P E
Oil & Grease by EPA 1664B
Nitrate as N by SM 4500-NO3 E
Ammonia as N by SM 4500-NH3 D
Elements
Total Trace Metals & Mercury (EPA 1640) by EPA 1640
Organics
Synthetic Pyrethroid Pesticides by EPA 625-NCI
Polynuclear Aromatic Hydrocarbons by EPA 625
Organophosphorus Pesticides by EPA 625

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Misty Mercier
Extension 202
714-335-5918 cell
mistymercier@physislabs.com

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ENVIRONMENTAL LABORATORIES, INC.
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PROJECT SAMPLE LIST

Weston Solutions, Inc. PHYSIS Project ID: 1210002-006

LACDPW Malibu ASBS Total Samples: 6

PHYSIS ID	Sample ID	Description	Date	Time	Matrix
38526	LACDPW-010316-ASBS-SO1 PRE		1/3/2016	12:30	Seawater
38527	LACDPW-010316-ASBS-SO2 PRE		1/3/2016	11:50	Seawater
38744	LACDPW-010616-ASBS-028		1/6/2016	16:20	Freshwater
38745	LACDPW-010616-ASBS-S02-Post		1/6/2016	16:20	Seawater
38746	LACDPW-010616-ASBS-016		1/6/2016	17:15	Freshwater
38747	LACDPW-010616-ASBS-S01		1/6/2016	17:15	Seawater

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

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Conventionals — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38526-R1	**LACDPW-010316-ASBS-SO1 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**12:30**	**Received: 03-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	57.6	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23143		Prepared: 05-Jan-16		Analyzed: 05-Jan-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 05-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	0.02	0.01	0.05	mg/L	J
Sample ID: 38527-R1	**LACDPW-010316-ASBS-SO2 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**11:50**	**Received: 03-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	4.5	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23143		Prepared: 05-Jan-16		Analyzed: 05-Jan-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 05-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	0.02	0.01	0.05	mg/L	J
Sample ID: 38744-R1	**LACDPW-010616-ASBS-028**	**Matrix: Freshwater**		**Sampled: 06-Jan-16**	**16:20**	**Received: 06-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	1040	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	0.42	0.02	0.05	mg/L	
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	4.8	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23150		Prepared: 08-Jan-16		Analyzed: 08-Jan-16

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Conventionals — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Total Orthophosphate as P	NA	0.21	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 08-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	0.34	0.01	0.05	mg/L	
Sample ID: 38745-R1	**LACDPW-010616-ASBS-S02-Post**	**Matrix: Seawater**		**Sampled: 06-Jan-16**	**16:20**	**Received: 06-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	35.2	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	0.04	0.02	0.05	mg/L	J
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23150		Prepared: 08-Jan-16		Analyzed: 08-Jan-16
Total Orthophosphate as P	NA	0.04	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 08-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	0.03	0.01	0.05	mg/L	J
Sample ID: 38746-R1	**LACDPW-010616-ASBS-016**	**Matrix: Freshwater**		**Sampled: 06-Jan-16**	**17:15**	**Received: 06-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	284	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	0.51	0.02	0.05	mg/L	
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23150		Prepared: 08-Jan-16		Analyzed: 08-Jan-16
Total Orthophosphate as P	NA	0.39	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 08-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	1.98	0.01	0.05	mg/L	
Sample ID: 38747-R1	**LACDPW-010616-ASBS-S01**	**Matrix: Seawater**		**Sampled: 06-Jan-16**	**17:15**	**Received: 06-Jan-16**
	Method: SM 2540 D	Batch ID: C-17143		Prepared: 09-Jan-16		Analyzed: 09-Jan-16
Total Suspended Solids	NA	10.7	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18115		Prepared: 28-Jan-16		Analyzed: 28-Jan-16
Ammonia as N	NA	0.15	0.02	0.05	mg/L	

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Conventionals

ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
	Method: EPA 1664B	Batch ID: C-19048		Prepared: 25-Jan-16		Analyzed: 25-Jan-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-23150		Prepared: 08-Jan-16		Analyzed: 08-Jan-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-23155		Prepared: 08-Jan-16		Analyzed: 26-Jan-16
Nitrate as N	NA	0.04	0.01	0.05	mg/L	J

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38526-R1	**LACDPW-010316-ASBS-SO1 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**12:30**	**Received: 03-Jan-16**
	Method: EPA 1640	Batch ID: E-10073		Prepared: 11-Feb-16		Analyzed: 20-Feb-16
Arsenic (As)	Total	1.525	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0357	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.3171	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.396	0.005	0.01	µg/L	
Lead (Pb)	Total	0.3222	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.9828	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.02	0.005	0.015	µg/L	
Silver (Ag)	Total	0.08	0.01	0.02	µg/L	
Zinc (Zn)	Total	0.3685	0.0025	0.005	µg/L	
Sample ID: 38527-R1	**LACDPW-010316-ASBS-SO2 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**11:50**	**Received: 03-Jan-16**
	Method: EPA 1640	Batch ID: E-10073		Prepared: 11-Feb-16		Analyzed: 20-Feb-16
Arsenic (As)	Total	1.437	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0275	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.2748	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.25	0.005	0.01	µg/L	
Lead (Pb)	Total	0.0552	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.3281	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.015	0.005	0.015	µg/L	
Silver (Ag)	Total	0.08	0.01	0.02	µg/L	
Zinc (Zn)	Total	1.4714	0.0025	0.005	µg/L	
Sample ID: 38744-R1	**LACDPW-010616-ASBS-028**	**Matrix: Freshwater**		**Sampled: 06-Jan-16**	**16:20**	**Received: 06-Jan-16**
	Method: EPA 1640	Batch ID: E-10073		Prepared: 11-Feb-16		Analyzed: 19-Feb-16
Arsenic (As)	Total	7.243	0.005	0.015	µg/L	
Cadmium (Cd)	Total	8.3246	0.0025	0.005	µg/L	
Chromium (Cr)	Total	36.7011	0.0125	0.025	µg/L	
Copper (Cu)	Total	71.403	0.005	0.01	µg/L	

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Lead (Pb)	Total	33.5413	0.0025	0.005	µg/L	
Mercury (Hg)	Total	0.5599	0.0012	0.005	µg/L	
Nickel (Ni)	Total	69.7875	0.0025	0.005	µg/L	
Selenium (Se)	Total	1.482	0.005	0.015	µg/L	
Silver (Ag)	Total	0.01	0.01	0.02	µg/L	J
Zinc (Zn)	Total	413.4303	0.0025	0.005	µg/L	

Sample ID: 38745-R1 **LACDPW-010616-ASBS-S02-Post** **Matrix: Seawater** **Sampled: 06-Jan-16 16:20** **Received: 06-Jan-16**
Method: EPA 1640 Batch ID: E-10073 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

Arsenic (As)	Total	1.592	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.1077	0.0025	0.005	µg/L	
Chromium (Cr)	Total	1.955	0.0125	0.025	µg/L	
Copper (Cu)	Total	2.004	0.005	0.01	µg/L	
Lead (Pb)	Total	0.6518	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	1.9523	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.076	0.005	0.015	µg/L	
Silver (Ag)	Total	0.09	0.01	0.02	µg/L	
Zinc (Zn)	Total	5.2993	0.0025	0.005	µg/L	

Sample ID: 38746-R1 **LACDPW-010616-ASBS-016** **Matrix: Freshwater** **Sampled: 06-Jan-16 17:15** **Received: 06-Jan-16**
Method: EPA 1640 Batch ID: E-10073 Prepared: 11-Feb-16 Analyzed: 19-Feb-16

Arsenic (As)	Total	4.141	0.005	0.015	µg/L	
Cadmium (Cd)	Total	9.2101	0.0025	0.005	µg/L	
Chromium (Cr)	Total	35.1759	0.0125	0.025	µg/L	
Copper (Cu)	Total	73.101	0.005	0.01	µg/L	
Lead (Pb)	Total	34.7992	0.0025	0.005	µg/L	
Mercury (Hg)	Total	0.4391	0.0012	0.005	µg/L	
Nickel (Ni)	Total	72.0448	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.965	0.005	0.015	µg/L	
Silver (Ag)	Total	0.08	0.01	0.02	µg/L	
Zinc (Zn)	Total	446.4958	0.0025	0.005	µg/L	

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38747-R1	**LACDPW-010616-ASBS-S01**	**Matrix: Seawater**		**Sampled: 06-Jan-16 17:15**		**Received: 06-Jan-16**
	Method: EPA 1640	Batch ID: E-10073		Prepared: 11-Feb-16		Analyzed: 20-Feb-16
Arsenic (As)	Total	1.551	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0279	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.8967	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.564	0.005	0.01	µg/L	
Lead (Pb)	Total	0.1701	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.8076	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.012	0.005	0.015	µg/L	J
Silver (Ag)	Total	0.09	0.01	0.02	µg/L	
Zinc (Zn)	Total	1.1452	0.0025	0.005	µg/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38526-R1	**LACDPW-010316-ASBS-SO1 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16 12:30**		**Received: 03-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(PCB030)	Total	89			% Recovery	
(PCB112)	Total	90			% Recovery	
(PCB198)	Total	83			% Recovery	
(TCMX)	Total	71			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	
Sample ID: 38527-R1	**LACDPW-010316-ASBS-SO2 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16 11:50**		**Received: 03-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(PCB030)	Total	74			% Recovery	
(PCB112)	Total	85			% Recovery	
(PCB198)	Total	81			% Recovery	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(TCMX)	Total	56			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 38744-R1 **LACDPW-010616-ASBS-028** **Matrix: Freshwater** **Sampled: 06-Jan-16 16:20** **Received: 06-Jan-16**
Method: EPA 625 Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 04-Feb-16

(PCB030)	Total	96			% Recovery	
(PCB112)	Total	93			% Recovery	
(PCB198)	Total	31			% Recovery	
(TCMX)	Total	99			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 38745-R1 **LACDPW-010616-ASBS-S02-Post** **Matrix: Seawater** **Sampled: 06-Jan-16 16:20** **Received: 06-Jan-16**
Method: EPA 625 Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 04-Feb-16

(PCB030)	Total	97			% Recovery	
(PCB112)	Total	93			% Recovery	
(PCB198)	Total	84			% Recovery	
(TCMX)	Total	90			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 38746-R1 **LACDPW-010616-ASBS-016** **Matrix: Freshwater** **Sampled: 06-Jan-16 17:15** **Received: 06-Jan-16**

Method: EPA 625 Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 04-Feb-16

(PCB030)	Total	77			% Recovery	
(PCB112)	Total	78			% Recovery	
(PCB198)	Total	74			% Recovery	
(TCMX)	Total	68			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 38747-R1 **LACDPW-010616-ASBS-S01** **Matrix: Seawater** **Sampled: 06-Jan-16 17:15** **Received: 06-Jan-16**
Method: EPA 625 Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 04-Feb-16

(PCB030)	Total	79			% Recovery	
(PCB112)	Total	79			% Recovery	
(PCB198)	Total	78			% Recovery	
(TCMX)	Total	59			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38526-R1	**LACDPW-010316-ASBS-SO1 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16 12:30**		**Received: 03-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	83			% Recovery	
(d10-Phenanthrene)	Total	80			% Recovery	
(d12-Chrysene)	Total	100			% Recovery	
(d8-Naphthalene)	Total	76			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	ND	1	5	ng/L	
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	ND	1	5	ng/L	
Benz[a]anthracene	Total	ND	1	5	ng/L	
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	ND	1	5	ng/L	
Benzo[e]pyrene	Total	ND	1	5	ng/L	
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L	
Benzo[k]fluoranthene	Total	ND	1	5	ng/L	
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	ND	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	ND	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	2.1	1	5	ng/L	J
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	ND	1	5	ng/L	
Pyrene	Total	ND	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38527-R1	**LACDPW-010316-ASBS-SO2 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16 11:50**		**Received: 03-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	78			% Recovery	
(d10-Phenanthrene)	Total	80			% Recovery	
(d12-Chrysene)	Total	102			% Recovery	
(d8-Naphthalene)	Total	70			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	1.6	1	5	ng/L	J
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	ND	1	5	ng/L	
Benz[a]anthracene	Total	ND	1	5	ng/L	
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	ND	1	5	ng/L	
Benzo[e]pyrene	Total	ND	1	5	ng/L	
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L	
Benzo[k]fluoranthene	Total	ND	1	5	ng/L	
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	ND	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	ND	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	2.7	1	5	ng/L	J
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	1.1	1	5	ng/L	J
Pyrene	Total	ND	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38744-R1	**LACDPW-010616-ASBS-028**	**Matrix: Freshwater**		**Sampled: 06-Jan-16 16:20**		**Received: 06-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	94			% Recovery	
(d10-Phenanthrene)	Total	89			% Recovery	
(d12-Chrysene)	Total	136			% Recovery	
(d8-Naphthalene)	Total	85			% Recovery	
1-Methylnaphthalene	Total	6.3	1	5	ng/L	
1-Methylphenanthrene	Total	42.8	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	11.3	1	5	ng/L	
Acenaphthene	Total	10.7	1	5	ng/L	
Acenaphthylene	Total	10.4	1	5	ng/L	
Anthracene	Total	36.1	1	5	ng/L	
Benz[a]anthracene	Total	104.6	1	5	ng/L	
Benzo[a]pyrene	Total	54.4	1	5	ng/L	
Benzo[b]fluoranthene	Total	124	1	5	ng/L	
Benzo[e]pyrene	Total	136.8	1	5	ng/L	
Benzo[g,h,i]perylene	Total	122.9	1	5	ng/L	
Benzo[k]fluoranthene	Total	35.4	1	5	ng/L	
Biphenyl	Total	5.3	1	5	ng/L	
Chrysene	Total	307.8	1	5	ng/L	
Dibenz[a,h]anthracene	Total	32.3	1	5	ng/L	
Dibenzothiophene	Total	24.9	1	5	ng/L	
Fluoranthene	Total	352.3	1	5	ng/L	
Fluorene	Total	12.6	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	106.5	1	5	ng/L	
Naphthalene	Total	23.1	1	5	ng/L	
Perylene	Total	67.1	1	5	ng/L	
Phenanthrene	Total	255.5	1	5	ng/L	
Pyrene	Total	277.1	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38745-R1	**LACDPW-010616-ASBS-S02-Post**	**Matrix: Seawater**		**Sampled: 06-Jan-16 16:20**		**Received: 06-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	90			% Recovery	
(d10-Phenanthrene)	Total	85			% Recovery	
(d12-Chrysene)	Total	112			% Recovery	
(d8-Naphthalene)	Total	81			% Recovery	
1-Methylnaphthalene	Total	1.3	1	5	ng/L	J
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	2.9	1	5	ng/L	J
2-Methylnaphthalene	Total	2.1	1	5	ng/L	J
Acenaphthene	Total	1.4	1	5	ng/L	J
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	1.3	1	5	ng/L	J
Benz[a]anthracene	Total	2.7	1	5	ng/L	J
Benzo[a]pyrene	Total	1.7	1	5	ng/L	J
Benzo[b]fluoranthene	Total	3.1	1	5	ng/L	J
Benzo[e]pyrene	Total	2.6	1	5	ng/L	J
Benzo[g,h,i]perylene	Total	4	1	5	ng/L	J
Benzo[k]fluoranthene	Total	1.3	1	5	ng/L	J
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	4.6	1	5	ng/L	J
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	6.9	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	3.9	1	5	ng/L	J
Perylene	Total	6.1	1	5	ng/L	
Phenanthrene	Total	6.3	1	5	ng/L	
Pyrene	Total	5.4	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38746-R1	**LACDPW-010616-ASBS-016**	**Matrix: Freshwater**		**Sampled: 06-Jan-16 17:15**		**Received: 06-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	82			% Recovery	
(d10-Phenanthrene)	Total	88			% Recovery	
(d12-Chrysene)	Total	118			% Recovery	
(d8-Naphthalene)	Total	82			% Recovery	
1-Methylnaphthalene	Total	1.5	1	5	ng/L	J
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	2.7	1	5	ng/L	J
Acenaphthene	Total	6.7	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	17.4	1	5	ng/L	
Benz[a]anthracene	Total	9.2	1	5	ng/L	
Benzo[a]pyrene	Total	6.7	1	5	ng/L	
Benzo[b]fluoranthene	Total	18.1	1	5	ng/L	
Benzo[e]pyrene	Total	14.3	1	5	ng/L	
Benzo[g,h,i]perylene	Total	14.7	1	5	ng/L	
Benzo[k]fluoranthene	Total	5.6	1	5	ng/L	
Biphenyl	Total	2.1	1	5	ng/L	J
Chrysene	Total	24	1	5	ng/L	
Dibenz[a,h]anthracene	Total	7.1	1	5	ng/L	
Dibenzothiophene	Total	9.4	1	5	ng/L	
Fluoranthene	Total	23.9	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	20.6	1	5	ng/L	
Naphthalene	Total	5.9	1	5	ng/L	
Perylene	Total	3.4	1	5	ng/L	J
Phenanthrene	Total	14.6	1	5	ng/L	
Pyrene	Total	20.6	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38747-R1	**LACDPW-010616-ASBS-S01**	**Matrix: Seawater**		**Sampled: 06-Jan-16 17:15**		**Received: 06-Jan-16**
	Method: EPA 625	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 04-Feb-16
(d10-Acenaphthene)	Total	77			% Recovery	
(d10-Phenanthrene)	Total	84			% Recovery	
(d12-Chrysene)	Total	102			% Recovery	
(d8-Naphthalene)	Total	69			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	1.8	1	5	ng/L	J
2-Methylnaphthalene	Total	1.3	1	5	ng/L	J
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	ND	1	5	ng/L	
Benz[a]anthracene	Total	ND	1	5	ng/L	
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	ND	1	5	ng/L	
Benzo[e]pyrene	Total	ND	1	5	ng/L	
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L	
Benzo[k]fluoranthene	Total	ND	1	5	ng/L	
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	ND	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	ND	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	2.1	1	5	ng/L	J
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	1.1	1	5	ng/L	J
Pyrene	Total	ND	1	5	ng/L	

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Pyrethroids — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38526-R1	**LACDPW-010316-ASBS-SO1 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**12:30**	**Received: 03-Jan-16**
	Method: EPA 625-NCI	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 20-Jan-16
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	
Permethrin, trans-	Total	ND	5	10	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	
Sample ID: 38527-R1	**LACDPW-010316-ASBS-SO2 PRE**	**Matrix: Seawater**		**Sampled: 03-Jan-16**	**11:50**	**Received: 03-Jan-16**
	Method: EPA 625-NCI	Batch ID: O-9034		Prepared: 07-Jan-16		Analyzed: 20-Jan-16
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	
Permethrin, trans-	Total	ND	5	10	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	

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Pyrethroids ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 38744-R1 **LACDPW-010616-ASBS-028** **Matrix: Freshwater** **Sampled: 06-Jan-16 16:20** **Received: 06-Jan-16**
Method: EPA 625-NCI Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 20-Jan-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	164.2	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	3.9	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	3.3	0.5	2	ng/L	
Fenvalerate	Total	1.1	0.5	2	ng/L	J
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	
Permethrin, trans-	Total	ND	5	10	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 38745-R1 **LACDPW-010616-ASBS-S02-Post** **Matrix: Seawater** **Sampled: 06-Jan-16 16:20** **Received: 06-Jan-16**
Method: EPA 625-NCI Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 20-Jan-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	
Permethrin, trans-	Total	ND	5	10	ng/L	

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Pyrethroids ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 38746-R1 **LACDPW-010616-ASBS-016** **Matrix: Freshwater** **Sampled: 06-Jan-16 17:15** **Received: 06-Jan-16**
Method: EPA 625-NCI Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 20-Jan-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	
Permethrin, trans-	Total	ND	5	10	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 38747-R1 **LACDPW-010616-ASBS-S01** **Matrix: Seawater** **Sampled: 06-Jan-16 17:15** **Received: 06-Jan-16**
Method: EPA 625-NCI Batch ID: O-9034 Prepared: 07-Jan-16 Analyzed: 20-Jan-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	5	10	ng/L	

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Pyrethroids

ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Permethrin, trans-	Total	ND	5	10	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

QUALITY CONTROL REPORT

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Conventionals QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Ammonia as N			**Method: SM 4500-NH3 D**			**Fraction: NA**			**Prepared: 28-Jan-16**			**Analyzed: 28-Jan-16**			
38524-B1	QAQC Procedural Blank	C-18115	ND	0.02	0.05	mg/L									
38524-BS1	QAQC Procedural Blank	C-18115	0.25	0.02	0.05	mg/L	0.25	0	100	80 - 120%	PASS				
38524-BS2	QAQC Procedural Blank	C-18115	0.25	0.02	0.05	mg/L	0.25	0	100	80 - 120%	PASS	0	25	PASS	
38526-MS1	LACDPW-010316-ASBS-	C-18115	0.32	0.02	0.05	mg/L	0.25	0	128	80 - 120%	PASS			PASS	Q
38526-MS2	LACDPW-010316-ASBS-	C-18115	0.32	0.02	0.05	mg/L	0.25	0	128	80 - 120%	PASS	0	25	PASS	Q
38526-R2	LACDPW-010316-ASBS-	C-18115	ND	0.02	0.05	mg/L						0	25	PASS	
Nitrate as N			**Method: SM 4500-NO3 E**			**Fraction: NA**			**Prepared: 05-Jan-16**			**Analyzed: 26-Jan-16**			
38524-B1	QAQC Procedural Blank	C-23155	ND	0.01	0.05	mg/L									
38524-BS1	QAQC Procedural Blank	C-23155	0.52	0.01	0.05	mg/L	0.5	0	104	80 - 120%	PASS				
38524-BS2	QAQC Procedural Blank	C-23155	0.52	0.01	0.05	mg/L	0.5	0	104	80 - 120%	PASS	0	25	PASS	
38526-MS1	LACDPW-010316-ASBS-	C-23155	0.57	0.01	0.05	mg/L	0.5	0.02	110	80 - 120%	PASS				
38526-MS2	LACDPW-010316-ASBS-	C-23155	0.58	0.01	0.05	mg/L	0.5	0.02	112	80 - 120%	PASS	2	25	PASS	
38526-R2	LACDPW-010316-ASBS-	C-23155	0.02	0.01	0.05	mg/L						0	25	PASS	J
Oil & Grease			**Method: EPA 1664B**			**Fraction: NA**			**Prepared: 25-Jan-16**			**Analyzed: 25-Jan-16**			
38524-B1	QAQC Procedural Blank	C-19048	ND	1	1	mg/L									
38524-BS1	QAQC Procedural Blank	C-19048	36.2	1	1	mg/L	40	0	91	80 - 120%	PASS				
38524-BS2	QAQC Procedural Blank	C-19048	37.5	1	1	mg/L	40	0	94	80 - 120%	PASS	4	25	PASS	
Total Orthophosphate as P			**Method: SM 4500-P E**			**Fraction: NA**			**Prepared: 05-Jan-16**			**Analyzed: 05-Jan-16**			
38524-B1	QAQC Procedural Blank	C-23143	ND	0.01	0.02	mg/L									
38524-BS1	QAQC Procedural Blank	C-23143	0.19	0.01	0.02	mg/L	0.2	0	95	80 - 120%	PASS				
38524-BS2	QAQC Procedural Blank	C-23143	0.2	0.01	0.02	mg/L	0.2	0	100	80 - 120%	PASS	5	25	PASS	
38526-MS1	LACDPW-010316-ASBS-	C-23143	0.22	0.01	0.02	mg/L	0.2	0.03	95	80 - 120%	PASS				
38526-MS2	LACDPW-010316-ASBS-	C-23143	0.22	0.01	0.02	mg/L	0.2	0.03	95	80 - 120%	PASS	0	25	PASS	
38526-R2	LACDPW-010316-ASBS-	C-23143	0.03	0.01	0.02	mg/L						0	25	PASS	
38745-MS1	LACDPW-010616-ASBS-	C-23150	0.23	0.01	0.02	mg/L	0.2	0.04	95	80 - 120%	PASS				
38745-MS2	LACDPW-010616-ASBS-	C-23150	0.24	0.01	0.02	mg/L	0.2	0.04	100	80 - 120%	PASS	5	25	PASS	
38745-R2	LACDPW-010616-ASBS-	C-23150	0.04	0.01	0.02	mg/L						0	25	PASS	
38748-B1	QAQC Procedural Blank	C-23150	ND	0.01	0.02	mg/L									

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Conventionals QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
38748-BS1	QAQC Procedural Blank	C-23150	0.2	0.01	0.02	mg/L	0.2	0	100	80 - 120%	PASS			
38748-BS2	QAQC Procedural Blank	C-23150	0.21	0.01	0.02	mg/L	0.2	0	105	80 - 120%	PASS	5	25 PASS	

Total Suspended Solids **Method: SM 2540 D** **Fraction: NA** **Prepared: 09-Jan-16** **Analyzed: 09-Jan-16**

38524-B1	QAQC Procedural Blank	C-17143	ND	0.5	0.5	mg/L								
38744-R2	LACDPW-010616-ASBS-	C-17143	952	0.5	0.5	mg/L						9	25 PASS	

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 38524-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10073		Prepared: 11-Feb-16			Analyzed: 20-Feb-16		
Arsenic (As)	Total	ND	0.005	0.015	µg/L							
Cadmium (Cd)	Total	ND	0.0025	0.005	µg/L							
Chromium (Cr)	Total	ND	0.0125	0.025	µg/L							
Copper (Cu)	Total	ND	0.005	0.01	µg/L							
Lead (Pb)	Total	ND	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Total	ND	0.0025	0.005	µg/L							
Selenium (Se)	Total	ND	0.005	0.015	µg/L							
Silver (Ag)	Total	ND	0.01	0.02	µg/L							
Zinc (Zn)	Total	ND	0.0025	0.005	µg/L							
Sample ID: 38525-LCM1	**QAQC LCM - Physis Seawater**				**Matrix: Seawater**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10073		Prepared: 11-Feb-16			Analyzed: 20-Feb-16		
Arsenic (As)	Total	1.731	0.005	0.015	µg/L							
Cadmium (Cd)	Total	0.0839	0.0025	0.005	µg/L							
Chromium (Cr)	Total	0.182	0.0125	0.025	µg/L							
Copper (Cu)	Total	0.149	0.005	0.01	µg/L							
Lead (Pb)	Total	0.0067	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Total	0.355	0.0025	0.005	µg/L							
Selenium (Se)	Total	0.033	0.005	0.015	µg/L							
Silver (Ag)	Total	0.06	0.01	0.02	µg/L							
Zinc (Zn)	Total	0.7389	0.0025	0.005	µg/L							
Sample ID: 38525-LCS1	**QAQC LCM - Physis Seawater**				**Matrix: Seawater**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10073		Prepared: 11-Feb-16			Analyzed: 20-Feb-16		
Arsenic (As)	Total	22.176	0.005	0.015	µg/L	20	1.731	102	75 - 125%	PASS		
Cadmium (Cd)	Total	16.8781	0.0025	0.005	µg/L	20	0.0839	84	75 - 125%	PASS		
Chromium (Cr)	Total	21.3525	0.0125	0.025	µg/L	20	0.182	106	75 - 125%	PASS		
Copper (Cu)	Total	19.244	0.005	0.01	µg/L	20	0.149	95	75 - 125%	PASS		

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Lead (Pb)	Total	18.7909	0.0025	0.005	µg/L	20	0.0067	94	75 - 125%	PASS				
Mercury (Hg)	Total	8.7439	0.0012	0.005	µg/L	10	0	87	75 - 125%	PASS				
Nickel (Ni)	Total	18.5916	0.0025	0.005	µg/L	20	0.355	91	75 - 125%	PASS				
Selenium (Se)	Total	20.089	0.005	0.015	µg/L	20	0.033	100	75 - 125%	PASS				
Silver (Ag)	Total	9.63	0.01	0.02	µg/L	10	0.06	96	75 - 125%	PASS				
Zinc (Zn)	Total	17.4756	0.0025	0.005	µg/L	20	0.7389	84	75 - 125%	PASS				

Sample ID: 38525-LCS2 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10073 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

Arsenic (As)	Total	20.981	0.005	0.015	µg/L	20	1.731	96	75 - 125%	PASS	6	25	PASS	
Cadmium (Cd)	Total	16.4895	0.0025	0.005	µg/L	20	0.0839	82	75 - 125%	PASS	2	25	PASS	
Chromium (Cr)	Total	20.7739	0.0125	0.025	µg/L	20	0.182	103	75 - 125%	PASS	3	25	PASS	
Copper (Cu)	Total	18.967	0.005	0.01	µg/L	20	0.149	94	75 - 125%	PASS	1	25	PASS	
Lead (Pb)	Total	18.2203	0.0025	0.005	µg/L	20	0.0067	91	75 - 125%	PASS	3	25	PASS	
Mercury (Hg)	Total	8.4421	0.0012	0.005	µg/L	10	0	84	75 - 125%	PASS	4	25	PASS	
Nickel (Ni)	Total	18.1838	0.0025	0.005	µg/L	20	0.355	89	75 - 125%	PASS	2	25	PASS	
Selenium (Se)	Total	19.939	0.005	0.015	µg/L	20	0.033	100	75 - 125%	PASS	0	25	PASS	
Silver (Ag)	Total	9.51	0.01	0.02	µg/L	10	0.06	94	75 - 125%	PASS	2	25	PASS	
Zinc (Zn)	Total	16.4964	0.0025	0.005	µg/L	20	0.7389	79	75 - 125%	PASS	6	25	PASS	

Sample ID: 38526-R2 **LACDPW-010316-ASBS-SO1 PRE** **Matrix: Seawater** **Sampled: 03-Jan-16 12:30** **Received: 03-Jan-16**
Method: EPA 1640 Batch ID: E-10073 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

Arsenic (As)	Total	1.465	0.005	0.015	µg/L						4	25	PASS	
Cadmium (Cd)	Total	0.0305	0.0025	0.005	µg/L						16	25	PASS	
Chromium (Cr)	Total	0.5959	0.0125	0.025	µg/L						61	25	FAIL	NH
Copper (Cu)	Total	0.386	0.005	0.01	µg/L						3	25	PASS	
Lead (Pb)	Total	0.3149	0.0025	0.005	µg/L						2	25	PASS	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L						0	25	PASS	
Nickel (Ni)	Total	0.9567	0.0025	0.005	µg/L						3	25	PASS	
Selenium (Se)	Total	0.018	0.005	0.015	µg/L						11	25	PASS	
Silver (Ag)	Total	0.08	0.01	0.02	µg/L						0	25	PASS	
Zinc (Zn)	Total	0.2144	0.0025	0.005	µg/L						53	25	FAIL	NH

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 38744-R2	**LACDPW-010616-ASBS-028**				**Matrix: Freshwater**		**Sampled: 06-Jan-16 16:20**			**Received: 06-Jan-16**		
	Method: EPA 1640				Batch ID: E-10073		Prepared: 11-Feb-16			Analyzed: 19-Feb-16		
Arsenic (As)	Total	3.94	0.005	0.015	µg/L					59	25 FAIL	NH
Cadmium (Cd)	Total	8.9511	0.0025	0.005	µg/L					7	25 PASS	
Chromium (Cr)	Total	34.506	0.0125	0.025	µg/L					6	25 PASS	
Copper (Cu)	Total	70.083	0.005	0.01	µg/L					2	25 PASS	
Lead (Pb)	Total	33.3159	0.0025	0.005	µg/L					1	25 PASS	
Mercury (Hg)	Total	0.5363	0.0012	0.005	µg/L					4	25 PASS	
Nickel (Ni)	Total	71.7218	0.0025	0.005	µg/L					3	25 PASS	
Selenium (Se)	Total	1.387	0.005	0.015	µg/L					7	25 PASS	
Silver (Ag)	Total	0.06	0.01	0.02	µg/L					143	25 FAIL	SL
Zinc (Zn)	Total	422.4352	0.0025	0.005	µg/L					2	25 PASS	

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 38524-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625				Batch ID: O-9034		Prepared: 06-Jan-16			Analyzed: 03-Feb-16		
(PCB030)	Total	91			% Recovery	100		91	57 - 133%	PASS		
(PCB112)	Total	90			% Recovery	100		90	65 - 133%	PASS		
(PCB198)	Total	95			% Recovery	100		95	69 - 133%	PASS		
(TCMX)	Total	85			% Recovery	100		85	39 - 135%	PASS		
Bolstar (Sulprofos)	Total	ND	2	4	ng/L							
Chlorpyrifos	Total	ND	0.5	1	ng/L							
Demeton	Total	ND	1	2	ng/L							
Diazinon	Total	ND	0.5	1	ng/L							
Dichlorvos	Total	ND	3	6	ng/L							
Dimethoate	Total	ND	5	10	ng/L							
Disulfoton	Total	ND	1	2	ng/L							
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L							
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L							
Fensulfothion	Total	ND	1	2	ng/L							
Fenthion	Total	ND	2	4	ng/L							
Malathion	Total	ND	3	6	ng/L							
Methidathion	Total	ND	5	10	ng/L							
Methyl parathion	Total	ND	1	2	ng/L							
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L							
Phorate	Total	ND	5	10	ng/L							
Phosmet	Total	ND	5	10	ng/L							
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L							
Tokuthion	Total	ND	3	6	ng/L							
Trichloronate	Total	ND	1	2	ng/L							
Sample ID: 38524-BS1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625				Batch ID: O-9034		Prepared: 06-Jan-16			Analyzed: 03-Feb-16		
(PCB030)	Total	65			% Recovery	100	0	65	57 - 133%	PASS		
(PCB112)	Total	65			% Recovery	100	0	65	65 - 133%	PASS		

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB198)	Total	69			% Recovery	100	0	69	69 - 133%	PASS			
(TCMX)	Total	60			% Recovery	100	0	60	39 - 135%	PASS			
Bolstar (Sulprofos)	Total	346.4	2	4	ng/L	500	0	69	50 - 150%	PASS			
Chlorpyrifos	Total	385.9	0.5	1	ng/L	500	0	77	50 - 150%	PASS			
Demeton	Total	254.3	1	2	ng/L	500	0	51	50 - 150%	PASS			
Diazinon	Total	436.3	0.5	1	ng/L	500	0	87	50 - 150%	PASS			
Dichlorvos	Total	377.2	3	6	ng/L	500	0	75	50 - 150%	PASS			
Dimethoate	Total	353.2	5	10	ng/L	500	0	71	50 - 150%	PASS			
Disulfoton	Total	420.9	1	2	ng/L	500	0	84	50 - 150%	PASS			
Ethoprop (Ethoprofos)	Total	388.5	1	2	ng/L	500	0	78	50 - 150%	PASS			
Fenchlorphos (Ronnel)	Total	396.5	2	4	ng/L	500	0	79	50 - 150%	PASS			
Fensulfothion	Total	411.9	1	2	ng/L	500	0	82	50 - 150%	PASS			
Fenthion	Total	299.6	2	4	ng/L	500	0	60	50 - 150%	PASS			
Malathion	Total	284.2	3	6	ng/L	500	0	57	50 - 150%	PASS			
Methidathion	Total	228.1	5	10	ng/L	500	0	46	50 - 150%	PASS		PASS	Q
Methyl parathion	Total	468.8	1	2	ng/L	500	0	94	50 - 150%	PASS			
Mevinphos (Phosdrin)	Total	396	5	10	ng/L	500	0	79	50 - 150%	PASS			
Phorate	Total	301	5	10	ng/L	500	0	60	50 - 150%	PASS			
Phosmet	Total	254.9	5	10	ng/L	500	0	51	50 - 150%	PASS			
Tetrachlorvinphos (Stirofos)	Total	338.7	2	4	ng/L	500	0	68	50 - 150%	PASS			
Tokuthion	Total	378.8	3	6	ng/L	500	0	76	50 - 150%	PASS			
Trichloronate	Total	378.3	1	2	ng/L	500	0	76	50 - 150%	PASS			

Sample ID: 38524-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625 Batch ID: O-9034 Prepared: 06-Jan-16 Analyzed: 03-Feb-16

(PCB030)	Total	76			% Recovery	100	0	76	57 - 133%	PASS	16	30	PASS
(PCB112)	Total	73			% Recovery	100	0	73	65 - 133%	PASS	12	30	PASS
(PCB198)	Total	78			% Recovery	100	0	78	69 - 133%	PASS	12	30	PASS
(TCMX)	Total	71			% Recovery	100	0	71	39 - 135%	PASS	17	30	PASS
Bolstar (Sulprofos)	Total	423.9	2	4	ng/L	500	0	85	50 - 150%	PASS	21	25	PASS
Chlorpyrifos	Total	472.5	0.5	1	ng/L	500	0	94	50 - 150%	PASS	20	25	PASS
Demeton	Total	294.7	1	2	ng/L	500	0	59	50 - 150%	PASS	15	25	PASS

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Diazinon	Total	511.6	0.5	1	ng/L	500	0	102	50 - 150%	PASS	16	25	PASS	
Dichlorvos	Total	430	3	6	ng/L	500	0	86	50 - 150%	PASS	14	25	PASS	
Dimethoate	Total	323	5	10	ng/L	500	0	65	50 - 150%	PASS	9	25	PASS	
Disulfoton	Total	482.6	1	2	ng/L	500	0	97	50 - 150%	PASS	14	25	PASS	
Ethoprop (Ethoprofos)	Total	456.5	1	2	ng/L	500	0	91	50 - 150%	PASS	15	25	PASS	
Fenchlorphos (Ronnel)	Total	475.1	2	4	ng/L	500	0	95	50 - 150%	PASS	18	25	PASS	
Fensulfothion	Total	369.5	1	2	ng/L	500	0	74	50 - 150%	PASS	10	25	PASS	
Fenthion	Total	373.8	2	4	ng/L	500	0	75	50 - 150%	PASS	22	25	PASS	
Malathion	Total	356.5	3	6	ng/L	500	0	71	50 - 150%	PASS	22	25	PASS	
Methidathion	Total	256.4	5	10	ng/L	500	0	51	50 - 150%	PASS	10	25	PASS	
Methyl parathion	Total	585.3	1	2	ng/L	500	0	117	50 - 150%	PASS	22	25	PASS	
Mevinphos (Phosdrin)	Total	376.9	5	10	ng/L	500	0	75	50 - 150%	PASS	5	25	PASS	
Phorate	Total	363.3	5	10	ng/L	500	0	73	50 - 150%	PASS	20	25	PASS	
Phosmet	Total	301.2	5	10	ng/L	500	0	60	50 - 150%	PASS	16	25	PASS	
Tetrachlorvinphos (Stirofos)	Total	403.7	2	4	ng/L	500	0	81	50 - 150%	PASS	17	25	PASS	
Tokuthion	Total	375.8	3	6	ng/L	500	0	75	50 - 150%	PASS	1	25	PASS	
Trichloronate	Total	394.1	1	2	ng/L	500	0	79	50 - 150%	PASS	4	25	PASS	

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 38524-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625				Batch ID: O-9034		Prepared: 06-Jan-16			Analyzed: 03-Feb-16		
(d10-Acenaphthene)	Total	100			% Recovery	100	100	65 - 113%	PASS			
(d10-Phenanthrene)	Total	92			% Recovery	100	92	80 - 111%	PASS			
(d12-Chrysene)	Total	99			% Recovery	100	99	60 - 139%	PASS			
(d8-Naphthalene)	Total	101			% Recovery	100	101	44 - 119%	PASS			
1-Methylnaphthalene	Total	ND	1	5	ng/L							
1-Methylphenanthrene	Total	ND	1	5	ng/L							
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L							
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L							
2-Methylnaphthalene	Total	ND	1	5	ng/L							
Acenaphthene	Total	ND	1	5	ng/L							
Acenaphthylene	Total	ND	1	5	ng/L							
Anthracene	Total	ND	1	5	ng/L							
Benz[a]anthracene	Total	ND	1	5	ng/L							
Benzo[a]pyrene	Total	ND	1	5	ng/L							
Benzo[b]fluoranthene	Total	ND	1	5	ng/L							
Benzo[e]pyrene	Total	ND	1	5	ng/L							
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L							
Benzo[k]fluoranthene	Total	ND	1	5	ng/L							
Biphenyl	Total	ND	1	5	ng/L							
Chrysene	Total	ND	1	5	ng/L							
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L							
Dibenzothiophene	Total	ND	1	5	ng/L							
Fluoranthene	Total	ND	1	5	ng/L							
Fluorene	Total	ND	1	5	ng/L							
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L							
Naphthalene	Total	ND	1	5	ng/L							
Perylene	Total	ND	1	5	ng/L							
Phenanthrene	Total	ND	1	5	ng/L							
Pyrene	Total	ND	1	5	ng/L							

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 38524-BS1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625 Batch ID: O-9034 Prepared: 06-Jan-16 Analyzed: 03-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
(d10-Acenaphthene)	Total	88			% Recovery	100	0	88	65 - 113%	PASS		
(d10-Phenanthrene)	Total	84			% Recovery	100	0	84	80 - 111%	PASS		
(d12-Chrysene)	Total	95			% Recovery	100	0	95	60 - 139%	PASS		
(d8-Naphthalene)	Total	84			% Recovery	100	0	84	44 - 119%	PASS		
1-Methylnaphthalene	Total	468.6	1	5	ng/L	500	0	94	50 - 150%	PASS		
1-Methylphenanthrene	Total	426.4	1	5	ng/L	500	0	85	50 - 150%	PASS		
2,3,5-Trimethylnaphthalene	Total	448	1	5	ng/L	500	0	90	50 - 150%	PASS		
2,6-Dimethylnaphthalene	Total	462.2	1	5	ng/L	500	0	92	50 - 150%	PASS		
2-Methylnaphthalene	Total	463.7	1	5	ng/L	500	0	93	50 - 150%	PASS		
Acenaphthene	Total	463.7	1	5	ng/L	500	0	93	50 - 150%	PASS		
Acenaphthylene	Total	418.6	1	5	ng/L	500	0	84	50 - 150%	PASS		
Anthracene	Total	324.5	1	5	ng/L	500	0	65	50 - 150%	PASS		
Benz[a]anthracene	Total	467.8	1	5	ng/L	500	0	94	50 - 150%	PASS		
Benzo[a]pyrene	Total	409.5	1	5	ng/L	500	0	82	50 - 150%	PASS		
Benzo[b]fluoranthene	Total	422.8	1	5	ng/L	500	0	85	50 - 150%	PASS		
Benzo[e]pyrene	Total	467.7	1	5	ng/L	500	0	94	50 - 150%	PASS		
Benzo[g,h,i]perylene	Total	425.7	1	5	ng/L	500	0	85	50 - 150%	PASS		
Benzo[k]fluoranthene	Total	427	1	5	ng/L	500	0	85	50 - 150%	PASS		
Biphenyl	Total	473.8	1	5	ng/L	500	0	95	50 - 150%	PASS		
Chrysene	Total	506.8	1	5	ng/L	500	0	101	50 - 150%	PASS		
Dibenz[a,h]anthracene	Total	427.1	1	5	ng/L	500	0	85	50 - 150%	PASS		
Dibenzothiophene	Total	441.9	1	5	ng/L	500	0	88	50 - 150%	PASS		
Fluoranthene	Total	409.1	1	5	ng/L	500	0	82	50 - 150%	PASS		
Fluorene	Total	442.7	1	5	ng/L	500	0	89	50 - 150%	PASS		
Indeno[1,2,3-c,d]pyrene	Total	432.6	1	5	ng/L	500	0	87	50 - 150%	PASS		
Naphthalene	Total	469.1	1	5	ng/L	500	0	94	50 - 150%	PASS		
Perylene	Total	414.7	1	5	ng/L	500	0	83	50 - 150%	PASS		
Phenanthrene	Total	435.9	1	5	ng/L	500	0	87	50 - 150%	PASS		
Pyrene	Total	419.8	1	5	ng/L	500	0	84	50 - 150%	PASS		

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 38524-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625 Batch ID: O-9034 Prepared: 06-Jan-16 Analyzed: 03-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
(d10-Acenaphthene)	Total	99			% Recovery	100	0	99	65 - 113%	PASS	12	30	PASS	
(d10-Phenanthrene)	Total	94			% Recovery	100	0	94	80 - 111%	PASS	11	30	PASS	
(d12-Chrysene)	Total	111			% Recovery	100	0	111	60 - 139%	PASS	16	30	PASS	
(d8-Naphthalene)	Total	92			% Recovery	100	0	92	44 - 119%	PASS	9	30	PASS	
1-Methylnaphthalene	Total	552.9	1	5	ng/L	500	0	111	50 - 150%	PASS	17	25	PASS	
1-Methylphenanthrene	Total	498.9	1	5	ng/L	500	0	100	50 - 150%	PASS	16	25	PASS	
2,3,5-Trimethylnaphthalene	Total	531.6	1	5	ng/L	500	0	106	50 - 150%	PASS	16	25	PASS	
2,6-Dimethylnaphthalene	Total	537.2	1	5	ng/L	500	0	107	50 - 150%	PASS	15	25	PASS	
2-Methylnaphthalene	Total	545.2	1	5	ng/L	500	0	109	50 - 150%	PASS	16	25	PASS	
Acenaphthene	Total	536.6	1	5	ng/L	500	0	107	50 - 150%	PASS	14	25	PASS	
Acenaphthylene	Total	491.2	1	5	ng/L	500	0	98	50 - 150%	PASS	15	25	PASS	
Anthracene	Total	377.4	1	5	ng/L	500	0	75	50 - 150%	PASS	14	25	PASS	
Benz[a]anthracene	Total	572.8	1	5	ng/L	500	0	115	50 - 150%	PASS	20	25	PASS	
Benzo[a]pyrene	Total	480.8	1	5	ng/L	500	0	96	50 - 150%	PASS	16	25	PASS	
Benzo[b]fluoranthene	Total	510.6	1	5	ng/L	500	0	102	50 - 150%	PASS	18	25	PASS	
Benzo[e]pyrene	Total	549.4	1	5	ng/L	500	0	110	50 - 150%	PASS	16	25	PASS	
Benzo[g,h,i]perylene	Total	506.8	1	5	ng/L	500	0	101	50 - 150%	PASS	17	25	PASS	
Benzo[k]fluoranthene	Total	521	1	5	ng/L	500	0	104	50 - 150%	PASS	20	25	PASS	
Biphenyl	Total	550.5	1	5	ng/L	500	0	110	50 - 150%	PASS	15	25	PASS	
Chrysene	Total	602.6	1	5	ng/L	500	0	121	50 - 150%	PASS	18	25	PASS	
Dibenz[a,h]anthracene	Total	501.1	1	5	ng/L	500	0	100	50 - 150%	PASS	16	25	PASS	
Dibenzothiophene	Total	511.8	1	5	ng/L	500	0	102	50 - 150%	PASS	15	25	PASS	
Fluoranthene	Total	477.8	1	5	ng/L	500	0	96	50 - 150%	PASS	16	25	PASS	
Fluorene	Total	517.1	1	5	ng/L	500	0	103	50 - 150%	PASS	15	25	PASS	
Indeno[1,2,3-c,d]pyrene	Total	501.7	1	5	ng/L	500	0	100	50 - 150%	PASS	14	25	PASS	
Naphthalene	Total	556.3	1	5	ng/L	500	0	111	50 - 150%	PASS	17	25	PASS	
Perylene	Total	484.5	1	5	ng/L	500	0	97	50 - 150%	PASS	16	25	PASS	
Phenanthrene	Total	503.9	1	5	ng/L	500	0	101	50 - 150%	PASS	15	25	PASS	
Pyrene	Total	486.6	1	5	ng/L	500	0	97	50 - 150%	PASS	14	25	PASS	

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Pyrethroids QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 38524-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625-NCI				Batch ID: O-9034		Prepared: 06-Jan-16			Analyzed: 19-Jan-16		
Allethrin	Total	ND	0.5	2	ng/L							
Bifenthrin	Total	ND	0.5	2	ng/L							
Cyfluthrin	Total	ND	0.5	2	ng/L							
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L							
Cypermethrin	Total	ND	0.5	2	ng/L							
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L							
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L							
Esfenvalerate	Total	ND	0.5	2	ng/L							
Fenvalerate	Total	ND	0.5	2	ng/L							
Fluvalinate	Total	ND	0.5	2	ng/L							
Permethrin, cis-	Total	ND	5	10	ng/L							
Permethrin, trans-	Total	ND	5	10	ng/L							
Prallethrin	Total	ND	0.5	2	ng/L							
Resmethrin	Total	ND	5	10	ng/L							
Sample ID: 38524-BS1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625-NCI				Batch ID: O-9034		Prepared: 06-Jan-16			Analyzed: 19-Jan-16		
Allethrin	Total	308.4	0.5	2	ng/L	500	0	62	50 - 150%	PASS		R
Bifenthrin	Total	338.2	0.5	2	ng/L	500	0	68	50 - 150%	PASS		
Cyfluthrin	Total	406.6	0.5	2	ng/L	505	0	81	50 - 150%	PASS		
Cyhalothrin, Total Lambda	Total	369	0.5	2	ng/L	500	0	74	50 - 150%	PASS		
Cypermethrin	Total	413.6	0.5	2	ng/L	500	0	83	50 - 150%	PASS		
Danitol (Fenpropathrin)	Total	358.4	0.5	2	ng/L	500	0	72	50 - 150%	PASS		
Deltamethrin/Tralomethrin	Total	448.3	0.5	2	ng/L	500	0	90	50 - 150%	PASS		
Esfenvalerate	Total	428.3	0.5	2	ng/L	500	0	86	50 - 150%	PASS		
Fenvalerate	Total	422.1	0.5	2	ng/L	500	0	84	50 - 150%	PASS		
Fluvalinate	Total	443.7	0.5	2	ng/L	500	0	89	50 - 150%	PASS		
Permethrin, cis-	Total	99.3	5	10	ng/L	133.5	0	74	50 - 150%	PASS		
Permethrin, trans-	Total	294.9	5	10	ng/L	358	0	82	50 - 150%	PASS		

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Pyrethroids QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Prallethrin	Total	300.3	0.5	2	ng/L	500	0	60	50 - 150%	PASS				
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS			PASS	Q

Sample ID: 38524-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625-NCI Batch ID: O-9034 Prepared: 06-Jan-16 Analyzed: 19-Jan-16

Allethrin	Total	331.7	0.5	2	ng/L	500	0	66	50 - 150%	PASS	6	25	PASS	
Bifenthrin	Total	418.3	0.5	2	ng/L	500	0	84	50 - 150%	PASS	21	25	PASS	
Cyfluthrin	Total	527.7	0.5	2	ng/L	505	0	104	50 - 150%	PASS	25	25	PASS	
Cyhalothrin, Total Lambda	Total	460.4	0.5	2	ng/L	500	0	92	50 - 150%	PASS	22	25	PASS	
Cypermethrin	Total	555.2	0.5	2	ng/L	500	0	111	50 - 150%	PASS	29	25	PASS	Q
Danitol (Fenpropathrin)	Total	437.2	0.5	2	ng/L	500	0	87	50 - 150%	PASS	19	25	PASS	
Deltamethrin/Tralomethrin	Total	604	0.5	2	ng/L	500	0	121	50 - 150%	PASS	29	25	PASS	Q
Esfenvalerate	Total	572.9	0.5	2	ng/L	500	0	115	50 - 150%	PASS	29	25	PASS	Q
Fenvalerate	Total	571.1	0.5	2	ng/L	500	0	114	50 - 150%	PASS	30	25	PASS	Q
Fluvalinate	Total	600.7	0.5	2	ng/L	500	0	120	50 - 150%	PASS	30	25	PASS	Q
Permethrin, cis-	Total	132	5	10	ng/L	133.5	0	99	50 - 150%	PASS	29	25	PASS	Q
Permethrin, trans-	Total	391.2	5	10	ng/L	358	0	109	50 - 150%	PASS	28	25	PASS	Q
Prallethrin	Total	323.6	0.5	2	ng/L	500	0	65	50 - 150%	PASS	8	25	PASS	
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS	0	25	PASS	Q

CHAIN OF CUSTODY

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WESTON SOLUTIONS

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CHAIN OF CUSTODY

36238

DATE 1/3/16 PAGE ____ OF ____

PROJECT NAME / SURVEY / PROJECT NUMBER: LACDPW MALIBU ASBS

PROJECT MANAGER / CONTACT: DAN McCOY

CLIENT: WESTON SOLUTIONS

ADDRESS: SEE ABOVE

PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	TSS	OIL AND GREASE	NITRATE & TOTAL PHOSPHATES	AMMONIA	METALS & Hg	PESTICIDES		PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-S01	PRE LACDPW-010316-ASBS-S01	1/3/16	PRE	SEDIMENT		7	X	X	X	X	X	X		ICE		
ASBS-S02	PRE LACDPW-010516-ASBS-S02	1/3/16	11:50	↓		7	X	X	X	X	X	X		↓		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ____

Container Code: G=glass P=plastic B=bags O=other ____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ Client drop off ☐ Other ____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other ____

Reporting Requirements: ☒ PDF ☐ EDD ☐ Hard Copy ☐ Email ☒ Other: CEDEN

SAMPLED BY: PRINT SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. DAN McCOY	[signature]	WESTON	1/3/16	ISMAEL PHENG	[signature]	PHYSIS	1/3/16 3:40
2.							
3.							
4.							
5.							
6.							

WHITE - return to originator • YELLOW - lab • PINK - retained by originator

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
General Chemistry						
Total Suspended Solids	SM 2540-D	7 days	5.0	mg/L		1 L HDPE
Oil and Grease	EPA 1664A	28 days	5.0	mg/L		250-mL glass
Ammonia-N	SM 4500-NH3 D	28 days	0.06	µg/L		250 mL glass H_2SO4
Nitrate-N	SM 4500-NO3 E	48 hours	0.05	mg/L		250 mL HDPE
Total Orthosphosphate (as P)	SM 4500-P E	28 days	0.02	mg/L		
Total Metals						
Aluminum (Al)	EPA 1640	Lab will acidify, then 180 days	6	µg/L		1L HDPE
Antimony (Sb)			0.015	µg/L		
Arsenic (As)			0.015	µg/L	80	
Beryllium (Be)			0.01	µg/L		
Cadmium (Cd)			0.01	µg/L	10	
Chromium (Cr)			0.05	µg/L	20*	
Copper (Cu)			0.02	µg/L	30	
Lead (Pb)			0.01	µg/L	20	
Manganese (Mn)			0.02	µg/L		
Molybdenum (Mo)			0.01	µg/L		
Nickel (Ni)			0.01	µg/L	50	
Selenium (Se)			0.015	µg/L	150	
Silver (Ag)			0.04	µg/L	7	
Thallium (Tl)			0.01	µg/L		
Zinc (Zn)			0.01	µg/L	200	
Mercury (Hg)	EPA 1640		0.02	µg/L	0.4	
Organophosphorus Pesticides						
Bolstar (Sulprofos)	EPA 625	7 days until extraction, 40 days until analysis	4	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
Chlorpyrifos			2	ng/L		
Demeton			2	ng/L		
Diazinon			4	ng/L		
Dichlorvos			6	ng/L		
Disulfoton			2	ng/L		
Ethoprop (Ethoprofos)			2	ng/L		
Fenchlorophos (Ronnel)			4	ng/L		
Fensulfothion			2	ng/L		
Fenthion			4	ng/L		
Malathion			6	ng/L		
Methyl Parathion			2	ng/L		
Mevinphos (Phosdrin)			16	ng/L		
Phorate			12	ng/L		
Tetrachlorvinphos (Stirofos)			4	ng/L		
Tokuthion			6	ng/L		
Trichloronate			2	ng/L		
Synthetic Pyrethroids						

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
Allethrin	EPA 625 NCI	21 days	2	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
Bifenthrin			2	ng/L		
Cyfluthrin			2	ng/L		
Cypermethrin			2	ng/L		
Danitol (Fenpropathrin)			2	ng/L		
Deltamethrin			2	ng/L		
Esfenvalerate			2	ng/L		
Fenvalerate			2	ng/L		
Fluvalinate			2	ng/L		
L-Cyhalothrin			2	ng/L		
Permethrin, cis-			25	ng/L		
Permethrin, trans-			25	ng/L		
Prallethrin			2	ng/L		
Resmethrin			25	ng/L		
Polynuclear Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene	EPA 625	7 days until extraction, 40 days until analysis	5	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
1-Methylphenanthrene			5	ng/L		
2,3,5-Trimethylnaphthalene			5	ng/L		
2,6-Dimethylnaphthalene			5	ng/L		
2-Methylnaphthalene			5	ng/L		
Acenaphthene			5	ng/L		
Acenaphthylene			5	ng/L		
Anthracene			5	ng/L		
Benzo(a)anthracene			5	ng/L		
Benzo(a)pyrene			5	ng/L		
Benzo(b)fluoranthene			5	ng/L		
Benzo(e)pyrene			5	ng/L		
Benzo(g,h,i)perylene			5	ng/L		
Benzo(k)fluoranthene			5	ng/L		
Biphenyl			5	ng/L		
Chrysene			5	ng/L		
Dibenzo(a,h)anthracene			5	ng/L		
Dibenzothiophene			5	ng/L		
Fluoranthene			5	ng/L		
Fluorene			5	ng/L		
Indeno(1,2,3-cd)pyrene			5	ng/L		
Naphthalene			5	ng/L		
Perylene			5	ng/L		
Phenanthrene			5	ng/L		
Pyrene			5	ng/L		
Toxicity						
Bivalve Development (1-storm event)	EPA/600/R-95/136 (Mod Bight	36 h preferred	NA	NA	NA	4 L cubitainer

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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Physis Project ID

1210002-006

Sample Receipt Summary

Client: Weston Solutions, Inc. | Date Received: 1/3/2016 | Received By: IP | Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☑ Client	☑ Cooler ☐ Box Total #: 1	☐ BLUE ☑ WET ☐ DRY
Start ____ End ____ ☐ Other: ____	☐ Other : ____	☐ None 7.6 °C

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out.....Yes
2. All sample containers arrived intact.....Yes
3. All samples listed on COC(s) are present.....Yes
4. Information on containers consistent with information on COC(s).....No; see notes below
5. Correct containers and volume for all analyses indicated.....Yes
6. All samples received within method holding time.....Yes
7. Correct preservation used for all analyses indicated.....Yes
8. Name of sampler included on COC(s).....No

Notes:

Sample ID LACDPW-010316-ASBS-SO1 PRE on the COC is SO11 but on the bag it is SO1, so we logged it in to match the bag sample ID.
Sample ID LACDPW-010316-ASBS-SO1 PRE both the TSS and Metals were double bagged.
Sample ID LACDPW-010316-ASBS-SO2 PRE none of the 1L HDPE's (TSS & Metals) were double bagged.

WESTON SOLUTIONS

☒ 5817 Dryden Place, Ste 101 • Carlsbad, CA 9[illegible] • (760) 795-6900, FAX 931-1580
☐ 1340 Treat Blvd, Ste 210 • Walnut Creek, CA 94597 • (925) 948-2600, FAX 948-2601

CHAIN OF CU[illegible]TODY

36233

DATE 1/6/16 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LACDPW MALIBU ASBS
PROJECT MANAGER / CONTACT: DAN McCOY
CLIENT: WESTON SOLUTIONS
ADDRESS: SEE ABOVE
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	TSS	OIL AND GREASE NITRATE AND TOTAL SERTIE PHOSPHATE	AMMONIA	METALS + Hg	ORGANICS		PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-028	LACDPW-010616-ASBS-028	1/6/16	1630	FW	6 UNPRESED	7	X	X	X	X	X	X	ICE		
ASBS-502	LACDPW-010616-ASBS-502 Rep	↓	1630	SLT	↓	7	X	X	X	X	X	X	↓		
ASBS-016	LACDPW-010616-ASBS-016		1715	FW		7	X	X	X	X	X	X			
ASBS-501	LACDPW-010616-ASBS501	↓	1715	SLT	↓	7	X	X	X	X	X	X	↓		

Sample Matrix Codes: FW=fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify)
Container Code: B=bags O=other
Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☑ Client drop off ☐ Other
Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other
Reporting Requirements: ☒ PDF ☐ EDD ☐ Hard Copy ☐ Email ☒ Other CEDEN EDD

SAMPLED BY: PRINT OLGA E. HERNANDEZ SIGNATURE
COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. DAN McCOY		WESTON	1-6-16/1954	C. Nwadiuse		Physics	1/6/16 1951
2.							
3.							
4.							
5.							
6.							

WHITE - return to originator • YELLOW - lab • PINK - retained by originator

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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Physis Project ID

1210002-006

Sample Receipt Summary

Client: Weston Solutions, Inc. Date Received: 1/6/2016 Received By: CN Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☑ Client	☑ Cooler ☐ Box Total #: 4	☐ BLUE ☑ WET ☐ DRY
Start End ☐ Other:	☐ Other :	☐ None 0.5 °C

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out.....Yes
2. All sample containers arrived intact.....Yes
3. All samples listed on COC(s) are present.....Yes
4. Information on containers consistent with information on COC(s).....Yes
5. Correct containers and volume for all analyses indicated.....Yes
6. All samples received within method holding time.....Yes
7. Correct preservation used for all analyses indicated.....Yes
8. Name of sampler included on COC(s).....Yes

Notes:

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Innovative Solutions for Nature

April 22, 2016

Dan McCoy
Weston Solutions, Inc.
5817 Dryden Place
Carlsbad, CA 92008-

Project Name: LACDPW Malibu ASBS
Physis Project ID: 1210002-007

Dear Dan,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 3/4/2016. A total of 5 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Conventionals
Total Suspended Solids by SM 2540 D
Total Orthophosphate as P by SM 4500-P E
Nitrate as N by SM 4500-NO3 E
Ammonia as N by SM 4500-NH3 D
Elements
Total Trace Metals & Mercury (EPA 1640) by EPA 1640
Organics
Synthetic Pyrethroid Pesticides by EPA 625-NCI
Polynuclear Aromatic Hydrocarbons by EPA 625
Organophosphorus Pesticides by EPA 625
Oil & Grease by EPA 1664B

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Misty Mercier
Extension 202
714-335-5918 cell
mistymercier@physislabs.com

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PROJECT SAMPLE LIST

Weston Solutions, Inc. PHYSIS Project ID: 1210002-007

LACDPW Malibu ASBS Total Samples: 5

PHYSIS ID	Sample ID	Description	Date	Time	Matrix
39402	LACDPW-030416-ASBS-S01	ASBS-S01	3/4/2016	13:40	Seawater
39403	LACDPW-030616-ASBS-016-POST	ASBS-016	3/6/2016	4:30	Freshwater
39404	CDPW-030616-ASBS-016-DUP PO	ASBS-016	3/6/2016	5:20	Freshwater
39405	LACDPW-030616-ASBS-S01-POST	ASBS-S01	3/6/2016	4:45	Seawater
39406	LACDPW-030616-ASBS-FB	Field Blankk	3/6/2016	5:45	Freshwater

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ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to

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the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
#	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified accuracy and/or precision acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore accuracy and/or precision acceptance limits do not apply
SL	analyte results were lower than 10 times the MDL, therefore accuracy and/or precision acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore accuracy and/or precision acceptance limits do not apply
Q	analyte was outside the specified QAPP acceptance limits for precision and/or accuracy but within Physis derived acceptance limits, therefore the sample data was reported without further clarification
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

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ANALYTICAL REPORT

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Conventionals — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18125		Prepared: 29-Mar-16		Analyzed: 29-Mar-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28025		Prepared: 06-Mar-16		Analyzed: 06-Mar-16
Total Orthophosphate as P	NA	0.04	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28042		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
Nitrate as N	NA	ND	0.01	0.05	mg/L	
	Method: SM 2540 D	Batch ID: C-29016		Prepared: 10-Mar-16		Analyzed: 10-Mar-16
Total Suspended Solids	NA	5.6	0.5	0.5	mg/L	
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18125		Prepared: 29-Mar-16		Analyzed: 29-Mar-16
Ammonia as N	NA	0.17	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28029		Prepared: 08-Mar-16		Analyzed: 08-Mar-16
Total Orthophosphate as P	NA	0.57	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28042		Prepared: 08-Mar-16		Analyzed: 28-Mar-16
Nitrate as N	NA	1.08	0.01	0.05	mg/L	
	Method: SM 2540 D	Batch ID: C-29016		Prepared: 10-Mar-16		Analyzed: 10-Mar-16
Total Suspended Solids	NA	510	0.5	0.5	mg/L	
Sample ID: 39404-R1	**LACDPW-030616-ASBS-016-DUP POST A**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:20**		**Received: 06-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18125		Prepared: 29-Mar-16		Analyzed: 29-Mar-16
Ammonia as N	NA	0.11	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28029		Prepared: 08-Mar-16		Analyzed: 08-Mar-16
Total Orthophosphate as P	NA	0.35	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28042		Prepared: 08-Mar-16		Analyzed: 28-Mar-16
Nitrate as N	NA	1.04	0.01	0.05	mg/L	
	Method: SM 2540 D	Batch ID: C-29016		Prepared: 10-Mar-16		Analyzed: 10-Mar-16
Total Suspended Solids	NA	464	0.5	0.5	mg/L	
Sample ID: 39405-R1	**LACDPW-030616-ASBS-S01-POST ASBS-S**	**Matrix: Seawater**		**Sampled: 06-Mar-16 4:45**		**Received: 06-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18125		Prepared: 29-Mar-16		Analyzed: 29-Mar-16
Ammonia as N	NA	0.04	0.02	0.05	mg/L	J

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Conventionals

ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
	Method: SM 4500-P E	Batch ID: C-28029		Prepared: 08-Mar-16		Analyzed: 08-Mar-16
Total Orthophosphate as P	NA	0.15	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28042		Prepared: 08-Mar-16		Analyzed: 28-Mar-16
Nitrate as N	NA	0.08	0.01	0.05	mg/L	
	Method: SM 2540 D	Batch ID: C-29016		Prepared: 10-Mar-16		Analyzed: 10-Mar-16
Total Suspended Solids	NA	52.7	0.5	0.5	mg/L	
Sample ID: 39406-R1	**LACDPW-030616-ASBS-FB Field Blank**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:45**		**Received: 06-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18126		Prepared: 30-Mar-16		Analyzed: 30-Mar-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28029		Prepared: 08-Mar-16		Analyzed: 08-Mar-16
Total Orthophosphate as P	NA	ND	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28042		Prepared: 08-Mar-16		Analyzed: 28-Mar-16
Nitrate as N	NA	ND	0.01	0.05	mg/L	
	Method: SM 2540 D	Batch ID: C-29016		Prepared: 10-Mar-16		Analyzed: 10-Mar-16
Total Suspended Solids	NA	ND	0.5	0.5	mg/L	

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: EPA 1640	Batch ID: E-10125		Prepared: 14-Apr-16		Analyzed: 18-Apr-16
Arsenic (As)	Total	1.414	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0523	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.6154	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.346	0.005	0.01	µg/L	
Lead (Pb)	Total	0.1906	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.459	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.023	0.005	0.015	µg/L	
Silver (Ag)	Total	0.02	0.01	0.02	µg/L	
Zinc (Zn)	Total	1.0353	0.0025	0.005	µg/L	
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: EPA 1640	Batch ID: E-10125		Prepared: 14-Apr-16		Analyzed: 18-Apr-16
Arsenic (As)	Total	2.483	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.8965	0.0025	0.005	µg/L	
Chromium (Cr)	Total	33.3862	0.0125	0.025	µg/L	
Copper (Cu)	Total	26.032	0.005	0.01	µg/L	
Lead (Pb)	Total	6.4917	0.0025	0.005	µg/L	
Mercury (Hg)	Total	0.0629	0.0012	0.005	µg/L	
Nickel (Ni)	Total	36.0925	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.12	0.005	0.015	µg/L	
Silver (Ag)	Total	ND	0.01	0.02	µg/L	
Zinc (Zn)	Total	102.7039	0.0025	0.005	µg/L	
Sample ID: 39404-R1	**LACDPW-030616-ASBS-016-DUP POST A**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:20**		**Received: 06-Mar-16**
	Method: EPA 1640	Batch ID: E-10125		Prepared: 14-Apr-16		Analyzed: 18-Apr-16
Arsenic (As)	Total	2.586	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.9335	0.0025	0.005	µg/L	
Chromium (Cr)	Total	32.0911	0.0125	0.025	µg/L	
Copper (Cu)	Total	25.133	0.005	0.01	µg/L	

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Lead (Pb)	Total	6.4383	0.0025	0.005	µg/L	
Mercury (Hg)	Total	0.0494	0.0012	0.005	µg/L	
Nickel (Ni)	Total	35.9173	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.118	0.005	0.015	µg/L	
Silver (Ag)	Total	ND	0.01	0.02	µg/L	
Zinc (Zn)	Total	99.2754	0.0025	0.005	µg/L	

Sample ID: 39405-R1 **LACDPW-030616-ASBS-S01-POST ASBS-S** **Matrix: Seawater** **Sampled: 06-Mar-16 4:45** **Received: 06-Mar-16**
Method: EPA 1640 Batch ID: E-10125 Prepared: 14-Apr-16 Analyzed: 18-Apr-16

Arsenic (As)	Total	2.061	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0906	0.0025	0.005	µg/L	
Chromium (Cr)	Total	5.0684	0.0125	0.025	µg/L	
Copper (Cu)	Total	2.349	0.005	0.01	µg/L	
Lead (Pb)	Total	0.6623	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	3.5096	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.042	0.005	0.015	µg/L	
Silver (Ag)	Total	0.02	0.01	0.02	µg/L	
Zinc (Zn)	Total	10.3902	0.0025	0.005	µg/L	

Sample ID: 39406-R1 **LACDPW-030616-ASBS-FB Field Blank** **Matrix: Freshwater** **Sampled: 06-Mar-16 5:45** **Received: 06-Mar-16**
Method: EPA 1640 Batch ID: E-10125 Prepared: 14-Apr-16 Analyzed: 18-Apr-16

Arsenic (As)	Total	ND	0.005	0.015	µg/L	
Cadmium (Cd)	Total	ND	0.0025	0.005	µg/L	
Chromium (Cr)	Total	ND	0.0125	0.025	µg/L	
Copper (Cu)	Total	ND	0.005	0.01	µg/L	
Lead (Pb)	Total	ND	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	ND	0.0025	0.005	µg/L	
Selenium (Se)	Total	ND	0.005	0.015	µg/L	
Silver (Ag)	Total	ND	0.01	0.02	µg/L	
Zinc (Zn)	Total	ND	0.0025	0.005	µg/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(PCB030)	Total	76			% Recovery	
(PCB112)	Total	96			% Recovery	
(PCB198)	Total	76			% Recovery	
(TCMX)	Total	68			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(PCB030)	Total	77			% Recovery	
(PCB112)	Total	96			% Recovery	
(PCB198)	Total	71			% Recovery	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(TCMX)	Total	69			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 39404-R1 **LACDPW-030616-ASBS-016-DUP POST A** **Matrix: Freshwater** **Sampled: 06-Mar-16 5:20** **Received: 06-Mar-16**
Method: EPA 625 Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 28-Mar-16

(PCB030)	Total	80			% Recovery	
(PCB112)	Total	116			% Recovery	
(PCB198)	Total	63			% Recovery	
(TCMX)	Total	72			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 39405-R1 **LACDPW-030616-ASBS-S01-POST ASBS-S** **Matrix: Seawater** **Sampled: 06-Mar-16 4:45** **Received: 06-Mar-16**
Method: EPA 625 Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 28-Mar-16

(PCB030)	Total	70			% Recovery	
(PCB112)	Total	97			% Recovery	
(PCB198)	Total	74			% Recovery	
(TCMX)	Total	57			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	

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Organophosphorus Pesticides — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

Sample ID: 39406-R1 **LACDPW-030616-ASBS-FB Field Blank** **Matrix: Freshwater** **Sampled: 06-Mar-16 5:45** **Received: 06-Mar-16**

Method: EPA 625 Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 28-Mar-16

(PCB030)	Total	69			% Recovery	
(PCB112)	Total	93			% Recovery	
(PCB198)	Total	75			% Recovery	
(TCMX)	Total	54			% Recovery	
Bolstar (Sulprofos)	Total	ND	2	4	ng/L	
Chlorpyrifos	Total	ND	0.5	1	ng/L	
Demeton	Total	ND	1	2	ng/L	
Diazinon	Total	ND	0.5	1	ng/L	
Dichlorvos	Total	ND	3	6	ng/L	
Dimethoate	Total	ND	5	10	ng/L	
Disulfoton	Total	ND	1	2	ng/L	
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L	
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L	
Fensulfothion	Total	ND	1	2	ng/L	
Fenthion	Total	ND	2	4	ng/L	
Malathion	Total	ND	3	6	ng/L	
Methidathion	Total	ND	5	10	ng/L	
Methyl parathion	Total	ND	1	2	ng/L	
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L	
Phorate	Total	ND	5	10	ng/L	
Phosmet	Total	ND	5	10	ng/L	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L	
Tokuthion	Total	ND	3	6	ng/L	
Trichloronate	Total	ND	1	2	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(d10-Acenaphthene)	Total	77			% Recovery	
(d10-Phenanthrene)	Total	85			% Recovery	
(d12-Chrysene)	Total	76			% Recovery	
(d8-Naphthalene)	Total	72			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	ND	1	5	ng/L	
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	ND	1	5	ng/L	
Benz[a]anthracene	Total	ND	1	5	ng/L	
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	ND	1	5	ng/L	
Benzo[e]pyrene	Total	ND	1	5	ng/L	
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L	
Benzo[k]fluoranthene	Total	ND	1	5	ng/L	
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	ND	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	ND	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	ND	1	5	ng/L	
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	ND	1	5	ng/L	
Pyrene	Total	ND	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(d10-Acenaphthene)	Total	73			% Recovery	
(d10-Phenanthrene)	Total	89			% Recovery	
(d12-Chrysene)	Total	74			% Recovery	
(d8-Naphthalene)	Total	61			% Recovery	
1-Methylnaphthalene	Total	4.2	1	5	ng/L	J
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	1.9	1	5	ng/L	J
2-Methylnaphthalene	Total	4.2	1	5	ng/L	J
Acenaphthene	Total	9.4	1	5	ng/L	
Acenaphthylene	Total	2.2	1	5	ng/L	J
Anthracene	Total	12.1	1	5	ng/L	
Benz[a]anthracene	Total	9.2	1	5	ng/L	
Benzo[a]pyrene	Total	9.3	1	5	ng/L	
Benzo[b]fluoranthene	Total	15.9	1	5	ng/L	
Benzo[e]pyrene	Total	14.9	1	5	ng/L	
Benzo[g,h,i]perylene	Total	9.2	1	5	ng/L	
Benzo[k]fluoranthene	Total	7.5	1	5	ng/L	
Biphenyl	Total	2.2	1	5	ng/L	J
Chrysene	Total	25.3	1	5	ng/L	
Dibenz[a,h]anthracene	Total	1.7	1	5	ng/L	J
Dibenzothiophene	Total	5.2	1	5	ng/L	
Fluoranthene	Total	27.8	1	5	ng/L	
Fluorene	Total	8.3	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	6.7	1	5	ng/L	
Naphthalene	Total	9.1	1	5	ng/L	
Perylene	Total	3.1	1	5	ng/L	J
Phenanthrene	Total	29.6	1	5	ng/L	
Pyrene	Total	22.9	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39404-R1	**LACDPW-030616-ASBS-016-DUP POST A**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:20**		**Received: 06-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(d10-Acenaphthene)	Total	74			% Recovery	
(d10-Phenanthrene)	Total	89			% Recovery	
(d12-Chrysene)	Total	67			% Recovery	
(d8-Naphthalene)	Total	63			% Recovery	
1-Methylnaphthalene	Total	3.5	1	5	ng/L	J
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	1.8	1	5	ng/L	J
2-Methylnaphthalene	Total	3.7	1	5	ng/L	J
Acenaphthene	Total	8.6	1	5	ng/L	
Acenaphthylene	Total	1.7	1	5	ng/L	J
Anthracene	Total	10.2	1	5	ng/L	
Benz[a]anthracene	Total	9.3	1	5	ng/L	
Benzo[a]pyrene	Total	8.2	1	5	ng/L	
Benzo[b]fluoranthene	Total	16	1	5	ng/L	
Benzo[e]pyrene	Total	13.6	1	5	ng/L	
Benzo[g,h,i]perylene	Total	6.5	1	5	ng/L	
Benzo[k]fluoranthene	Total	6.8	1	5	ng/L	
Biphenyl	Total	1.8	1	5	ng/L	J
Chrysene	Total	27.3	1	5	ng/L	
Dibenz[a,h]anthracene	Total	1.5	1	5	ng/L	J
Dibenzothiophene	Total	5.2	1	5	ng/L	
Fluoranthene	Total	25.4	1	5	ng/L	
Fluorene	Total	7.9	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	5.4	1	5	ng/L	
Naphthalene	Total	8.5	1	5	ng/L	
Perylene	Total	2.6	1	5	ng/L	J
Phenanthrene	Total	27.9	1	5	ng/L	
Pyrene	Total	19.8	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39405-R1	**LACDPW-030616-ASBS-S01-POST ASBS-S**	**Matrix: Seawater**		**Sampled: 06-Mar-16 4:45**		**Received: 06-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(d10-Acenaphthene)	Total	72			% Recovery	
(d10-Phenanthrene)	Total	88			% Recovery	
(d12-Chrysene)	Total	74			% Recovery	
(d8-Naphthalene)	Total	62			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	ND	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L	
2-Methylnaphthalene	Total	ND	1	5	ng/L	
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	1.1	1	5	ng/L	J
Benz[a]anthracene	Total	1.4	1	5	ng/L	J
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	6.8	1	5	ng/L	
Benzo[e]pyrene	Total	1.9	1	5	ng/L	J
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L	
Benzo[k]fluoranthene	Total	1	1	5	ng/L	J
Biphenyl	Total	ND	1	5	ng/L	
Chrysene	Total	4.6	1	5	ng/L	J
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	ND	1	5	ng/L	
Fluoranthene	Total	4.1	1	5	ng/L	J
Fluorene	Total	1	1	5	ng/L	J
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	1.7	1	5	ng/L	J
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	4	1	5	ng/L	J
Pyrene	Total	3.1	1	5	ng/L	J

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Polynuclear Aromatic Hydrocarbons — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39406-R1	**LACDPW-030616-ASBS-FB Field Blank**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:45**		**Received: 06-Mar-16**
	Method: EPA 625	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 28-Mar-16
(d10-Acenaphthene)	Total	81			% Recovery	
(d10-Phenanthrene)	Total	97			% Recovery	
(d12-Chrysene)	Total	83			% Recovery	
(d8-Naphthalene)	Total	71			% Recovery	
1-Methylnaphthalene	Total	1.4	1	5	ng/L	J
1-Methylphenanthrene	Total	4.9	1	5	ng/L	J
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	1.4	1	5	ng/L	J
2-Methylnaphthalene	Total	1.2	1	5	ng/L	J
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	ND	1	5	ng/L	
Anthracene	Total	4.1	1	5	ng/L	J
Benz[a]anthracene	Total	1.4	1	5	ng/L	J
Benzo[a]pyrene	Total	14.7	1	5	ng/L	
Benzo[b]fluoranthene	Total	8	1	5	ng/L	
Benzo[e]pyrene	Total	24.2	1	5	ng/L	
Benzo[g,h,i]perylene	Total	65.7	1	5	ng/L	
Benzo[k]fluoranthene	Total	1.7	1	5	ng/L	J
Biphenyl	Total	1.3	1	5	ng/L	J
Chrysene	Total	2.6	1	5	ng/L	J
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	4.5	1	5	ng/L	J
Fluoranthene	Total	83.2	1	5	ng/L	
Fluorene	Total	3.2	1	5	ng/L	J
Indeno[1,2,3-c,d]pyrene	Total	10.9	1	5	ng/L	
Naphthalene	Total	2.7	1	5	ng/L	J
Perylene	Total	2.9	1	5	ng/L	J
Phenanthrene	Total	45.3	1	5	ng/L	
Pyrene	Total	378.7	1	5	ng/L	

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Pyrethroids — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: EPA 625-NCI	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 21-Mar-16
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	2	4	ng/L	
Permethrin, trans-	Total	ND	1	2	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: EPA 625-NCI	Batch ID: O-9128		Prepared: 06-Mar-16		Analyzed: 21-Mar-16
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	2	4	ng/L	
Permethrin, trans-	Total	ND	1	2	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	

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Pyrethroids ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 39404-R1 **LACDPW-030616-ASBS-016-DUP POST A** **Matrix: Freshwater** **Sampled: 06-Mar-16 5:20** **Received: 06-Mar-16**
Method: EPA 625-NCI Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 21-Mar-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	5.3	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	2	4	ng/L	
Permethrin, trans-	Total	ND	1	2	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 39405-R1 **LACDPW-030616-ASBS-S01-POST ASBS-S** **Matrix: Seawater** **Sampled: 06-Mar-16 4:45** **Received: 06-Mar-16**
Method: EPA 625-NCI Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 21-Mar-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	2	4	ng/L	
Permethrin, trans-	Total	ND	1	2	ng/L	

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Pyrethroids ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

Sample ID: 39406-R1 **LACDPW-030616-ASBS-FB Field Blank** **Matrix: Freshwater** **Sampled: 06-Mar-16 5:45** **Received: 06-Mar-16**
Method: EPA 625-NCI Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 21-Mar-16

Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	ND	0.5	2	ng/L	
Cyfluthrin	Total	ND	0.5	2	ng/L	
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L	
Cypermethrin	Total	ND	0.5	2	ng/L	
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	ND	0.5	2	ng/L	
Fenvalerate	Total	ND	0.5	2	ng/L	
Fluvalinate	Total	ND	0.5	2	ng/L	
Permethrin, cis-	Total	ND	2	4	ng/L	
Permethrin, trans-	Total	ND	1	2	ng/L	
Prallethrin	Total	ND	0.5	2	ng/L	
Resmethrin	Total	ND	5	10	ng/L	

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Total Extractable Organics — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39402-R1	**LACDPW-030416-ASBS-S01 ASBS-S01**	**Matrix: Seawater**		**Sampled: 04-Mar-16 13:40**		**Received: 04-Mar-16**
	Method: EPA 1664B	Batch ID: C-19056		Prepared: 31-Mar-16		Analyzed: 31-Mar-16
Oil & Grease	NA	ND	1	1	mg/L	
Sample ID: 39403-R1	**LACDPW-030616-ASBS-016-POST ASBS-0**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**
	Method: EPA 1664B	Batch ID: C-19056		Prepared: 31-Mar-16		Analyzed: 31-Mar-16
Oil & Grease	NA	1	1	1	mg/L	J
Sample ID: 39404-R1	**LACDPW-030616-ASBS-016-DUP POST A**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:20**		**Received: 06-Mar-16**
	Method: EPA 1664B	Batch ID: C-19056		Prepared: 31-Mar-16		Analyzed: 31-Mar-16
Oil & Grease	NA	1.4	1	1	mg/L	
Sample ID: 39405-R1	**LACDPW-030616-ASBS-S01-POST ASBS-S**	**Matrix: Seawater**		**Sampled: 06-Mar-16 4:45**		**Received: 06-Mar-16**
	Method: EPA 1664B	Batch ID: C-19056		Prepared: 31-Mar-16		Analyzed: 31-Mar-16
Oil & Grease	NA	1.1	1	1	mg/L	
Sample ID: 39406-R1	**LACDPW-030616-ASBS-FB Field Blank**	**Matrix: Freshwater**		**Sampled: 06-Mar-16 5:45**		**Received: 06-Mar-16**
	Method: EPA 1664B	Batch ID: C-19056		Prepared: 31-Mar-16		Analyzed: 31-Mar-16
Oil & Grease	NA	1.8	1	1	mg/L	

QUALITY CONTROL REPORT

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Conventionals — QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Ammonia as N			**Method: SM 4500-NH3 D**			**Fraction: NA**			**Prepared: 29-Mar-16**			**Analyzed: 29-Mar-16**			
39400-B1	QAQC Procedural Blank	C-18125	ND	0.02	0.05	mg/L									
39400-BS1	QAQC Procedural Blank	C-18125	0.28	0.02	0.05	mg/L	0.25	0	112	80 - 120%	PASS				
39400-BS2	QAQC Procedural Blank	C-18125	0.28	0.02	0.05	mg/L	0.25	0	112	80 - 120%	PASS	0	25	PASS	
39402-MS1	LACDPW-030416-ASBS	C-18125	0.29	0.02	0.05	mg/L	0.25	0	116	80 - 120%	PASS				
39402-MS2	LACDPW-030416-ASBS	C-18125	0.28	0.02	0.05	mg/L	0.25	0	112	80 - 120%	PASS	4	25	PASS	
39402-R2	LACDPW-030416-ASBS	C-18125	ND	0.02	0.05	mg/L						0	25	PASS	
Nitrate as N			**Method: SM 4500-NO3 E**			**Fraction: NA**			**Prepared: 08-Mar-16**			**Analyzed: 28-Mar-16**			
39400-B1	QAQC Procedural Blank	C-28042	ND	0.01	0.05	mg/L									
39400-BS1	QAQC Procedural Blank	C-28042	0.51	0.01	0.05	mg/L	0.5	0	102	80 - 120%	PASS				
39400-BS2	QAQC Procedural Blank	C-28042	0.51	0.01	0.05	mg/L	0.5	0	102	80 - 120%	PASS	0	25	PASS	
39402-MS1	LACDPW-030416-ASBS	C-28042	0.54	0.01	0.05	mg/L	0.5	0	108	80 - 120%	PASS				
39402-MS2	LACDPW-030416-ASBS	C-28042	0.54	0.01	0.05	mg/L	0.5	0	108	80 - 120%	PASS	0	25	PASS	
39402-R2	LACDPW-030416-ASBS	C-28042	ND	0.01	0.05	mg/L						0	25	PASS	
Total Orthophosphate as P			**Method: SM 4500-P E**			**Fraction: NA**			**Prepared: 06-Mar-16**			**Analyzed: 06-Mar-16**			
39400-B1	QAQC Procedural Blank	C-28025	ND	0.01	0.02	mg/L									
39400-BS1	QAQC Procedural Blank	C-28025	0.21	0.01	0.02	mg/L	0.2	0	105	80 - 120%	PASS				
39400-BS2	QAQC Procedural Blank	C-28025	0.22	0.01	0.02	mg/L	0.2	0	110	80 - 120%	PASS	5	25	PASS	
39402-MS1	LACDPW-030416-ASBS	C-28025	0.24	0.01	0.02	mg/L	0.2	0.04	100	80 - 120%	PASS				
39402-MS2	LACDPW-030416-ASBS	C-28025	0.25	0.01	0.02	mg/L	0.2	0.04	105	80 - 120%	PASS	5	25	PASS	
39402-R2	LACDPW-030416-ASBS	C-28025	0.04	0.01	0.02	mg/L						0	25	PASS	
19220-B1	QAQC Procedural Blank	C-28029	ND	0.01	0.02	mg/L									
19220-BS1	QAQC Procedural Blank	C-28029	0.2	0.01	0.02	mg/L	0.2	0	100	80 - 120%	PASS				
19220-BS2	QAQC Procedural Blank	C-28029	0.19	0.01	0.02	mg/L	0.2	0	95	80 - 120%	PASS	5	25	PASS	
39404-MS1	LACDPW-030616-ASBS	C-28029	0.51	0.01	0.02	mg/L	0.2	0.36	75	80 - 120%	PASS			PASS	Q
39404-MS2	LACDPW-030616-ASBS	C-28029	0.52	0.01	0.02	mg/L	0.2	0.36	80	80 - 120%	PASS	6	25	PASS	
39404-R2	LACDPW-030616-ASBS	C-28029	0.36	0.01	0.02	mg/L						3	25	PASS	
Total Suspended Solids			**Method: SM 2540 D**			**Fraction: NA**			**Prepared: 10-Mar-16**			**Analyzed: 10-Mar-16**			
39400-B1	QAQC Procedural Blank	C-29016	ND	0.5	0.5	mg/L									

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Conventionals QUALITY CONTROL REPORT

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
39404-R2	LACDPW-030616-ASBS	C-29016	466	0.5	0.5	mg/L					0	25 PASS	

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39400-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10125		Prepared: 14-Apr-16			Analyzed: 18-Apr-16		
Arsenic (As)	Total	ND	0.005	0.015	µg/L							
Cadmium (Cd)	Total	ND	0.0025	0.005	µg/L							
Chromium (Cr)	Total	ND	0.0125	0.025	µg/L							
Copper (Cu)	Total	ND	0.005	0.01	µg/L							
Lead (Pb)	Total	ND	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Total	ND	0.0025	0.005	µg/L							
Selenium (Se)	Total	ND	0.005	0.015	µg/L							
Silver (Ag)	Total	ND	0.01	0.02	µg/L							
Zinc (Zn)	Total	ND	0.0025	0.005	µg/L							
Sample ID: 39401-LCM1	**QAQC LCM - Physis Seawater**				**Matrix: Seawater**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10125		Prepared: 14-Apr-16			Analyzed: 18-Apr-16		
Arsenic (As)	Total	1.612	0.005	0.015	µg/L							
Cadmium (Cd)	Total	0.0913	0.0025	0.005	µg/L							
Chromium (Cr)	Total	0.1867	0.0125	0.025	µg/L							
Copper (Cu)	Total	0.148	0.005	0.01	µg/L							
Lead (Pb)	Total	0.0109	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Total	0.3416	0.0025	0.005	µg/L							
Selenium (Se)	Total	0.036	0.005	0.015	µg/L							
Silver (Ag)	Total	0.02	0.01	0.02	µg/L							
Zinc (Zn)	Total	0.1268	0.0025	0.005	µg/L							
Sample ID: 39401-LCS1	**QAQC LCM - Physis Seawater**				**Matrix: Seawater**		**Sampled:**			**Received:**		
	Method: EPA 1640				Batch ID: E-10125		Prepared: 14-Apr-16			Analyzed: 19-Apr-16		
Arsenic (As)	Total	19.093	0.005	0.015	µg/L	20	1.612	87	75 - 125%	PASS		
Cadmium (Cd)	Total	17.3819	0.0025	0.005	µg/L	20	0.0913	86	75 - 125%	PASS		
Chromium (Cr)	Total	20.1777	0.0125	0.025	µg/L	20	0.1867	100	75 - 125%	PASS		
Copper (Cu)	Total	18.784	0.005	0.01	µg/L	20	0.148	93	75 - 125%	PASS		

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Lead (Pb)	Total	19.6718	0.0025	0.005	µg/L	20	0.0109	98	75 - 125%	PASS				
Mercury (Hg)	Total	8.7502	0.0012	0.005	µg/L	10	0	88	75 - 125%	PASS				
Nickel (Ni)	Total	18.1103	0.0025	0.005	µg/L	20	0.3416	89	75 - 125%	PASS				
Selenium (Se)	Total	19.498	0.005	0.015	µg/L	20	0.036	97	75 - 125%	PASS				
Silver (Ag)	Total	11.33	0.01	0.02	µg/L	10	0.02	113	75 - 125%	PASS				
Zinc (Zn)	Total	18.7116	0.0025	0.005	µg/L	20	0.1268	93	75 - 125%	PASS				

Sample ID: 39401-LCS2 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10125 Prepared: 14-Apr-16 Analyzed: 19-Apr-16

Arsenic (As)	Total	17.36	0.005	0.015	µg/L	20	1.612	79	75 - 125%	PASS	10	25	PASS	
Cadmium (Cd)	Total	16.9025	0.0025	0.005	µg/L	20	0.0913	84	75 - 125%	PASS	2	25	PASS	
Chromium (Cr)	Total	19.9591	0.0125	0.025	µg/L	20	0.1867	99	75 - 125%	PASS	1	25	PASS	
Copper (Cu)	Total	18.32	0.005	0.01	µg/L	20	0.148	91	75 - 125%	PASS	2	25	PASS	
Lead (Pb)	Total	19.1687	0.0025	0.005	µg/L	20	0.0109	96	75 - 125%	PASS	2	25	PASS	
Mercury (Hg)	Total	9.4016	0.0012	0.005	µg/L	10	0	94	75 - 125%	PASS	7	25	PASS	
Nickel (Ni)	Total	17.6022	0.0025	0.005	µg/L	20	0.3416	86	75 - 125%	PASS	3	25	PASS	
Selenium (Se)	Total	18.933	0.005	0.015	µg/L	20	0.036	94	75 - 125%	PASS	3	25	PASS	
Silver (Ag)	Total	9.78	0.01	0.02	µg/L	10	0.02	98	75 - 125%	PASS	14	25	PASS	
Zinc (Zn)	Total	19.5891	0.0025	0.005	µg/L	20	0.1268	97	75 - 125%	PASS	4	25	PASS	

Sample ID: 39402-R2 **LACDPW-030416-ASBS-S01 ASBS-S01** **Matrix: Seawater** **Sampled: 04-Mar-16 13:40** **Received: 04-Mar-16**
Method: EPA 1640 Batch ID: E-10125 Prepared: 14-Apr-16 Analyzed: 18-Apr-16

Arsenic (As)	Total	1.527	0.005	0.015	µg/L						8	25	PASS	
Cadmium (Cd)	Total	0.0335	0.0025	0.005	µg/L						44	25	FAIL	
Chromium (Cr)	Total	0.5873	0.0125	0.025	µg/L						5	25	PASS	
Copper (Cu)	Total	0.344	0.005	0.01	µg/L						1	25	PASS	
Lead (Pb)	Total	0.1272	0.0025	0.005	µg/L						40	25	FAIL	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L						0	25	PASS	
Nickel (Ni)	Total	0.4532	0.0025	0.005	µg/L						1	25	PASS	
Selenium (Se)	Total	0.025	0.005	0.015	µg/L						8	25	PASS	
Silver (Ag)	Total	0.03	0.01	0.02	µg/L						40	25	FAIL	SL
Zinc (Zn)	Total	0.4179	0.0025	0.005	µg/L						85	25	FAIL	

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Elements QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39403-R2		**LACDPW-030616-ASBS-016-POST ASBS-0**			**Matrix: Freshwater**			**Sampled: 06-Mar-16 4:30**		**Received: 06-Mar-16**		
		Method: EPA 1640			Batch ID: E-10125			Prepared: 14-Apr-16		Analyzed: 18-Apr-16		
Arsenic (As)	Total	2.255	0.005	0.015	µg/L					10	25	PASS
Cadmium (Cd)	Total	0.8938	0.0025	0.005	µg/L					0	25	PASS
Chromium (Cr)	Total	33.5173	0.0125	0.025	µg/L					0	25	PASS
Copper (Cu)	Total	26.003	0.005	0.01	µg/L					0	25	PASS
Lead (Pb)	Total	6.4763	0.0025	0.005	µg/L					0	25	PASS
Mercury (Hg)	Total	0.0654	0.0012	0.005	µg/L					4	25	PASS
Nickel (Ni)	Total	36.0084	0.0025	0.005	µg/L					0	25	PASS
Selenium (Se)	Total	0.21	0.005	0.015	µg/L					55	25	FAIL
Silver (Ag)	Total	ND	0.01	0.02	µg/L					0	25	PASS
Zinc (Zn)	Total	102.7733	0.0025	0.005	µg/L					0	25	PASS

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39400-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625				Batch ID: O-9128		Prepared: 06-Mar-16			Analyzed: 27-Mar-16		
(PCB030)	Total	83			% Recovery	100	83	50 - 150%	PASS			
(PCB112)	Total	77			% Recovery	100	77	50 - 150%	PASS			
(PCB198)	Total	79			% Recovery	100	79	50 - 150%	PASS			
(TCMX)	Total	82			% Recovery	100	82	50 - 150%	PASS			
Bolstar (Sulprofos)	Total	ND	2	4	ng/L							
Chlorpyrifos	Total	ND	0.5	1	ng/L							
Demeton	Total	ND	1	2	ng/L							
Diazinon	Total	ND	0.5	1	ng/L							
Dichlorvos	Total	ND	3	6	ng/L							
Dimethoate	Total	ND	5	10	ng/L							
Disulfoton	Total	ND	1	2	ng/L							
Ethoprop (Ethoprofos)	Total	ND	1	2	ng/L							
Fenchlorphos (Ronnel)	Total	ND	2	4	ng/L							
Fensulfothion	Total	ND	1	2	ng/L							
Fenthion	Total	ND	2	4	ng/L							
Malathion	Total	ND	3	6	ng/L							
Methidathion	Total	ND	5	10	ng/L							
Methyl parathion	Total	ND	1	2	ng/L							
Mevinphos (Phosdrin)	Total	ND	5	10	ng/L							
Phorate	Total	ND	5	10	ng/L							
Phosmet	Total	ND	5	10	ng/L							
Tetrachlorvinphos (Stirofos)	Total	ND	2	4	ng/L							
Tokuthion	Total	ND	3	6	ng/L							
Trichloronate	Total	ND	1	2	ng/L							
Sample ID: 39400-BS1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625				Batch ID: O-9128		Prepared: 06-Mar-16			Analyzed: 27-Mar-16		
(PCB030)	Total	89			% Recovery	100	0	89	50 - 150%	PASS		
(PCB112)	Total	94			% Recovery	100	0	94	50 - 150%	PASS		

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB198)	Total	104			% Recovery	100	0	104	50 - 150%	PASS			
(TCMX)	Total	84			% Recovery	100	0	84	50 - 150%	PASS			
Bolstar (Sulprofos)	Total	474.4	2	4	ng/L	500	0	95	50 - 150%	PASS			
Chlorpyrifos	Total	442	0.5	1	ng/L	500	0	88	50 - 150%	PASS			
Demeton	Total	453.5	1	2	ng/L	500	0	91	50 - 150%	PASS			
Diazinon	Total	432.7	0.5	1	ng/L	500	0	87	50 - 150%	PASS			
Dichlorvos	Total	421.1	3	6	ng/L	500	0	84	50 - 150%	PASS			
Dimethoate	Total	293.4	5	10	ng/L	500	0	59	50 - 150%	PASS			
Disulfoton	Total	362.2	1	2	ng/L	500	0	72	50 - 150%	PASS			
Ethoprop (Ethoprofos)	Total	404.5	1	2	ng/L	500	0	81	50 - 150%	PASS			
Fenchlorphos (Ronnel)	Total	432.8	2	4	ng/L	500	0	87	50 - 150%	PASS			
Fensulfothion	Total	618.6	1	2	ng/L	500	0	124	50 - 150%	PASS			
Fenthion	Total	422.8	2	4	ng/L	500	0	85	50 - 150%	PASS			
Malathion	Total	477.1	3	6	ng/L	500	0	95	50 - 150%	PASS			
Methidathion	Total	516.1	5	10	ng/L	500	0	103	50 - 150%	PASS			
Methyl parathion	Total	462	1	2	ng/L	500	0	92	50 - 150%	PASS			
Mevinphos (Phosdrin)	Total	408.3	5	10	ng/L	500	0	82	50 - 150%	PASS			
Phorate	Total	415.5	5	10	ng/L	500	0	83	50 - 150%	PASS			
Phosmet	Total	457.2	5	10	ng/L	500	0	91	50 - 150%	PASS			
Tetrachlorvinphos (Stirofos)	Total	512.2	2	4	ng/L	500	0	102	50 - 150%	PASS			
Tokuthion	Total	428.5	3	6	ng/L	500	0	86	50 - 150%	PASS			
Trichloronate	Total	418.7	1	2	ng/L	500	0	84	50 - 150%	PASS			

Sample ID: 39400-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625 Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 27-Mar-16

(PCB030)	Total	86			% Recovery	100	0	86	50 - 150%	PASS	3	30	PASS
(PCB112)	Total	92			% Recovery	100	0	92	50 - 150%	PASS	2	30	PASS
(PCB198)	Total	101			% Recovery	100	0	101	50 - 150%	PASS	3	30	PASS
(TCMX)	Total	78			% Recovery	100	0	78	50 - 150%	PASS	7	30	PASS
Bolstar (Sulprofos)	Total	464.3	2	4	ng/L	500	0	93	50 - 150%	PASS	2	25	PASS
Chlorpyrifos	Total	436.2	0.5	1	ng/L	500	0	87	50 - 150%	PASS	1	25	PASS
Demeton	Total	431.7	1	2	ng/L	500	0	86	50 - 150%	PASS	6	25	PASS

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Organophosphorus Pesticides QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Diazinon	Total	414.3	0.5	1	ng/L	500	0	83	50 - 150%	PASS	5	25	PASS	
Dichlorvos	Total	379.5	3	6	ng/L	500	0	76	50 - 150%	PASS	10	25	PASS	
Dimethoate	Total	280.5	5	10	ng/L	500	0	56	50 - 150%	PASS	5	25	PASS	
Disulfoton	Total	350.2	1	2	ng/L	500	0	70	50 - 150%	PASS	3	25	PASS	
Ethoprop (Ethoprofos)	Total	377.1	1	2	ng/L	500	0	75	50 - 150%	PASS	8	25	PASS	
Fenchlorphos (Ronnel)	Total	420.8	2	4	ng/L	500	0	84	50 - 150%	PASS	4	25	PASS	
Fensulfothion	Total	565.5	1	2	ng/L	500	0	113	50 - 150%	PASS	9	25	PASS	
Fenthion	Total	426.2	2	4	ng/L	500	0	85	50 - 150%	PASS	0	25	PASS	
Malathion	Total	483.3	3	6	ng/L	500	0	97	50 - 150%	PASS	2	25	PASS	
Methidathion	Total	529.4	5	10	ng/L	500	0	106	50 - 150%	PASS	3	25	PASS	
Methyl parathion	Total	496.1	1	2	ng/L	500	0	99	50 - 150%	PASS	7	25	PASS	
Mevinphos (Phosdrin)	Total	362.6	5	10	ng/L	500	0	73	50 - 150%	PASS	12	25	PASS	
Phorate	Total	404.4	5	10	ng/L	500	0	81	50 - 150%	PASS	2	25	PASS	
Phosmet	Total	474.7	5	10	ng/L	500	0	95	50 - 150%	PASS	4	25	PASS	
Tetrachlorvinphos (Stirofos)	Total	520.1	2	4	ng/L	500	0	104	50 - 150%	PASS	2	25	PASS	
Tokuthion	Total	411.2	3	6	ng/L	500	0	82	50 - 150%	PASS	5	25	PASS	
Trichloronate	Total	427	1	2	ng/L	500	0	85	50 - 150%	PASS	1	25	PASS	

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39400-B1		**QAQC Procedural Blank**			**Matrix: DI Water**			**Sampled:**			**Received:**	
		Method: EPA 625			Batch ID: O-9128			Prepared: 06-Mar-16			Analyzed: 27-Mar-16	
(d10-Acenaphthene)	Total	81			% Recovery	100		81	50 - 150%	PASS		
(d10-Phenanthrene)	Total	76			% Recovery	100		76	50 - 150%	PASS		
(d12-Chrysene)	Total	112			% Recovery	100		112	50 - 150%	PASS		
(d8-Naphthalene)	Total	77			% Recovery	100		77	50 - 150%	PASS		
1-Methylnaphthalene	Total	ND	1	5	ng/L							
1-Methylphenanthrene	Total	ND	1	5	ng/L							
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L							
2,6-Dimethylnaphthalene	Total	ND	1	5	ng/L							
2-Methylnaphthalene	Total	ND	1	5	ng/L							
Acenaphthene	Total	ND	1	5	ng/L							
Acenaphthylene	Total	ND	1	5	ng/L							
Anthracene	Total	ND	1	5	ng/L							
Benz[a]anthracene	Total	ND	1	5	ng/L							
Benzo[a]pyrene	Total	ND	1	5	ng/L							
Benzo[b]fluoranthene	Total	ND	1	5	ng/L							
Benzo[e]pyrene	Total	ND	1	5	ng/L							
Benzo[g,h,i]perylene	Total	ND	1	5	ng/L							
Benzo[k]fluoranthene	Total	ND	1	5	ng/L							
Biphenyl	Total	ND	1	5	ng/L							
Chrysene	Total	ND	1	5	ng/L							
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L							
Dibenzothiophene	Total	ND	1	5	ng/L							
Fluoranthene	Total	ND	1	5	ng/L							
Fluorene	Total	ND	1	5	ng/L							
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L							
Naphthalene	Total	ND	1	5	ng/L							
Perylene	Total	ND	1	5	ng/L							
Phenanthrene	Total	ND	1	5	ng/L							
Pyrene	Total	ND	1	5	ng/L							

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39400-BS1	**QAQC Procedural Blank**				**Matrix: DI Water**			**Sampled:**			**Received:**	
	Method: EPA 625				Batch ID: O-9128			Prepared: 06-Mar-16			Analyzed: 27-Mar-16	
(d10-Acenaphthene)	Total	87			% Recovery	100	0	87	50 - 150%	PASS		
(d10-Phenanthrene)	Total	95			% Recovery	100	0	95	50 - 150%	PASS		
(d12-Chrysene)	Total	114			% Recovery	100	0	114	50 - 150%	PASS		
(d8-Naphthalene)	Total	79			% Recovery	100	0	79	50 - 150%	PASS		
1-Methylnaphthalene	Total	448.5	1	5	ng/L	500	0	90	50 - 150%	PASS		
1-Methylphenanthrene	Total	458	1	5	ng/L	500	0	92	50 - 150%	PASS		
2,3,5-Trimethylnaphthalene	Total	466.8	1	5	ng/L	500	0	93	50 - 150%	PASS		
2,6-Dimethylnaphthalene	Total	458.8	1	5	ng/L	500	0	92	50 - 150%	PASS		
2-Methylnaphthalene	Total	445.3	1	5	ng/L	500	0	89	50 - 150%	PASS		
Acenaphthene	Total	457.2	1	5	ng/L	500	0	91	50 - 150%	PASS		
Acenaphthylene	Total	440.5	1	5	ng/L	500	0	88	50 - 150%	PASS		
Anthracene	Total	449.9	1	5	ng/L	500	0	90	50 - 150%	PASS		
Benz[a]anthracene	Total	526.5	1	5	ng/L	500	0	105	50 - 150%	PASS		
Benzo[a]pyrene	Total	484.6	1	5	ng/L	500	0	97	50 - 150%	PASS		
Benzo[b]fluoranthene	Total	502.1	1	5	ng/L	500	0	100	50 - 150%	PASS		
Benzo[e]pyrene	Total	505.4	1	5	ng/L	500	0	101	50 - 150%	PASS		
Benzo[g,h,i]perylene	Total	454.6	1	5	ng/L	500	0	91	50 - 150%	PASS		
Benzo[k]fluoranthene	Total	518.2	1	5	ng/L	500	0	104	50 - 150%	PASS		
Biphenyl	Total	465	1	5	ng/L	500	0	93	50 - 150%	PASS		
Chrysene	Total	531.5	1	5	ng/L	500	0	106	50 - 150%	PASS		
Dibenz[a,h]anthracene	Total	425.8	1	5	ng/L	500	0	85	50 - 150%	PASS		
Dibenzothiophene	Total	467.9	1	5	ng/L	500	0	94	50 - 150%	PASS		
Fluoranthene	Total	452.5	1	5	ng/L	500	0	90	50 - 150%	PASS		
Fluorene	Total	465.9	1	5	ng/L	500	0	93	50 - 150%	PASS		
Indeno[1,2,3-c,d]pyrene	Total	443.5	1	5	ng/L	500	0	89	50 - 150%	PASS		
Naphthalene	Total	433.8	1	5	ng/L	500	0	87	50 - 150%	PASS		
Perylene	Total	477.9	1	5	ng/L	500	0	96	50 - 150%	PASS		
Phenanthrene	Total	465.9	1	5	ng/L	500	0	93	50 - 150%	PASS		
Pyrene	Total	453.4	1	5	ng/L	500	0	91	50 - 150%	PASS		

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Sample ID: 39400-BS2	**QAQC Procedural Blank**				**Matrix: DI Water**			**Sampled:**			**Received:**			
	Method: EPA 625				Batch ID: O-9128			Prepared: 06-Mar-16			Analyzed: 27-Mar-16			
(d10-Acenaphthene)	Total	87			% Recovery	100	0	87	50 - 150%	PASS	0	30	PASS	
(d10-Phenanthrene)	Total	96			% Recovery	100	0	96	50 - 150%	PASS	1	30	PASS	
(d12-Chrysene)	Total	114			% Recovery	100	0	114	50 - 150%	PASS	0	30	PASS	
(d8-Naphthalene)	Total	79			% Recovery	100	0	79	50 - 150%	PASS	0	30	PASS	
1-Methylnaphthalene	Total	455.4	1	5	ng/L	500	0	91	50 - 150%	PASS	1	25	PASS	
1-Methylphenanthrene	Total	478.9	1	5	ng/L	500	0	96	50 - 150%	PASS	4	25	PASS	
2,3,5-Trimethylnaphthalene	Total	466.4	1	5	ng/L	500	0	93	50 - 150%	PASS	0	25	PASS	
2,6-Dimethylnaphthalene	Total	461.5	1	5	ng/L	500	0	92	50 - 150%	PASS	0	25	PASS	
2-Methylnaphthalene	Total	456.8	1	5	ng/L	500	0	91	50 - 150%	PASS	2	25	PASS	
Acenaphthene	Total	459.1	1	5	ng/L	500	0	92	50 - 150%	PASS	1	25	PASS	
Acenaphthylene	Total	447.4	1	5	ng/L	500	0	89	50 - 150%	PASS	1	25	PASS	
Anthracene	Total	464.1	1	5	ng/L	500	0	93	50 - 150%	PASS	3	25	PASS	
Benz[a]anthracene	Total	537.3	1	5	ng/L	500	0	107	50 - 150%	PASS	2	25	PASS	
Benzo[a]pyrene	Total	492.2	1	5	ng/L	500	0	98	50 - 150%	PASS	1	25	PASS	
Benzo[b]fluoranthene	Total	510.3	1	5	ng/L	500	0	102	50 - 150%	PASS	2	25	PASS	
Benzo[e]pyrene	Total	512.5	1	5	ng/L	500	0	102	50 - 150%	PASS	1	25	PASS	
Benzo[g,h,i]perylene	Total	460.7	1	5	ng/L	500	0	92	50 - 150%	PASS	1	25	PASS	
Benzo[k]fluoranthene	Total	520.3	1	5	ng/L	500	0	104	50 - 150%	PASS	0	25	PASS	
Biphenyl	Total	466.7	1	5	ng/L	500	0	93	50 - 150%	PASS	0	25	PASS	
Chrysene	Total	539.5	1	5	ng/L	500	0	108	50 - 150%	PASS	2	25	PASS	
Dibenz[a,h]anthracene	Total	445.7	1	5	ng/L	500	0	89	50 - 150%	PASS	5	25	PASS	
Dibenzothiophene	Total	476.1	1	5	ng/L	500	0	95	50 - 150%	PASS	1	25	PASS	
Fluoranthene	Total	474.9	1	5	ng/L	500	0	95	50 - 150%	PASS	5	25	PASS	
Fluorene	Total	464	1	5	ng/L	500	0	93	50 - 150%	PASS	0	25	PASS	
Indeno[1,2,3-c,d]pyrene	Total	454.2	1	5	ng/L	500	0	91	50 - 150%	PASS	2	25	PASS	
Naphthalene	Total	449.5	1	5	ng/L	500	0	90	50 - 150%	PASS	3	25	PASS	
Perylene	Total	486.5	1	5	ng/L	500	0	97	50 - 150%	PASS	1	25	PASS	
Phenanthrene	Total	475.5	1	5	ng/L	500	0	95	50 - 150%	PASS	2	25	PASS	
Pyrene	Total	482.9	1	5	ng/L	500	0	97	50 - 150%	PASS	6	25	PASS	

PHYSIS ENVIRONMENTAL LABORATORIES, INC.
TERRA FAUNA FLORA AQUA AURA
Innovative Solutions for Nature
1904 E. Wright Circle, Anaheim CA 92806 main: (714) 602-5320 fax: (714) 602-5321 www.physislabs.com info@physislabs.com CA ELAP #2769

Pyrethroids QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Sample ID: 39400-B1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625-NCI				Batch ID: O-9128		Prepared: 06-Mar-16			Analyzed: 20-Mar-16		
Allethrin	Total	ND	0.5	2	ng/L							
Bifenthrin	Total	ND	0.5	2	ng/L							
Cyfluthrin	Total	ND	0.5	2	ng/L							
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L							
Cypermethrin	Total	ND	0.5	2	ng/L							
Danitol (Fenpropathrin)	Total	ND	0.3	2	ng/L							
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L							
Esfenvalerate	Total	ND	0.5	2	ng/L							
Fenvalerate	Total	ND	0.5	2	ng/L							
Fluvalinate	Total	ND	0.5	2	ng/L							
Permethrin, cis-	Total	ND	2	4	ng/L							
Permethrin, trans-	Total	ND	1	2	ng/L							
Prallethrin	Total	ND	0.5	2	ng/L							
Resmethrin	Total	ND	5	10	ng/L							
Sample ID: 39400-BS1	**QAQC Procedural Blank**				**Matrix: DI Water**		**Sampled:**			**Received:**		
	Method: EPA 625-NCI				Batch ID: O-9128		Prepared: 06-Mar-16			Analyzed: 21-Mar-16		
Allethrin	Total	501.8	0.5	2	ng/L	500	0	100	50 - 150%	PASS		
Bifenthrin	Total	558.1	0.5	2	ng/L	500	0	112	50 - 150%	PASS		
Cyfluthrin	Total	488	0.5	2	ng/L	500	0	98	50 - 150%	PASS		
Cyhalothrin, Total Lambda	Total	494.1	0.5	2	ng/L	500	0	99	50 - 150%	PASS		
Cypermethrin	Total	460	0.5	2	ng/L	500	0	92	50 - 150%	PASS		
Danitol (Fenpropathrin)	Total	520.3	0.3	2	ng/L	500	0	104	50 - 150%	PASS		
Deltamethrin/Tralomethrin	Total	440.2	0.5	2	ng/L	500	0	88	50 - 150%	PASS		
Esfenvalerate	Total	478	0.5	2	ng/L	500	0	96	50 - 150%	PASS		
Fenvalerate	Total	457.4	0.5	2	ng/L	500	0	91	50 - 150%	PASS		
Fluvalinate	Total	448	0.5	2	ng/L	500	0	90	50 - 150%	PASS		
Permethrin, cis-	Total	148.3	2	4	ng/L	133.5	0	111	50 - 150%	PASS		
Permethrin, trans-	Total	328	1	2	ng/L	358	0	92	50 - 150%	PASS		

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Pyrethroids QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Prallethrin	Total	516	0.5	2	ng/L	500	0	103	50 - 150%	PASS				
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS			PASS	Q

Sample ID: 39400-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625-NCI Batch ID: O-9128 Prepared: 06-Mar-16 Analyzed: 21-Mar-16

Allethrin	Total	483.4	0.5	2	ng/L	500	0	97	50 - 150%	PASS	3	25	PASS	
Bifenthrin	Total	547.9	0.5	2	ng/L	500	0	110	50 - 150%	PASS	2	25	PASS	
Cyfluthrin	Total	482.6	0.5	2	ng/L	500	0	97	50 - 150%	PASS	1	25	PASS	
Cyhalothrin, Total Lambda	Total	448.3	0.5	2	ng/L	500	0	90	50 - 150%	PASS	10	25	PASS	
Cypermethrin	Total	478.9	0.5	2	ng/L	500	0	96	50 - 150%	PASS	4	25	PASS	
Danitol (Fenpropathrin)	Total	487	0.3	2	ng/L	500	0	97	50 - 150%	PASS	7	25	PASS	
Deltamethrin/Tralomethrin	Total	443.2	0.5	2	ng/L	500	0	89	50 - 150%	PASS	1	25	PASS	
Esfenvalerate	Total	467.5	0.5	2	ng/L	500	0	94	50 - 150%	PASS	2	25	PASS	
Fenvalerate	Total	461	0.5	2	ng/L	500	0	92	50 - 150%	PASS	1	25	PASS	
Fluvalinate	Total	449.3	0.5	2	ng/L	500	0	90	50 - 150%	PASS	0	25	PASS	
Permethrin, cis-	Total	173.5	2	4	ng/L	133.5	0	130	50 - 150%	PASS	16	25	PASS	
Permethrin, trans-	Total	173.6	1	2	ng/L	358	0	48	50 - 150%	PASS	63	25	PASS	Q
Prallethrin	Total	485	0.5	2	ng/L	500	0	97	50 - 150%	PASS	6	25	PASS	
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS	0	25	PASS	Q

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Total Extractable Organics — QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Sample ID: 39400-B1		**QAQC Procedural Blank**			**Matrix:**	**DI Water**		**Sampled:**			**Received:**			
		Method: EPA 1664B			Batch ID:	C-19056		Prepared:	31-Mar-16		Analyzed:	31-Mar-16		
Oil & Grease	NA	ND	1	1	mg/L									
Sample ID: 39400-BS1		**QAQC Procedural Blank**			**Matrix:**	**DI Water**		**Sampled:**			**Received:**			
		Method: EPA 1664B			Batch ID:	C-19056		Prepared:	31-Mar-16		Analyzed:	31-Mar-16		
Oil & Grease	NA	31.2	1	1	mg/L	40	0	78	80 - 120%	PASS		PASS		Q
Sample ID: 39400-BS2		**QAQC Procedural Blank**			**Matrix:**	**DI Water**		**Sampled:**			**Received:**			
		Method: EPA 1664B			Batch ID:	C-19056		Prepared:	31-Mar-16		Analyzed:	31-Mar-16		
Oil & Grease	NA	31.5	1	1	mg/L	40	0	79	80 - 120%	PASS	1	25	PASS	Q

CHAIN OF CUSTODY

PHTS
TERRA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Individual Form
Reporting Year 2015 - 2016
Uninc. County

WESTON SOLUTIONS

☒ 5817 Dryden Place, Ste 101 • Carlsbad, CA 9[illegible] • (760) 795-6900, FAX 931-1580
☐ 1340 Treat Blvd, Ste 210 • Walnut Creek, CA 94597 • (925) 948-2600, FAX 948-2601

CHAIN OF CUSTODY

36234

121000 2-007

DATE 3/4/16 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: MALIBU ASBS
PROJECT MANAGER / CONTACT: DAN McCOY
CLIENT: ~~LADPW~~ WESTON
ADDRESS: SEE ABOVE
PHONE / FAX / EMAIL: " "

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED *	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-501	LADPW-030416-ASBS-501	3-4-16	13:40	SEA WATER	VARIED	7	X	ICE		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☒ EDD ☐ Hard Copy ☐ Email ☐ Other CEDEN

SAMPLED BY: PRINT: DAN McCOY SIGNATURE: [signature]

COMMENTS / SPECIAL INSTRUCTIONS

* SEE ANALYTE LIST ATTACHED

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. DAN McCOY	[signature]	WESTON	3/4/16 16:30	Richard Hankin	[signature]	Physis	3/4/16 1630
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

ASK FOR BAGGED METALS CONTAINER

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
General Chemistry						
Total Suspended Solids	SM 2540-D	7 days	5.0	mg/L		1 L HDPE
Oil and Grease	EPA 1664A	28 days	5.0	mg/L		250-mL glass
Ammonia-N	SM 4500-NH3 D	28 days	0.06	µg/L		250 mL glass H_2SO4
Nitrate-N	SM 4500-NO3 E	48 hours	0.05	mg/L		250 mL HDPE
Total Orthosphosphate (as P)	SM 4500-P E	28 days	0.02	mg/L		
Total Metals						
Aluminum (Al)	EPA 1640	Lab will acidify, then 180 days	6	µg/L		1L HDPE
Antimony (Sb)			0.015	µg/L		
Arsenic (As)			0.015	µg/L	80	
Beryllium (Be)			0.01	µg/L		
Cadmium (Cd)			0.01	µg/L	10	
Chromium (Cr)			0.05	µg/L	20*	
Copper (Cu)			0.02	µg/L	30	
Lead (Pb)			0.01	µg/L	20	
Manganese (Mn)			0.02	µg/L		
Molybdenum (Mo)			0.01	µg/L		
Nickel (Ni)			0.01	µg/L	50	
Selenium (Se)			0.015	µg/L	150	
Silver (Ag)			0.04	µg/L	7	
Thallium (Tl)			0.01	µg/L		
Zinc (Zn)			0.01	µg/L	200	
Mercury (Hg)	EPA 1640		0.02	µg/L	0.4	
Organophosphorus Pesticides						
Bolstar (Sulprofos)	EPA 625	7 days until extraction, 40 days until analysis	4	ng/L		A total of 2 L for OP pesticides. Synthetic pyrethroids and PAHs- Amber bottles
Chlorpyrifos			2	ng/L		
Demeton			2	ng/L		
Diazinon			4	ng/L		
Dichlorvos			6	ng/L		
Disulfoton			2	ng/L		
Ethoprop (Ethoprofos)			2	ng/L		
Fenchlorophos (Ronnel)			4	ng/L		
Fensulfothion			2	ng/L		
Fenthion			4	ng/L		
Malathion			6	ng/L		
Methyl Parathion			2	ng/L		
Mevinphos (Phosdrin)			16	ng/L		
Phorate			12	ng/L		
Tetrachlorvinphos (Stirofos)			4	ng/L		
Tokuthion			6	ng/L		
Trichloronate			2	ng/L		
Synthetic Pyrethroids						

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
Allethrin	EPA 625 NCI	21 days	2	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
Bifenthrin			2	ng/L		
Cyfluthrin			2	ng/L		
Cypermethrin			2	ng/L		
Danitol (Fenpropathrin)			2	ng/L		
Deltamethrin			2	ng/L		
Esfenvalerate			2	ng/L		
Fenvalerate			2	ng/L		
Fluvalinate			2	ng/L		
L-Cyhalothrin			2	ng/L		
Permethrin, cis-			25	ng/L		
Permethrin, trans-			25	ng/L		
Prallethrin			2	ng/L		
Resmethrin			25	ng/L		
Polynuclear Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene	EPA 625	7 days until extraction, 40 days until analysis	5	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
1-Methylphenanthrene			5	ng/L		
2,3,5-Trimethylnaphthalene			5	ng/L		
2,6-Dimethylnaphthalene			5	ng/L		
2-Methylnaphthalene			5	ng/L		
Acenaphthene			5	ng/L		
Acenaphthylene			5	ng/L		
Anthracene			5	ng/L		
Benzo(a)anthracene			5	ng/L		
Benzo(a)pyrene			5	ng/L		
Benzo(b)fluoranthene			5	ng/L		
Benzo(e)pyrene			5	ng/L		
Benzo(g,h,i)perylene			5	ng/L		
Benzo(k)fluoranthene			5	ng/L		
Biphenyl			5	ng/L		
Chrysene			5	ng/L		
Dibenzo(a,h)anthracene			5	ng/L		
Dibenzothiophene			5	ng/L		
Fluoranthene			5	ng/L		
Fluorene			5	ng/L		
Indeno(1,2,3-cd)pyrene			5	ng/L		
Naphthalene			5	ng/L		
Perylene			5	ng/L		
Phenanthrene			5	ng/L		
Pyrene			5	ng/L		
Toxicity						
Bivalve Development (1-storm event)	EPA/600/R -95/136 (Mod Bight	36 h preferred	NA	NA	NA	4 L cubitainer

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Physis Project ID

1210002-007

Sample Receipt Summary

Client: Weston Solutions, Inc. Date Received: 3/4/2016 Received By: RGH Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☑ Client	☑ Cooler ☐ Box Total #: 1	☐ BLUE ☑ WET ☐ DRY
Start End ☐ Other:	☐ Other :	☐ None 1.5 °C

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out.....Yes
2. All sample containers arrived intact.....Yes
3. All samples listed on COC(s) are present.....Yes
4. Information on containers consistent with information on COC(s).....Yes
5. Correct containers and volume for all analyses indicated.....Yes
6. All samples received within method holding time.....Yes
7. Correct preservation used for all analyses indicated.....Yes
8. Name of sampler included on COC(s).....Yes

Notes:

Page 1 of 23 01117

WESTON SOLUTIONS
5817 DRYDEN PL, SUITE 101, CARLSBAD CA 92008 TEL: 7956900
☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 428 Thirteenth St., Ste B, 6th Floor • Oakland, CA 94612 • (510) 788-3800, FAX 891-9710

CHAIN OF CUSTODY

33275

DATE 3/6/16 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LACDPW MALIBU ASBS
PROJECT MANAGER / CONTACT: DAN McCOY
CLIENT: WESTON SOLUTIONS
ADDRESS: SEE ABOVE
PHONE / FAX / EMAIL: " "

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	TSS	OIL & GREASE	NITRATE AND TOTAL NITROGEN	AMMONIA	METALS AND Hg	ORGANICS			PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-016	LACDPW-030616-ASBS-016-TSS	3/6/16	04:30	FW	VARIED	7	X	X	X	X	X	X			ICE		
ASBS-016	LACDPW-030616-ASBS-016-DUP	↓	05:20	FW	↓	↓	↓	↓	↓	↓	↓	↓			↓		
ASBS-S01	LACDPW-030616-ASBS-S01-DUST	↓	04:45	SLT	↓	↓	↓	↓	↓	↓	↓	↓			↓		
FIELD BLANK	LACDPW-030616-ASBS-FB	↓	05:45	FW	↓	↓	↓	↓	↓	↓	↓	↓			↓		

FOR WESTON USE ONLY

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other _____

Reporting Requirements: ☒ PDF ☒ EDD ☐ Hard Copy ☒ Email ☐ Other _____

SAMPLED BY: PRINT: DAN McCOY SIGNATURE: [signature]

COMMENTS / SPECIAL INSTRUCTIONS: METALS ANALYSES INCLUDES Hg. SEE ATTACHED ANALYSES TABLE

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. DAN McCOY	[signature]	WESTON	3/6/16				
2. CEASAR NWADIKE	[signature]	PHYSIS	3/6/16 0745				
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
General Chemistry						
Total Suspended Solids	SM 2540-D	7 days	5.0	mg/L		1 L HDPE
Oil and Grease	EPA 1664A	28 days	5.0	mg/L		250-mL glass
Ammonia-N	SM 4500-NH3 D	28 days	0.06	µg/L		250 mL glass H_2SO4
Nitrate-N	SM 4500-NO3 E	48 hours	0.05	mg/L		250 mL HDPE
Total Orthosphosphate (as P)	SM 4500-P E	28 days	0.02	mg/L		
Total Metals						
Aluminum (Al)	EPA 1640	Lab will acidify, then 180 days	6	µg/L		1L HDPE
Antimony (Sb)			0.015	µg/L		
Arsenic (As)			0.015	µg/L	80	
Beryllium (Be)			0.01	µg/L		
Cadmium (Cd)			0.01	µg/L	10	
Chromium (Cr)			0.05	µg/L	20*	
Copper (Cu)			0.02	µg/L	30	
Lead (Pb)			0.01	µg/L	20	
Manganese (Mn)			0.02	µg/L		
Molybdenum (Mo)			0.01	µg/L		
Nickel (Ni)			0.01	µg/L	50	
Selenium (Se)			0.015	µg/L	150	
Silver (Ag)			0.04	µg/L	7	
Thallium (Tl)			0.01	µg/L		
Zinc (Zn)			0.01	µg/L	200	
Mercury (Hg)	EPA 1640		0.02	µg/L	0.4	
Organophosphorus Pesticides						
Bolstar (Sulprofos)	EPA 625	7 days until extraction, 40 days until analysis	4	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
Chlorpyrifos			2	ng/L		
Demeton			2	ng/L		
Diazinon			4	ng/L		
Dichlorvos			6	ng/L		
Disulfoton			2	ng/L		
Ethoprop (Ethoprofos)			2	ng/L		
Fenchlorophos (Ronnel)			4	ng/L		
Fensulfothion			2	ng/L		
Fenthion			4	ng/L		
Malathion			6	ng/L		
Methyl Parathion			2	ng/L		
Mevinphos (Phosdrin)			16	ng/L		
Phorate			12	ng/L		
Tetrachlorvinphos (Stirofos)			4	ng/L		
Tokuthion			6	ng/L		
Trichloronate			2	ng/L		
Synthetic Pyrethroids						

Ocean Receiving Water Chemistry and Toxicity

Table 2. List of Analyses to Be Conducted on Samples Collected at Ocean Receiving Water Monitoring Sites

Constituent	Method	Holding Time	Method Reporting Limits	Units	COP[1]	Bottle Type/ Preservative
Allethrin	EPA 625 NCI	21 days	2	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
Bifenthrin			2	ng/L		
Cyfluthrin			2	ng/L		
Cypermethrin			2	ng/L		
Danitol (Fenpropathrin)			2	ng/L		
Deltamethrin			2	ng/L		
Esfenvalerate			2	ng/L		
Fenvalerate			2	ng/L		
Fluvalinate			2	ng/L		
L-Cyhalothrin			2	ng/L		
Permethrin, cis-			25	ng/L		
Permethrin, trans-			25	ng/L		
Prallethrin			2	ng/L		
Resmethrin			25	ng/L		
Polynuclear Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene	EPA 625	7 days until extraction, 40 days until analysis	5	ng/L		A total of 2 L for OP pesticides, Synthetic pyrethroids and PAHs- Amber bottles
1-Methylphenanthrene			5	ng/L		
2,3,5-Trimethylnaphthalene			5	ng/L		
2,6-Dimethylnaphthalene			5	ng/L		
2-Methylnaphthalene			5	ng/L		
Acenaphthene			5	ng/L		
Acenaphthylene			5	ng/L		
Anthracene			5	ng/L		
Benzo(a)anthracene			5	ng/L		
Benzo(a)pyrene			5	ng/L		
Benzo(b)fluoranthene			5	ng/L		
Benzo(e)pyrene			5	ng/L		
Benzo(g,h,i)perylene			5	ng/L		
Benzo(k)fluoranthene			5	ng/L		
Biphenyl			5	ng/L		
Chrysene			5	ng/L		
Dibenzo(a,h)anthracene			5	ng/L		
Dibenzothiophene			5	ng/L		
Fluoranthene			5	ng/L		
Fluorene			5	ng/L		
Indeno(1,2,3-cd)pyrene			5	ng/L		
Naphthalene			5	ng/L		
Perylene			5	ng/L		
Phenanthrene			5	ng/L		
Pyrene			5	ng/L		
Toxicity						
Bivalve Development (1-storm event)	EPA 600/R -95/136 (Mod Bight	36 h preferred	NA	NA	NA	4 L cubitainer

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Physis Project ID

1210002-007

Sample Receipt Summary

Client: Weston Solutions, Inc. Date Received: 3/6/2016 Received By: CN Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☑ Client	☑ Cooler ☐ Box Total #: 2	☐ BLUE ☑ WET ☐ DRY
Start End ☐ Other:	☐ Other :	☐ None 3.5 °C

Sample Integrity Upon Receipt:

1. COC(s) included and completely filled out.....Yes
2. All sample containers arrived intact.....Yes
3. All samples listed on COC(s) are present.....Yes
4. Information on containers consistent with information on COC(s).....Yes
5. Correct containers and volume for all analyses indicated.....No; see notes below
6. All samples received within method holding time.....Yes
7. Correct preservation used for all analyses indicated.....Yes
8. Name of sampler included on COC(s).....Yes

Notes:

Sample ID(s) LACDPW-030616-ASBS-016-DUP POST (ASBS-016), LACDPW-030616-ASBS-FB (Field Blank) were received in the wrong container or lack of preservation. We noted the inccorect containers and we preserved the Ammonia bottle ASAP.

APPENDIX D

Toxicity Results

aquatic bioassay & consulting laboratories, inc

March 31, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "The concentration-response was normal. Test was set at 38 hours holding time which is beyond the prescribed 36 hour hold but within 72 hours. Reference toxicant was within limits and all other test acceptability criteria was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S02-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.085

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 31 Mar-16 10:41 (p 1 of 1)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	02-6241-7936	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-7596-9727	**Code:**	WST0116.085uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-0562-4291	Fertilization Rate	100	>100	NA	4.78%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
10-5156-2027	Fertilization Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
10-5156-2027	Fertilization Rate	Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
20-0562-4291	Fertilization Rate	Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
20-0562-4291	Fertilization Rate	PMSD	0.04779	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.926	0.9003	0.9517	0.9	0.95	0.009273	0.02074	2.24%	0.0%
25		5	0.942	0.9216	0.9624	0.92	0.96	0.007348	0.01643	1.74%	-1.73%
50		5	0.944	0.9214	0.9666	0.92	0.97	0.008124	0.01817	1.92%	-1.94%
100		5	0.96	0.9188	1	0.91	0.99	0.01483	0.03317	3.46%	-3.67%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.94	0.95
25		0.92	0.93	0.95	0.96	0.95
50		0.94	0.97	0.95	0.92	0.94
100		0.99	0.96	0.91	0.95	0.99

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	94/100	95/100
25		92/100	93/100	95/100	96/100	95/100
50		94/100	97/100	95/100	92/100	94/100
100		99/100	96/100	91/100	95/100	99/100

CETIS Analytical Report

Report Date: 31 Mar-16 10:41 (p 1 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0562-4291	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	02-6241-7936	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-7596-9727	**Code:**	WST0116.085uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.78%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-0.9199	2.227	0.078	8	0.9544	CDF	Non-Significant Effect
	50	-1.067	2.227	0.078	8	0.9674	CDF	Non-Significant Effect
	100	-2.498	2.227	0.078	8	0.9992	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04779	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01941021	0.006470069	3	2.131	0.1364	Non-Significant Effect
Error	0.04857622	0.003036014	16			
Total	0.06798643		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.447	11.34	0.2171	Equal Variances
Variances	Mod Levene Equality of Variance	2.766	5.953	0.0877	Equal Variances
Variances	Levene Equality of Variance	2.702	5.292	0.0803	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9705	0.866	0.7662	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.109	0.2235	0.8532	Normal Distribution
Distribution	D'Agostino Skewness	0.3588	2.576	0.7197	Normal Distribution
Distribution	D'Agostino Kurtosis	0.5652	2.576	0.5719	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.4482	9.21	0.7992	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2394	3.878	0.8063	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.926	0.9003	0.9517	0.93	0.9	0.95	0.009273	2.24%	0.0%
25		5	0.942	0.9216	0.9624	0.95	0.92	0.96	0.007348	1.74%	-1.73%
50		5	0.944	0.9214	0.9666	0.94	0.92	0.97	0.008124	1.92%	-1.94%
100		5	0.96	0.9188	1	0.96	0.91	0.99	0.01483	3.46%	-3.67%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.297	1.248	1.347	1.303	1.249	1.345	0.01777	3.06%	0.0%
25		5	1.329	1.286	1.373	1.345	1.284	1.369	0.01559	2.62%	-2.47%
50		5	1.335	1.283	1.386	1.323	1.284	1.397	0.01842	3.09%	-2.87%
100		5	1.384	1.276	1.493	1.369	1.266	1.471	0.03913	6.32%	-6.71%

CETIS Analytical Report

Report Date: 31 Mar-16 10:41 (p 2 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 20-0562-4291 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 31 Mar-16 10:36 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.94	0.95
25		0.92	0.93	0.95	0.96	0.95
50		0.94	0.97	0.95	0.92	0.94
100		0.99	0.96	0.91	0.95	0.99

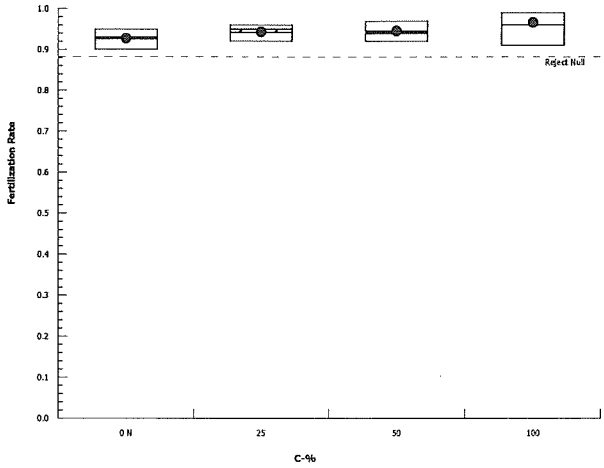
Angular (Corrected) Transformed Detail

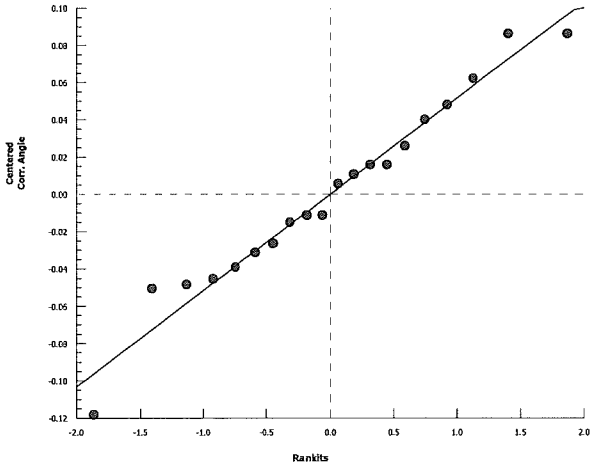
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.249	1.303	1.266	1.323	1.345
25		1.284	1.303	1.345	1.369	1.345
50		1.323	1.397	1.345	1.284	1.323
100		1.471	1.369	1.266	1.345	1.471

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	94/100	95/100
25		92/100	93/100	95/100	96/100	95/100
50		94/100	97/100	95/100	92/100	94/100
100		99/100	96/100	91/100	95/100	99/100

Graphics





CETIS Analytical Report

Report Date: 31 Mar-16 10:41 (p 1 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-5156-2027	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	02-6241-7936	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-7596-9727	**Code:**	WST0116.085uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	907777	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.926	0.9	0.95	0.009273	0.02074	2.24%	0.0%	463	500
25		5	0.942	0.92	0.96	0.007348	0.01643	1.74%	-1.73%	471	500
50		5	0.944	0.92	0.97	0.008124	0.01817	1.92%	-1.94%	472	500
100		5	0.96	0.91	0.99	0.01483	0.03317	3.46%	-3.67%	480	500

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.94	0.95
25		0.92	0.93	0.95	0.96	0.95
50		0.94	0.97	0.95	0.92	0.94
100		0.99	0.96	0.91	0.95	0.99

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	94/100	95/100
25		92/100	93/100	95/100	96/100	95/100
50		94/100	97/100	95/100	92/100	94/100
100		99/100	96/100	91/100	95/100	99/100

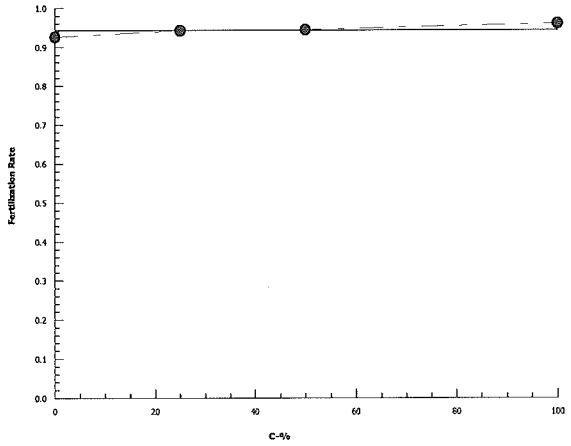
CETIS Analytical Report

Report Date: 31 Mar-16 10:41 (p 2 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-5156-2027	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:41 (p 1 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	02-6241-7936	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-7596-9727	**Code:**	WST0116.085uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.8	14.9	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
25		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
50		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
100		2	6.7	4.159	9.241	6.5	6.9	0.2	0.2828	4.22%	0
Overall		8	6.525			6.1	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		8	7.8			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:41 (p 2 of 2)
Test Code: WST0116.085urcf | 08-1732-7897

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.8
25		6.6	6.5
50		6.2	6.1
100		6.9	6.5

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.8	7.8
50		7.7	7.8
100		7.8	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting
laboratories, inc

March 31, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "The concentration-response was normal. Test was set at 38 hours holding time which is beyond the prescribed 36 hour hold but within 72 hours. Reference toxicant was within limits and all other test acceptability criteria was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S01-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.086

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 31 Mar-16 10:36 (p 1 of 1)
Test Code: WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-2897-2531	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-8413-7006	**Code:**	WST0116.086uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-5090-3798	Fertilization Rate	100	>100	NA	4.11%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
13-1584-8583	Fertilization Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
11-5090-3798	Fertilization Rate	Control Resp	0.9225	0.7 - NL	Yes	Passes Acceptability Criteria
13-1584-8583	Fertilization Rate	Control Resp	0.9225	0.7 - NL	Yes	Passes Acceptability Criteria
11-5090-3798	Fertilization Rate	PMSD	0.04109	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.9225	0.8872	0.9578	0.9	0.95	0.01109	0.02217	2.4%	0.0%
25		4	0.93	0.8956	0.9644	0.9	0.95	0.0108	0.0216	2.32%	-0.81%
50		4	0.9275	0.9003	0.9547	0.91	0.95	0.008539	0.01708	1.84%	-0.54%
100		4	0.9475	0.9147	0.9803	0.92	0.97	0.01031	0.02062	2.18%	-2.71%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.95	0.91	0.93
25		0.9	0.93	0.95	0.94
50		0.91	0.92	0.93	0.95
100		0.95	0.97	0.95	0.92

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	95/100	91/100	93/100
25		90/100	93/100	95/100	94/100
50		91/100	92/100	93/100	95/100
100		95/100	97/100	95/100	92/100

CETIS Analytical Report

Report Date:	31 Mar-16 10:36 (p 1 of 2)
Test Code:	WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-5090-3798	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	01-2897-2531	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-8413-7006	**Code:**	WST0116.086uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.11%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		25	-0.4907	2.287	0.067	6	0.8886	CDF	Non-Significant Effect
		50	-0.3001	2.287	0.067	6	0.8436	CDF	Non-Significant Effect
		100	-1.782	2.287	0.067	6	0.9937	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9225	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04109	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006297873	0.002099291	3	1.235	0.3400	Non-Significant Effect
Error	0.02039922	0.001699935	12			
Total	0.02669709		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.2513	11.34	0.9689	Equal Variances
Variances	Mod Levene Equality of Variance	0.08197	5.953	0.9686	Equal Variances
Variances	Levene Equality of Variance	0.09169	5.953	0.9632	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9484	0.8408	0.4645	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1116	0.2471	1.0000	Normal Distribution
Distribution	D'Agostino Skewness	0.06999	2.576	0.9442	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.297	3.878	0.6209	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.9225	0.8872	0.9578	0.92	0.9	0.95	0.01109	2.4%	0.0%
25		4	0.93	0.8956	0.9644	0.935	0.9	0.95	0.0108	2.32%	-0.81%
50		4	0.9275	0.9003	0.9547	0.925	0.91	0.95	0.008539	1.84%	-0.54%
100		4	0.9475	0.9147	0.9803	0.95	0.92	0.97	0.01031	2.18%	-2.71%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	4	1.291	1.223	1.359	1.285	1.249	1.345	0.02135	3.31%	0.0%
25		4	1.305	1.24	1.371	1.313	1.249	1.345	0.0206	3.16%	-1.11%
50		4	1.3	1.246	1.354	1.294	1.266	1.345	0.01699	2.61%	-0.68%
100		4	1.343	1.269	1.416	1.345	1.284	1.397	0.02304	3.43%	-4.03%

CETIS Analytical Report

Report Date: 31 Mar-16 10:36 (p 2 of 2)
Test Code: WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-5090-3798	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.95	0.91	0.93
25		0.9	0.93	0.95	0.94
50		0.91	0.92	0.93	0.95
100		0.95	0.97	0.95	0.92

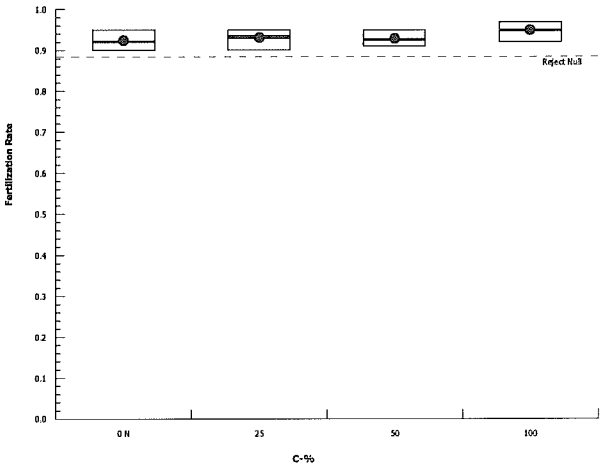
Angular (Corrected) Transformed Detail

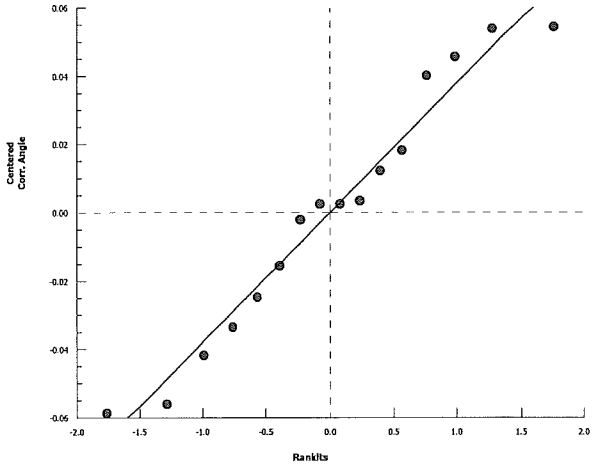
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.249	1.345	1.266	1.303
25		1.249	1.303	1.345	1.323
50		1.266	1.284	1.303	1.345
100		1.345	1.397	1.345	1.284

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	95/100	91/100	93/100
25		90/100	93/100	95/100	94/100
50		91/100	92/100	93/100	95/100
100		95/100	97/100	95/100	92/100

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:36 (p 1 of 2)
Test Code:	WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	13-1584-8583	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	01-2897-2531	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-8413-7006	**Code:**	WST0116.086uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9225	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.9225	0.9	0.95	0.01109	0.02217	2.4%	0.0%	369	400
25		4	0.93	0.9	0.95	0.0108	0.0216	2.32%	-0.81%	372	400
50		4	0.9275	0.91	0.95	0.008539	0.01708	1.84%	-0.54%	371	400
100		4	0.9475	0.92	0.97	0.01031	0.02062	2.18%	-2.71%	379	400

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.95	0.91	0.93
25		0.9	0.93	0.95	0.94
50		0.91	0.92	0.93	0.95
100		0.95	0.97	0.95	0.92

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	95/100	91/100	93/100
25		90/100	93/100	95/100	94/100
50		91/100	92/100	93/100	95/100
100		95/100	97/100	95/100	92/100

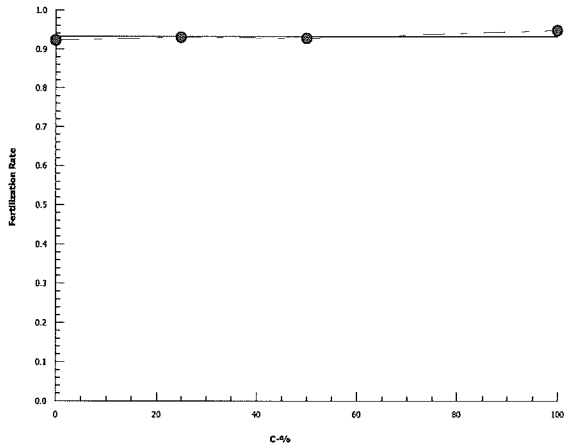
CETIS Analytical Report

Report Date: 31 Mar-16 10:36 (p 2 of 2)
Test Code: WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	13-1584-8583	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:36 (p 1 of 2)
Test Code: WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-2897-2531	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Jan-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	01-8413-7006	**Code:**	WST0116.086uf	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.9	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
25		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
50		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
100		2	6.6	6.586	6.614	6.6	6.6	0	0	0.0%	0
Overall		8	6.463			6.1	6.6				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		8	7.775			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.83			14.7	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:36 (p 2 of 2)
Test Code: WST0116.086urcf | 14-5529-3936

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.5
25		6.6	6.5
50		6.2	6.1
100		6.6	6.6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.8
25		7.8	7.8
50		7.8	7.7
100		7.7	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.7	14.8
50		14.9	14.8
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

March 31, 2016

Mr Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S02-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.085

MYTILUS SHELL DEVELOPMENT BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 31 Mar-16 10:40 (p 1 of 1)
Test Code: WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	13-6852-8059	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	14-1753-1095	**Code:**	WST0116.085m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-6506-1092	Combined Proportion Norm	100	>100	NA	2.83%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
08-6621-3906	Combined Proportion Norm	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
20-6506-1092	Combined Proportion Norm	PMSD	0.02835	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.9552	0.9312	0.9791	0.9372	0.9821	0.008626	0.01929	2.02%	0.0%
25		5	0.9453	0.928	0.9626	0.9327	0.9686	0.006246	0.01397	1.48%	1.03%
50		5	0.9587	0.946	0.9714	0.9462	0.9686	0.004573	0.01023	1.07%	-0.38%
100		5	0.9641	0.9371	0.9911	0.9372	0.9865	0.009722	0.02174	2.26%	-0.94%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9372	0.9686	0.9821	0.9417
25		0.9462	0.9327	0.9686	0.9417	0.9372
50		0.9686	0.9507	0.9686	0.9596	0.9462
100		0.9372	0.9686	0.9865	0.9462	0.9821

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	209/223	216/223	219/223	210/223
25		211/223	208/223	216/223	210/223	209/223
50		216/223	212/223	216/223	214/223	211/223
100		209/223	216/223	220/223	211/223	219/223

CETIS Analytical Report

Report Date:	31 Mar-16 10:40 (p 1 of 2)
Test Code:	WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-6506-1092	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-6852-8059	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	14-1753-1095	**Code:**	WST0116.085m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.83%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		25	0.9085	2.227	0.063	8	0.3682	CDF	Non-Significant Effect
		50	-0.1923	2.227	0.063	8	0.8135	CDF	Non-Significant Effect
		100	-0.9056	2.227	0.063	8	0.9530	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.02835	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006645774	0.002215258	3	1.116	0.3720	Non-Significant Effect
Error	0.03176935	0.001985584	16			
Total	0.03841512		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.018	11.34	0.3888	Equal Variances
Variances	Mod Levene Equality of Variance	1.679	5.953	0.2241	Equal Variances
Variances	Levene Equality of Variance	2.351	5.292	0.1109	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9636	0.866	0.6182	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1282	0.2235	0.5417	Normal Distribution
Distribution	D'Agostino Skewness	0.6624	2.576	0.5077	Normal Distribution
Distribution	D'Agostino Kurtosis	0.8484	2.576	0.3962	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.159	9.21	0.5603	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3367	3.878	0.5101	Normal Distribution

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.9552	0.9312	0.9791	0.9462	0.9372	0.9821	0.008626	2.02%	0.0%
25		5	0.9453	0.928	0.9626	0.9417	0.9327	0.9686	0.006246	1.48%	1.03%
50		5	0.9587	0.946	0.9714	0.9596	0.9462	0.9686	0.004573	1.07%	-0.38%
100		5	0.9641	0.9371	0.9911	0.9686	0.9372	0.9865	0.009722	2.26%	-0.94%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.362	1.299	1.425	1.337	1.318	1.436	0.02273	3.73%	0.0%
25		5	1.336	1.295	1.378	1.327	1.308	1.393	0.01482	2.48%	1.88%
50		5	1.367	1.336	1.399	1.369	1.337	1.393	0.0115	1.88%	-0.4%
100		5	1.388	1.313	1.462	1.393	1.318	1.455	0.02683	4.32%	-1.87%

CETIS Analytical Report

Report Date: 31 Mar-16 10:40 (p 2 of 2)
Test Code: WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 20-6506-1092 **Endpoint:** Combined Proportion Normal **CETIS Version:** CETISv1.8.7
Analyzed: 31 Mar-16 10:36 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9372	0.9686	0.9821	0.9417
25		0.9462	0.9327	0.9686	0.9417	0.9372
50		0.9686	0.9507	0.9686	0.9596	0.9462
100		0.9372	0.9686	0.9865	0.9462	0.9821

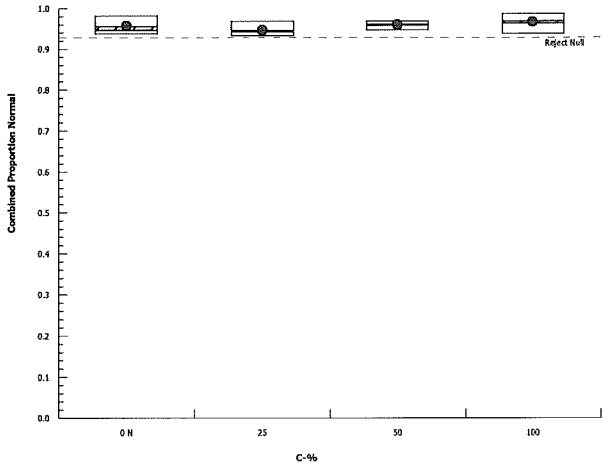
Angular (Corrected) Transformed Detail

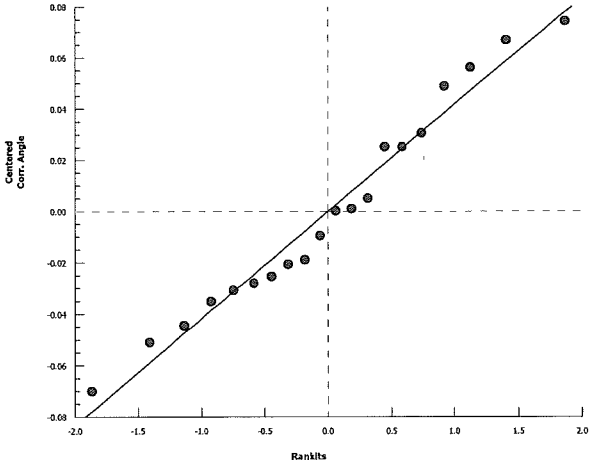
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.337	1.318	1.393	1.436	1.327
25		1.337	1.308	1.393	1.327	1.318
50		1.393	1.347	1.393	1.369	1.337
100		1.318	1.393	1.455	1.337	1.436

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	209/223	216/223	219/223	210/223
25		211/223	208/223	216/223	210/223	209/223
50		216/223	212/223	216/223	214/223	211/223
100		209/223	216/223	220/223	211/223	219/223

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:40 (p 1 of 2)
Test Code:	WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-6621-3906	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-6852-8059	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	14-1753-1095	**Code:**	WST0116.085m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Proportion Normal Summary

						Calculated Variate(A/B)					
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.9552	0.9372	0.9821	0.008626	0.01929	2.02%	0.0%	1065	1115
25		5	0.9453	0.9327	0.9686	0.006246	0.01397	1.48%	1.03%	1054	1115
50		5	0.9587	0.9462	0.9686	0.004573	0.01023	1.07%	-0.38%	1069	1115
100		5	0.9641	0.9372	0.9865	0.009722	0.02174	2.26%	-0.94%	1075	1115

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9372	0.9686	0.9821	0.9417
25		0.9462	0.9327	0.9686	0.9417	0.9372
50		0.9686	0.9507	0.9686	0.9596	0.9462
100		0.9372	0.9686	0.9865	0.9462	0.9821

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	209/223	216/223	219/223	210/223
25		211/223	208/223	216/223	210/223	209/223
50		216/223	212/223	216/223	214/223	211/223
100		209/223	216/223	220/223	211/223	219/223

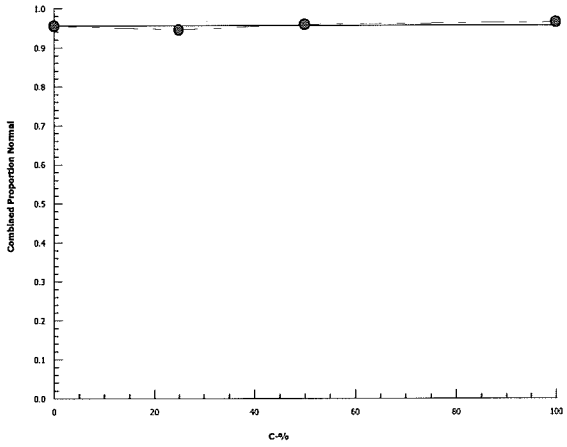
CETIS Analytical Report

Report Date: 31 Mar-16 10:40 (p 2 of 2)
Test Code: WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-6621-3906	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:40 (p 1 of 2)
Test Code: WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	13-6852-8059	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	14-1753-1095	**Code:**	WST0116.085m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
25		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
50		2	6.45	5.815	7.085	6.4	6.5	0.05001	0.07072	1.1%	0
100		2	6.55	2.103	11	6.2	6.9	0.35	0.495	7.56%	0
Overall		8	6.488			6.2	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		8	7.813			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:40 (p 2 of 2)
Test Code: WST0116.085myt | 02-6240-6477

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.5
25		6.6	6.2
50		6.5	6.4
100		6.9	6.2

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.8	7.8
50		7.8	7.8
100		7.8	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

March 31, 2016

Mr Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S01-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.086

MYTILUS SHELL DEVELOPMENT BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date:	31 Mar-16 10:38 (p 1 of 1)
Test Code:	WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	20-0005-8041	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	04-5722-4904	**Code:**	WST0116.086m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
12-3606-7304	Combined Proportion Norm	100	>100	NA	2.57%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
02-4549-6946	Combined Proportion Norm	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
12-3606-7304	Combined Proportion Norm	PMSD	0.02572	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.9552	0.934	0.9764	0.9372	0.9776	0.007636	0.01708	1.79%	0.0%
25		5	0.9632	0.9488	0.9776	0.9462	0.9776	0.005191	0.01161	1.21%	-0.85%
50		5	0.9596	0.9351	0.9842	0.9327	0.9821	0.008856	0.0198	2.06%	-0.47%
100		5	0.9848	0.9763	0.9932	0.9776	0.9955	0.003041	0.006801	0.69%	-3.1%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9686	0.9372	0.9776	0.9462
25		0.9776	0.9462	0.9686	0.9596	0.9641
50		0.9821	0.9327	0.9686	0.9462	0.9686
100		0.9821	0.9955	0.9821	0.9865	0.9776

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	216/223	209/223	218/223	211/223
25		218/223	211/223	216/223	214/223	215/223
50		219/223	208/223	216/223	211/223	216/223
100		219/223	222/223	219/223	220/223	218/223

CETIS Analytical Report

Report Date:	31 Mar-16 10:38 (p 1 of 2)
Test Code:	WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	12-3606-7304	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	20-0005-8041	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	04-5722-4904	**Code:**	WST0116.086m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.57%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-0.7436	2.227	0.057	8	0.9333	CDF	Non-Significant Effect
	50	-0.4945	2.227	0.057	8	0.8903	CDF	Non-Significant Effect
	100	-3.521	2.227	0.057	8	1.0000	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.02572	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02435178	0.00811726	3	5.022	0.0122	Significant Effect
Error	0.02585889	0.001616181	16			
Total	0.05021068		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.248	11.34	0.7415	Equal Variances
Variances	Mod Levene Equality of Variance	0.4236	5.953	0.7396	Equal Variances
Variances	Levene Equality of Variance	1.241	5.292	0.3276	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9652	0.866	0.6519	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1193	0.2235	0.6786	Normal Distribution
Distribution	D'Agostino Skewness	0.4502	2.576	0.6526	Normal Distribution
Distribution	D'Agostino Kurtosis	0.9723	2.576	0.3309	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.148	9.21	0.5633	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2761	3.878	0.6856	Normal Distribution

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.9552	0.934	0.9764	0.9462	0.9372	0.9776	0.007636	1.79%	0.0%
25		5	0.9632	0.9488	0.9776	0.9641	0.9462	0.9776	0.005191	1.21%	-0.85%
50		5	0.9596	0.9351	0.9842	0.9686	0.9327	0.9821	0.008856	2.06%	-0.47%
100		5	0.9848	0.9763	0.9932	0.9821	0.9776	0.9955	0.003041	0.69%	-3.1%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.361	1.307	1.415	1.337	1.318	1.42	0.01951	3.21%	0.0%
25		5	1.38	1.341	1.418	1.38	1.337	1.42	0.0138	2.24%	-1.39%
50		5	1.373	1.31	1.436	1.393	1.308	1.436	0.02268	3.69%	-0.92%
100		5	1.45	1.41	1.49	1.436	1.42	1.504	0.0144	2.22%	-6.58%

CETIS Analytical Report

Report Date: 31 Mar-16 10:38 (p 2 of 2)
Test Code: WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	12-3606-7304	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9686	0.9372	0.9776	0.9462
25		0.9776	0.9462	0.9686	0.9596	0.9641
50		0.9821	0.9327	0.9686	0.9462	0.9686
100		0.9821	0.9955	0.9821	0.9865	0.9776

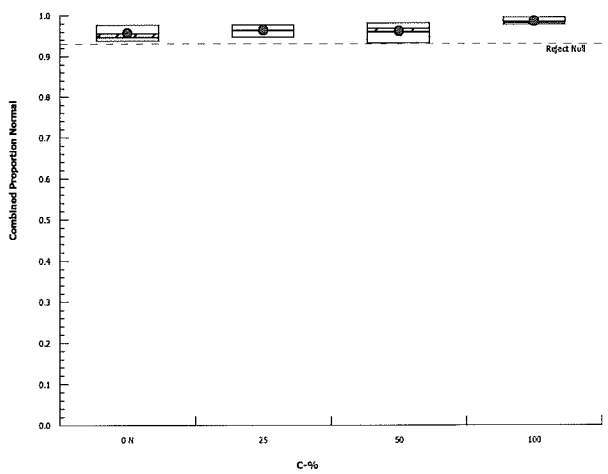
Angular (Corrected) Transformed Detail

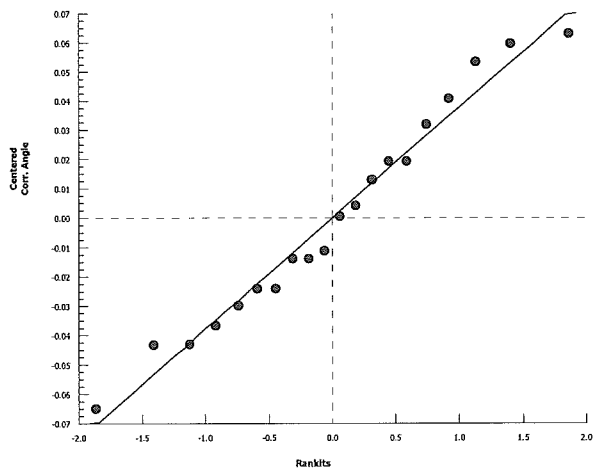
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.337	1.393	1.318	1.42	1.337
25		1.42	1.337	1.393	1.369	1.38
50		1.436	1.308	1.393	1.337	1.393
100		1.436	1.504	1.436	1.455	1.42

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	216/223	209/223	218/223	211/223
25		218/223	211/223	216/223	214/223	215/223
50		219/223	208/223	216/223	211/223	216/223
100		219/223	222/223	219/223	220/223	218/223

Graphics





CETIS Analytical Report

Report Date: 31 Mar-16 10:38 (p 1 of 2)
Test Code: WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-4549-6946	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	20-0005-8041	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	04-5722-4904	**Code:**	WST0116.086m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	8203	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Proportion Normal Summary

			Calculated Variate(A/B)								
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Negative Control	5	0.9552	0.9372	0.9776	0.007636	0.01708	1.79%	0.0%	1065	1115
25		5	0.9632	0.9462	0.9776	0.005191	0.01161	1.21%	-0.85%	1074	1115
50		5	0.9596	0.9327	0.9821	0.008856	0.0198	2.06%	-0.47%	1070	1115
100		5	0.9848	0.9776	0.9955	0.003041	0.0068	0.69%	-3.1%	1098	1115

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9462	0.9686	0.9372	0.9776	0.9462
25		0.9776	0.9462	0.9686	0.9596	0.9641
50		0.9821	0.9327	0.9686	0.9462	0.9686
100		0.9821	0.9955	0.9821	0.9865	0.9776

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/223	216/223	209/223	218/223	211/223
25		218/223	211/223	216/223	214/223	215/223
50		219/223	208/223	216/223	211/223	216/223
100		219/223	222/223	219/223	220/223	218/223

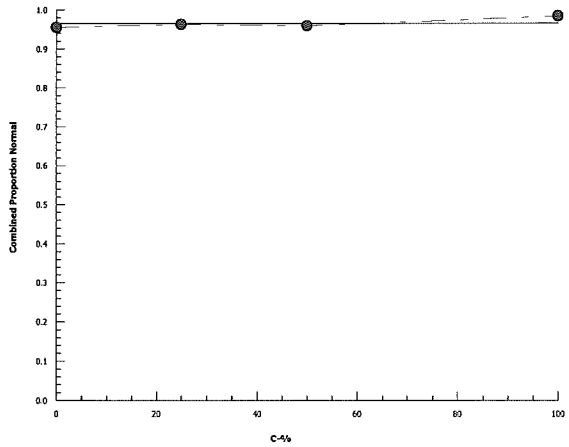
CETIS Analytical Report

Report Date: 31 Mar-16 10:38 (p 2 of 2)
Test Code: WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-4549-6946	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:38 (p 1 of 2)
Test Code: WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	20-0005-8041	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Jan-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	04-5722-4904	**Code:**	WST0116.086m	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
25		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
50		2	6.35	4.444	8.256	6.2	6.5	0.15	0.2121	3.34%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		8	6.488			6.1	6.8				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
50		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		8	7.825			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:38 (p 2 of 2)
Test Code: WST0116.086myt | 00-3807-4967

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.8
25		6.6	6.5
50		6.2	6.5
100		6.1	6.6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.9	7.8
50		7.8	7.8
100		7.8	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

March 31, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S02-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.085

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
TUBE LENGTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 31 Mar-16 10:39 (p 1 of 2)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
10-1458-9156	Germination Rate	100	>100	NA	4.03%	1	Dunnett Multiple Comparison Test
17-2798-1695	Mean Length	100	>100	NA	2.54%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
17-2437-7481	Germination Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	
03-7855-4270	Mean Length	IC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		IC10	>100	N/A	N/A	<1	
		IC15	>100	N/A	N/A	<1	
		IC20	>100	N/A	N/A	<1	
		IC25	>100	N/A	N/A	<1	
		IC40	>100	N/A	N/A	<1	
		IC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
10-1458-9156	Germination Rate	Control Resp	0.914	0.7 - NL	Yes	Passes Acceptability Criteria
17-2437-7481	Germination Rate	Control Resp	0.914	0.7 - NL	Yes	Passes Acceptability Criteria
03-7855-4270	Mean Length	Control Resp	14.36	10 - NL	Yes	Passes Acceptability Criteria
17-2798-1695	Mean Length	Control Resp	14.36	10 - NL	Yes	Passes Acceptability Criteria
10-1458-9156	Germination Rate	PMSD	0.04027	NL - 0.2	No	Passes Acceptability Criteria
17-2798-1695	Mean Length	PMSD	0.02544	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.914	0.8772	0.9508	0.88	0.96	0.01327	0.02966	3.25%	0.0%
25		5	0.92	0.8952	0.9448	0.9	0.95	0.008944	0.02	2.17%	-0.66%
50		5	0.932	0.9051	0.9589	0.91	0.96	0.009695	0.02168	2.33%	-1.97%
100		5	0.926	0.9003	0.9517	0.9	0.95	0.009274	0.02074	2.24%	-1.31%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.36	14.05	14.67	14	14.6	0.1122	0.251	1.75%	0.0%
25		5	14.38	14.08	14.68	14	14.6	0.1068	0.2387	1.66%	-0.14%
50		5	14.32	14.05	14.59	14.1	14.6	0.09695	0.2168	1.51%	0.28%
100		5	14.42	14.02	14.82	14	14.8	0.1428	0.3194	2.22%	-0.42%

CETIS Summary Report

Report Date: 31 Mar-16 10:39 (p 2 of 2)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.9	0.88	0.92	0.96
25		0.91	0.93	0.9	0.91	0.95
50		0.92	0.96	0.91	0.95	0.92
100		0.91	0.93	0.95	0.94	0.9

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.6	14.5	14	14.2	14.5
25		14.6	14	14.3	14.5	14.5
50		14.2	14.1	14.6	14.5	14.2
100		14.2	14	14.6	14.8	14.5

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	88/100	92/100	96/100
25		91/100	93/100	90/100	91/100	95/100
50		92/100	96/100	91/100	95/100	92/100
100		91/100	93/100	95/100	94/100	90/100

CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 1 of 4)
Test Code:	WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-1458-9156	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.03%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-0.3037	2.227	0.064	8	0.8451	CDF	Non-Significant Effect
	50	-1.129	2.227	0.064	8	0.9719	CDF	Non-Significant Effect
	100	-0.6997	2.227	0.064	8	0.9269	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.914	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04027	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00300823	0.001002743	3	0.4801	0.7007	Non-Significant Effect
Error	0.03341656	0.002088535	16			
Total	0.03642479		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.7432	11.34	0.8630	Equal Variances
Variances	Mod Levene Equality of Variance	0.1128	5.953	0.9509	Equal Variances
Variances	Levene Equality of Variance	0.1895	5.292	0.9020	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.94	0.866	0.2403	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1817	0.2235	0.0825	Normal Distribution
Distribution	D'Agostino Skewness	1.303	2.576	0.1925	Normal Distribution
Distribution	D'Agostino Kurtosis	0.3396	2.576	0.7341	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.814	9.21	0.4038	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.5618	3.878	0.1499	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.914	0.8772	0.9508	0.91	0.88	0.96	0.01327	3.25%	0.0%
25		5	0.92	0.8952	0.9448	0.91	0.9	0.95	0.008944	2.17%	-0.66%
50		5	0.932	0.9051	0.9589	0.92	0.91	0.96	0.009695	2.33%	-1.97%
100		5	0.926	0.9003	0.9517	0.93	0.9	0.95	0.009273	2.24%	-1.31%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.277	1.206	1.348	1.266	1.217	1.369	0.02558	4.48%	0.0%
25		5	1.286	1.238	1.334	1.266	1.249	1.345	0.01727	3.0%	-0.69%
50		5	1.31	1.254	1.365	1.284	1.266	1.369	0.02007	3.43%	-2.56%
100		5	1.297	1.248	1.347	1.303	1.249	1.345	0.01777	3.06%	-1.58%

CETIS Analytical Report

Report Date: 31 Mar-16 10:39 (p 2 of 4)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-1458-9156	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.9	0.88	0.92	0.96
25		0.91	0.93	0.9	0.91	0.95
50		0.92	0.96	0.91	0.95	0.92
100		0.91	0.93	0.95	0.94	0.9

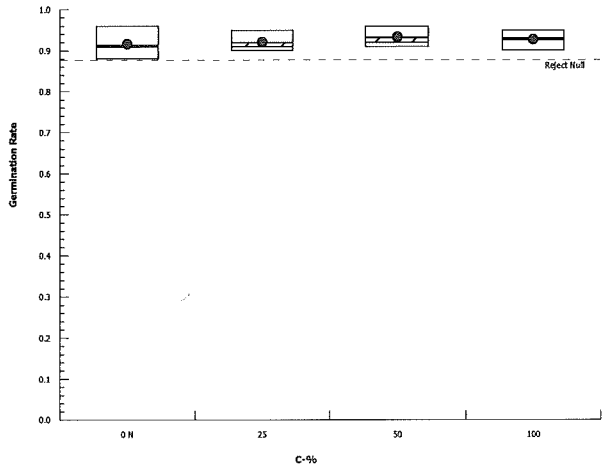
Angular (Corrected) Transformed Detail

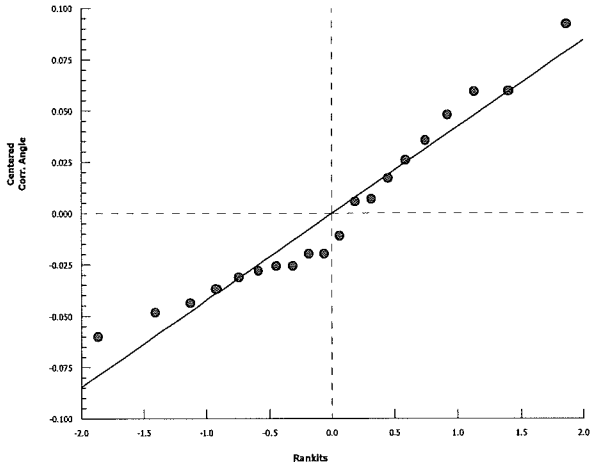
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.266	1.249	1.217	1.284	1.369
25		1.266	1.303	1.249	1.266	1.345
50		1.284	1.369	1.266	1.345	1.284
100		1.266	1.303	1.345	1.323	1.249

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	88/100	92/100	96/100
25		91/100	93/100	90/100	91/100	95/100
50		92/100	96/100	91/100	95/100	92/100
100		91/100	93/100	95/100	94/100	90/100

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 3 of 4)
Test Code:	WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2798-1695	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	2.54%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-0.1219	2.227	0.365	8	0.7916	CDF	Non-Significant Effect
	50	0.2439	2.227	0.365	8	0.6553	CDF	Non-Significant Effect
	100	-0.3658	2.227	0.365	8	0.8611	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.36	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.02544	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02600001	0.008666669	3	0.1289	0.9416	Non-Significant Effect
Error	1.076001	0.06725006	16			
Total	1.102001		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.6244	11.34	0.8908	Equal Variances
Variances	Mod Levene Equality of Variance	0.2299	5.953	0.8738	Equal Variances
Variances	Levene Equality of Variance	0.4764	5.292	0.7031	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9348	0.866	0.1908	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.193	0.2235	0.0493	Normal Distribution
Distribution	D'Agostino Skewness	0.7356	2.576	0.4619	Normal Distribution
Distribution	D'Agostino Kurtosis	1.361	2.576	0.1735	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.393	9.21	0.3022	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.6405	3.878	0.0953	Normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.36	14.05	14.67	14.5	14	14.6	0.1122	1.75%	0.0%
25		5	14.38	14.08	14.68	14.5	14	14.6	0.1068	1.66%	-0.14%
50		5	14.32	14.05	14.59	14.2	14.1	14.6	0.09695	1.51%	0.28%
100		5	14.42	14.02	14.82	14.5	14	14.8	0.1428	2.22%	-0.42%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.6	14.5	14	14.2	14.5
25		14.6	14	14.3	14.5	14.5
50		14.2	14.1	14.6	14.5	14.2
100		14.2	14	14.6	14.8	14.5

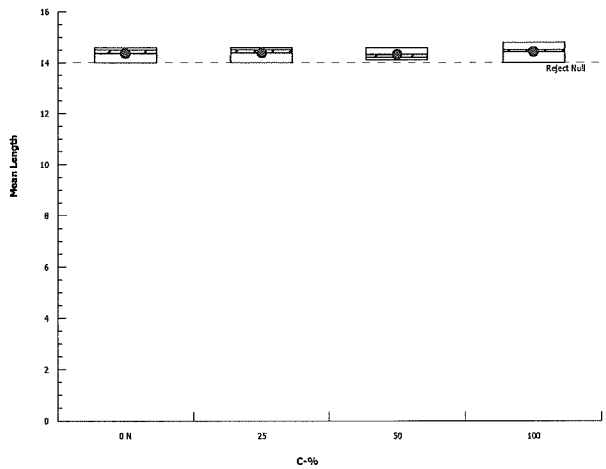
CETIS Analytical Report

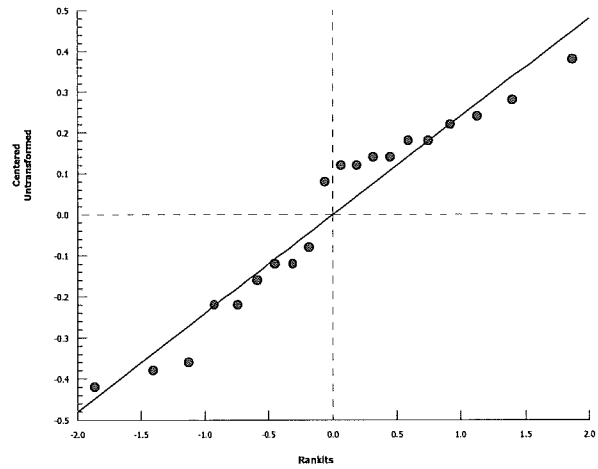
Report Date: 31 Mar-16 10:39 (p 4 of 4)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2798-1695	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 1 of 4)
Test Code:	WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2437-7481	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	86024	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.914	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Germination Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.914	0.88	0.96	0.01327	0.02966	3.25%	0.0%	457	500
25		5	0.92	0.9	0.95	0.008944	0.02	2.17%	-0.66%	460	500
50		5	0.932	0.91	0.96	0.009695	0.02168	2.33%	-1.97%	466	500
100		5	0.926	0.9	0.95	0.009273	0.02074	2.24%	-1.31%	463	500

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.9	0.88	0.92	0.96
25		0.91	0.93	0.9	0.91	0.95
50		0.92	0.96	0.91	0.95	0.92
100		0.91	0.93	0.95	0.94	0.9

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	88/100	92/100	96/100
25		91/100	93/100	90/100	91/100	95/100
50		92/100	96/100	91/100	95/100	92/100
100		91/100	93/100	95/100	94/100	90/100

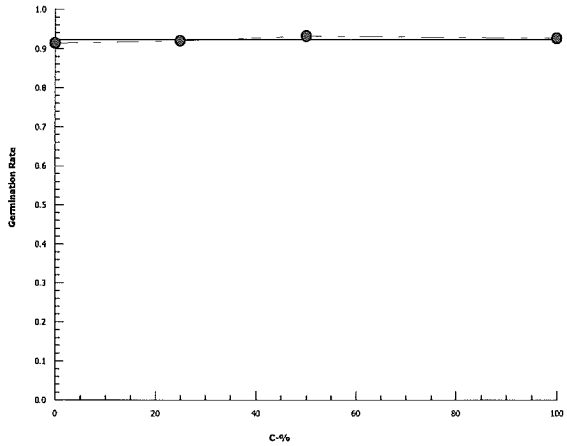
CETIS Analytical Report

Report Date: 31 Mar-16 10:39 (p 2 of 4)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2437-7481	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Report Date: 31 Mar-16 10:39 (p 3 of 4)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-7855-4270	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	195661	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.36	10 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Length Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.36	14	14.6	0.1122	0.251	1.75%	0.0%
25		5	14.38	14	14.6	0.1068	0.2387	1.66%	-0.14%
50		5	14.32	14.1	14.6	0.09695	0.2168	1.51%	0.28%
100		5	14.42	14	14.8	0.1428	0.3194	2.22%	-0.42%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.6	14.5	14	14.2	14.5
25		14.6	14	14.3	14.5	14.5
50		14.2	14.1	14.6	14.5	14.2
100		14.2	14	14.6	14.8	14.5

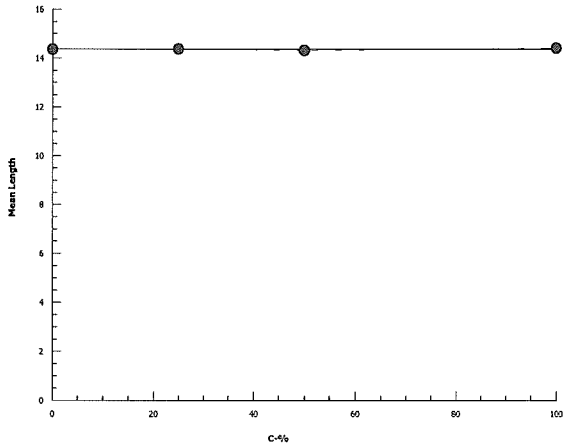
CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 4 of 4)
Test Code:	WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-7855-4270	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:39 (p 1 of 2)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	10-1325-6290	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-1670-0134	**Code:**	WST0116.085k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 16:20	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	45h	**Station:**	LACDPW-010616-ASBS-S02-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
25		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
50		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
100		2	6.7	4.159	9.241	6.5	6.9	0.2	0.2828	4.22%	0
Overall		8	6.587			6.2	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
50		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		8	7.825			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:39 (p 2 of 2)
Test Code: WST0116.085klp | 00-7816-5752

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.8
25		6.6	6.5
50		6.6	6.2
100		6.9	6.5

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.9	7.8
50		7.8	7.8
100		7.8	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

March 31, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-010616-ASBS-S01-POST
DATE RECEIVED:	1/8/2016
ABC LAB. NO.:	WST0116.086

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
TUBE LENGTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date:	31 Mar-16 10:39 (p 1 of 2)
Test Code:	WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-0773-9860	Germination Rate	100	>100	NA	4.18%	1	Dunnett Multiple Comparison Test
21-1037-3833	Mean Length	100	>100	NA	3.02%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
09-3543-0235	Germination Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	
09-3318-7022	Mean Length	IC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		IC10	>100	N/A	N/A	<1	
		IC15	>100	N/A	N/A	<1	
		IC20	>100	N/A	N/A	<1	
		IC25	>100	N/A	N/A	<1	
		IC40	>100	N/A	N/A	<1	
		IC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-3543-0235	Germination Rate	Control Resp	0.918	0.7 - NL	Yes	Passes Acceptability Criteria
18-0773-9860	Germination Rate	Control Resp	0.918	0.7 - NL	Yes	Passes Acceptability Criteria
09-3318-7022	Mean Length	Control Resp	14.32	10 - NL	Yes	Passes Acceptability Criteria
21-1037-3833	Mean Length	Control Resp	14.32	10 - NL	Yes	Passes Acceptability Criteria
18-0773-9860	Germination Rate	PMSD	0.04177	NL - 0.2	No	Passes Acceptability Criteria
21-1037-3833	Mean Length	PMSD	0.03016	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.918	0.8911	0.9449	0.9	0.95	0.009695	0.02168	2.36%	0.0%
25		5	0.922	0.8981	0.9459	0.9	0.95	0.008602	0.01924	2.09%	-0.44%
50		5	0.92	0.8952	0.9448	0.9	0.95	0.008944	0.02	2.17%	-0.22%
100		5	0.938	0.8993	0.9767	0.9	0.97	0.01393	0.03114	3.32%	-2.18%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.32	14.02	14.62	14	14.6	0.1068	0.2387	1.67%	0.0%
25		5	14.42	14.04	14.8	14	14.7	0.1356	0.3033	2.1%	-0.7%
50		5	14.28	13.84	14.72	14	14.9	0.1594	0.3564	2.5%	0.28%
100		5	14.4	14.01	14.79	14	14.8	0.1414	0.3162	2.2%	-0.56%

CETIS Summary Report

Report Date: 31 Mar-16 10:39 (p 2 of 2)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.95	0.9
25		0.93	0.91	0.9	0.92	0.95
50		0.91	0.93	0.95	0.91	0.9
100		0.91	0.96	0.95	0.97	0.9

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.2	14	14.3	14.6	14.5
25		14.6	14	14.2	14.6	14.7
50		14.2	14.1	14.9	14	14.2
100		14.4	14.2	14	14.6	14.8

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	95/100	90/100
25		93/100	91/100	90/100	92/100	95/100
50		91/100	93/100	95/100	91/100	90/100
100		91/100	96/100	95/100	97/100	90/100

CETIS Analytical Report

Report Date: 31 Mar-16 10:38 (p 1 of 4)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-0773-9860	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.18%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		25	-0.2362	2.227	0.066	8	0.8265	CDF	Non-Significant Effect
		50	-0.1152	2.227	0.066	8	0.7894	CDF	Non-Significant Effect
		100	-1.445	2.227	0.066	8	0.9870	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.918	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04177	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.005927434	0.001975811	3	0.9005	0.4626	Non-Significant Effect
Error	0.03510731	0.002194207	16			
Total	0.04103475		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.631	11.34	0.6524	Equal Variances
Variances	Mod Levene Equality of Variance	0.9349	5.953	0.4540	Equal Variances
Variances	Levene Equality of Variance	1.828	5.292	0.1827	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9525	0.866	0.4065	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1486	0.2235	0.2946	Normal Distribution
Distribution	D'Agostino Skewness	0.3488	2.576	0.7273	Normal Distribution
Distribution	D'Agostino Kurtosis	1.184	2.576	0.2364	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.523	9.21	0.4669	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4427	3.878	0.2918	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.918	0.8911	0.9449	0.91	0.9	0.95	0.009695	2.36%	0.0%
25		5	0.922	0.8981	0.9459	0.92	0.9	0.95	0.008602	2.09%	-0.44%
50		5	0.92	0.8952	0.9448	0.91	0.9	0.95	0.008944	2.17%	-0.22%
100		5	0.938	0.8993	0.9767	0.95	0.9	0.97	0.01393	3.32%	-2.18%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.283	1.231	1.334	1.266	1.249	1.345	0.01853	3.23%	0.0%
25		5	1.29	1.243	1.336	1.284	1.249	1.345	0.0166	2.88%	-0.55%
50		5	1.286	1.238	1.334	1.266	1.249	1.345	0.01727	3.0%	-0.27%
100		5	1.325	1.245	1.406	1.345	1.249	1.397	0.02895	4.89%	-3.34%

CETIS Analytical Report

Report Date: 31 Mar-16 10:38 (p 2 of 4)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-0773-9860	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.95	0.9
25		0.93	0.91	0.9	0.92	0.95
50		0.91	0.93	0.95	0.91	0.9
100		0.91	0.96	0.95	0.97	0.9

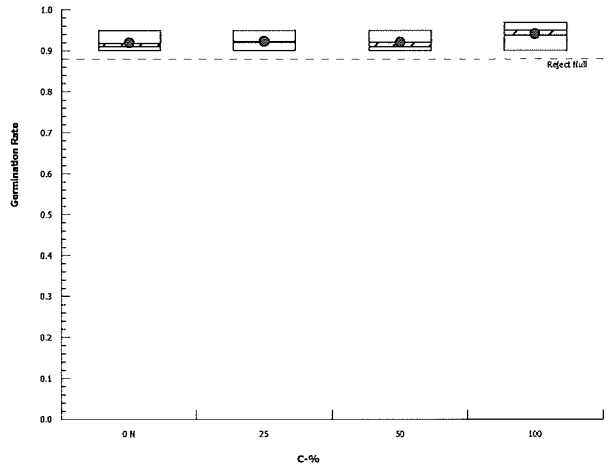
Angular (Corrected) Transformed Detail

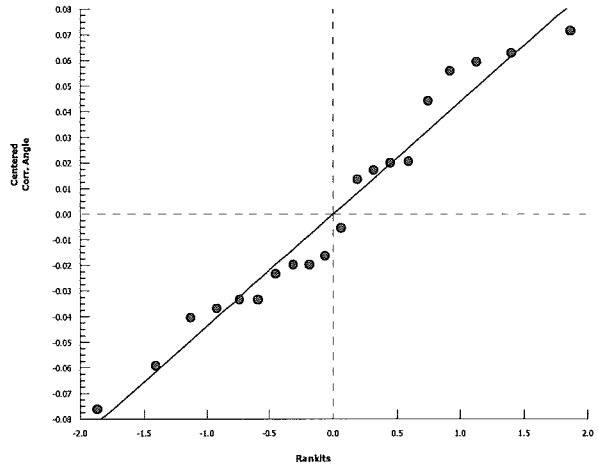
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.249	1.303	1.266	1.345	1.249
25		1.303	1.266	1.249	1.284	1.345
50		1.266	1.303	1.345	1.266	1.249
100		1.266	1.369	1.345	1.397	1.249

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	95/100	90/100
25		93/100	91/100	90/100	92/100	95/100
50		91/100	93/100	95/100	91/100	90/100
100		91/100	96/100	95/100	97/100	90/100

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:38 (p 3 of 4)
Test Code:	WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-1037-3833	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	3.02%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		25	-0.5157	2.227	0.432	8	0.8946	CDF	Non-Significant Effect
		50	0.2063	2.227	0.432	8	0.6707	CDF	Non-Significant Effect
		100	-0.4126	2.227	0.432	8	0.8723	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.32	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.03016	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06550008	0.02183336	3	0.2323	0.8726	Non-Significant Effect
Error	1.504	0.09400002	16			
Total	1.5695		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.5759	11.34	0.9019	Equal Variances
Variances	Mod Levene Equality of Variance	0.08547	5.953	0.9667	Equal Variances
Variances	Levene Equality of Variance	0.2074	5.292	0.8898	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.963	0.866	0.6055	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1388	0.2235	0.4008	Normal Distribution
Distribution	D'Agostino Skewness	0.8158	2.576	0.4146	Normal Distribution
Distribution	D'Agostino Kurtosis	0.3073	2.576	0.7586	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.76	9.21	0.6839	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3323	3.878	0.5215	Normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.32	14.02	14.62	14.3	14	14.6	0.1068	1.67%	0.0%
25		5	14.42	14.04	14.8	14.6	14	14.7	0.1356	2.1%	-0.7%
50		5	14.28	13.84	14.72	14.2	14	14.9	0.1594	2.5%	0.28%
100		5	14.4	14.01	14.79	14.4	14	14.8	0.1414	2.2%	-0.56%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.2	14	14.3	14.6	14.5
25		14.6	14	14.2	14.6	14.7
50		14.2	14.1	14.9	14	14.2
100		14.4	14.2	14	14.6	14.8

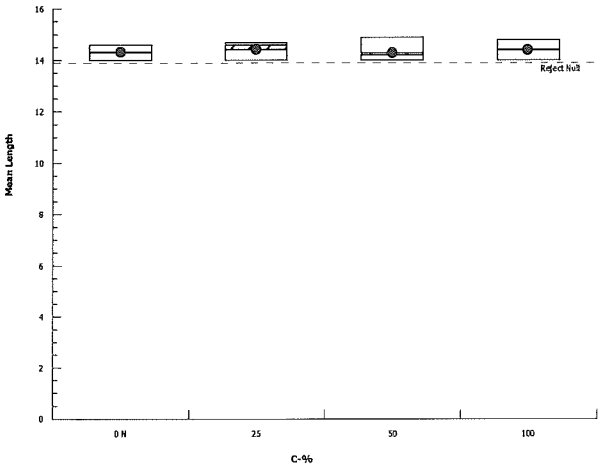
CETIS Analytical Report

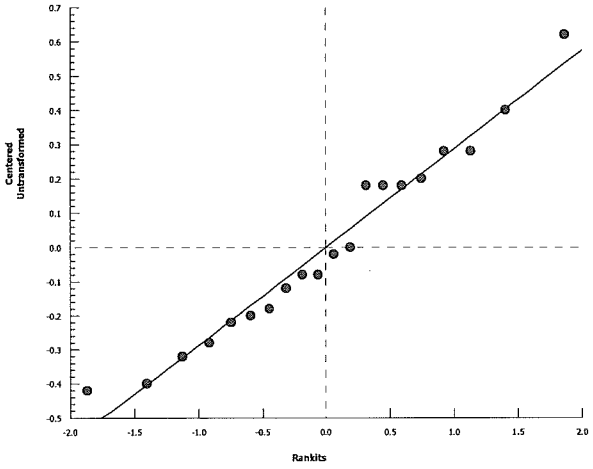
Report Date:	31 Mar-16 10:38 (p 4 of 4)
Test Code:	WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-1037-3833	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:35	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 1 of 4)
Test Code:	WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3543-0235	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.918	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Germination Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.918	0.9	0.95	0.009695	0.02168	2.36%	0.0%	459	500
25		5	0.922	0.9	0.95	0.008602	0.01923	2.09%	-0.44%	461	500
50		5	0.92	0.9	0.95	0.008944	0.02	2.17%	-0.22%	460	500
100		5	0.938	0.9	0.97	0.01393	0.03114	3.32%	-2.18%	469	500

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9	0.93	0.91	0.95	0.9
25		0.93	0.91	0.9	0.92	0.95
50		0.91	0.93	0.95	0.91	0.9
100		0.91	0.96	0.95	0.97	0.9

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	90/100	93/100	91/100	95/100	90/100
25		93/100	91/100	90/100	92/100	95/100
50		91/100	93/100	95/100	91/100	90/100
100		91/100	96/100	95/100	97/100	90/100

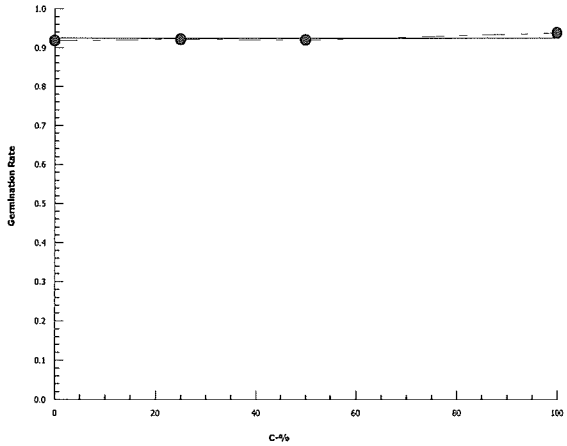
CETIS Analytical Report

Report Date:	31 Mar-16 10:39 (p 2 of 4)
Test Code:	WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3543-0235	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Report Date: 31 Mar-16 10:39 (p 3 of 4)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3318-7022	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1927374	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.32	10 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Length Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.32	14	14.6	0.1068	0.2387	1.67%	0.0%
25		5	14.42	14	14.7	0.1356	0.3033	2.1%	-0.7%
50		5	14.28	14	14.9	0.1594	0.3564	2.5%	0.28%
100		5	14.4	14	14.8	0.1414	0.3162	2.2%	-0.56%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.2	14	14.3	14.6	14.5
25		14.6	14	14.2	14.6	14.7
50		14.2	14.1	14.9	14	14.2
100		14.4	14.2	14	14.6	14.8

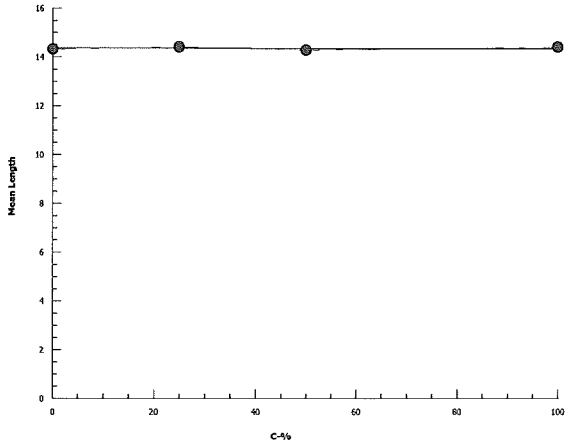
CETIS Analytical Report

Report Date: 31 Mar-16 10:39 (p 4 of 4)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3318-7022	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	31 Mar-16 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 31 Mar-16 10:39 (p 1 of 2)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	13-6147-0395	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Jan-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Jan-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	14-0500-2328	**Code:**	WST0116.086k	**Client:**	Weston Solutions
Sample Date:	06 Jan-16 17:15	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	44h	**Station:**	LACDPW-010616-ASBS-S01-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
25		2	6.65	4.744	8.556	6.5	6.8	0.15	0.2121	3.19%	0
50		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
100		2	6.55	2.103	11	6.2	6.9	0.35	0.495	7.56%	0
Overall		8	6.538			6.2	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		8	7.8			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.84			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 31 Mar-16 10:39 (p 2 of 2)
Test Code: WST0116.086klp | 16-7274-8994

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.5
25		6.5	6.8
50		6.6	6.2
100		6.9	6.2

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.8	7.8
50		7.8	7.7
100		7.8	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.8
50		14.9	14.8
100		14.8	14.9

WESTON SOLUTIONS

☒ 5817 Dryden Place, Ste 101 • Carlsbad, CA 92008 • (760) 795-6900, FAX 931-1580
☐ 1340 Treat Blvd, Ste 210 • Walnut Creek, CA 94597 • (925) 948-2600, FAX 948-2601

CHAIN OF CUSTODY

36723

DATE 6 JAN 2016 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LACDPW MALIBU ASBS
PROJECT MANAGER / CONTACT: DAN McCOY
CLIENT: WESTON SOLUTIONS
ADDRESS: SEE ABOVE
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	TOX - BIVALVE	TOX - ECHIND	TOX - KELP					PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-S02-POST	LACDPW-010616-ASBS-S02-POST	6JAN'16	1620	SLT	4-L	1	X	X	X					ICE		.085
ASBS-S01-POST	LACDPW-010616-ASBS-S01-POST	6JAN'16	1715	SLT	4-L	1	X	X	X					↓		.086

ANALYSIS/TEST REQUESTED

FOR WESTON USE ONLY

S02 = S01
Temp. deg. C = 2.6 C = 2.6 C
Chlorine (mg/L) = <0.1 = <0.1
NH3 (mg/L) = 0.0 = 0.0

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☒ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other _____

Reporting Requirements: ☒ PDF ☒ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT: OLGA ERENDIRA HERNANDEZ SIGNATURE: [signature]

COMMENTS / SPECIAL INSTRUCTIONS
3 CONC FOR ALL → (25, 50, 100%)

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. O.E. HERNANDEZ	[signature]	WESTON	7JAN 16 / 1228	E. MATSUMOTO	[signature]	ABC LABS	1-8-16
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

Uninc. County
Reporting Year 2015 - 2016
Individual Form

aquatic bioassay & consulting laboratories, inc

May 13, 2016

Mr Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-030616-ASBS-S01-Post
DATE RECEIVED:	3/8/2016
ABC LAB. NO.:	WST0316.052

MYTILUS SHELL DEVELOPMENT BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 13 May-16 10:54 (p 1 of 1)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-6768-5281	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Mar-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	16-4676-7952	**Code:**	WST0316.052m	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-1538-5799	Combined Proportion Norm	100	>100	NA	2.86%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
20-0956-8785	Combined Proportion Norm	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
20-1538-5799	Combined Proportion Norm	PMSD	0.02863	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.9467	0.9297	0.9637	0.9289	0.96	0.006126	0.0137	1.45%	0.0%
25		5	0.9538	0.9389	0.9687	0.9378	0.9689	0.00537	0.01201	1.26%	-0.75%
50		5	0.9547	0.9415	0.9678	0.9378	0.9644	0.004745	0.01061	1.11%	-0.85%
100		5	0.944	0.9083	0.9797	0.9022	0.9733	0.01285	0.02873	3.04%	0.28%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9378	0.96	0.9289	0.96	0.9467
25		0.9467	0.96	0.9689	0.9556	0.9378
50		0.96	0.9511	0.9644	0.9378	0.96
100		0.9733	0.9378	0.9689	0.9378	0.9022

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/225	216/225	209/225	216/225	213/225
25		213/225	216/225	218/225	215/225	211/225
50		216/225	214/225	217/225	211/225	216/225
100		219/225	211/225	218/225	211/225	203/225

CETIS Analytical Report

Report Date: 13 May-16 10:54 (p 1 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-1538-5799	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:53	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	15-6768-5281	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Mar-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	16-4676-7952	**Code:**	WST0316.052m	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.86%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		25	-0.6487	2.227	0.056	8	0.9189	CDF	Non-Significant Effect
		50	-0.7184	2.227	0.056	8	0.9297	CDF	Non-Significant Effect
		100	0.04602	2.227	0.056	8	0.7332	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.02863	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001589579	0.0005298596	3	0.3352	0.8001	Non-Significant Effect
Error	0.02529474	0.001580921	16			
Total	0.02688432		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.387	11.34	0.2226	Equal Variances
Variances	Mod Levene Equality of Variance	1.854	5.953	0.1912	Equal Variances
Variances	Levene Equality of Variance	2.728	5.292	0.0784	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9799	0.866	0.9327	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.09497	0.2235	1.0000	Normal Distribution
Distribution	D'Agostino Skewness	0.4758	2.576	0.6342	Normal Distribution
Distribution	D'Agostino Kurtosis	0.5927	2.576	0.5534	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.5777	9.21	0.7491	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2207	3.878	0.8672	Normal Distribution

Combined Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.9467	0.9297	0.9637	0.9467	0.9289	0.96	0.006127	1.45%	0.0%
25		5	0.9538	0.9389	0.9687	0.9556	0.9378	0.9689	0.00537	1.26%	-0.75%
50		5	0.9547	0.9415	0.9678	0.96	0.9378	0.9644	0.004746	1.11%	-0.85%
100		5	0.944	0.9083	0.9797	0.9378	0.9022	0.9733	0.01285	3.04%	0.28%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.339	1.301	1.377	1.338	1.301	1.369	0.01364	2.28%	0.0%
25		5	1.356	1.32	1.391	1.358	1.319	1.393	0.01288	2.12%	-1.22%
50		5	1.357	1.327	1.388	1.369	1.319	1.381	0.01105	1.82%	-1.35%
100		5	1.338	1.26	1.416	1.319	1.253	1.407	0.02812	4.7%	0.09%

CETIS Analytical Report

Report Date: 13 May-16 10:54 (p 2 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-1538-5799	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:53	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9378	0.96	0.9289	0.96	0.9467
25		0.9467	0.96	0.9689	0.9556	0.9378
50		0.96	0.9511	0.9644	0.9378	0.96
100		0.9733	0.9378	0.9689	0.9378	0.9022

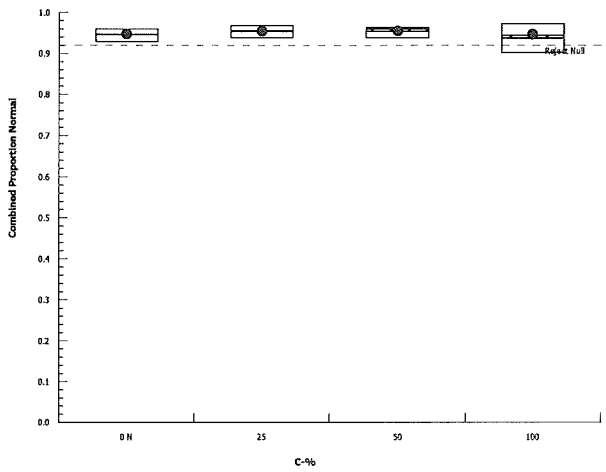
Angular (Corrected) Transformed Detail

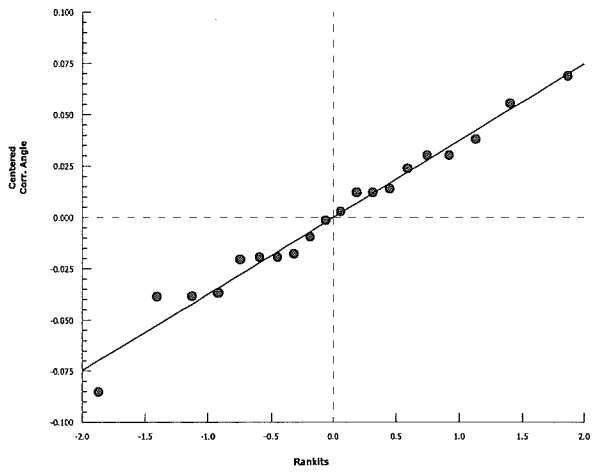
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.319	1.369	1.301	1.369	1.338
25		1.338	1.369	1.393	1.358	1.319
50		1.369	1.348	1.381	1.319	1.369
100		1.407	1.319	1.393	1.319	1.253

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/225	216/225	209/225	216/225	213/225
25		213/225	216/225	218/225	215/225	211/225
50		216/225	214/225	217/225	211/225	216/225
100		219/225	211/225	218/225	211/225	203/225

Graphics





CETIS Analytical Report

Report Date: 13 May-16 10:54 (p 1 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0956-8785	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:53	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	15-6768-5281	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Mar-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	16-4676-7952	**Code:**	WST0316.052m	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Combined Proportion Normal Summary

										Calculated Variate(A/B)	
C-%	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Negative Control	5	0.9467	0.9289	0.96	0.006127	0.0137	1.45%	0.0%	1065	1125
25		5	0.9538	0.9378	0.9689	0.00537	0.01201	1.26%	-0.75%	1073	1125
50		5	0.9547	0.9378	0.9644	0.004746	0.01061	1.11%	-0.85%	1074	1125
100		5	0.944	0.9022	0.9733	0.01285	0.02873	3.04%	0.28%	1062	1125

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9378	0.96	0.9289	0.96	0.9467
25		0.9467	0.96	0.9689	0.9556	0.9378
50		0.96	0.9511	0.9644	0.9378	0.96
100		0.9733	0.9378	0.9689	0.9378	0.9022

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/225	216/225	209/225	216/225	213/225
25		213/225	216/225	218/225	215/225	211/225
50		216/225	214/225	217/225	211/225	216/225
100		219/225	211/225	218/225	211/225	203/225

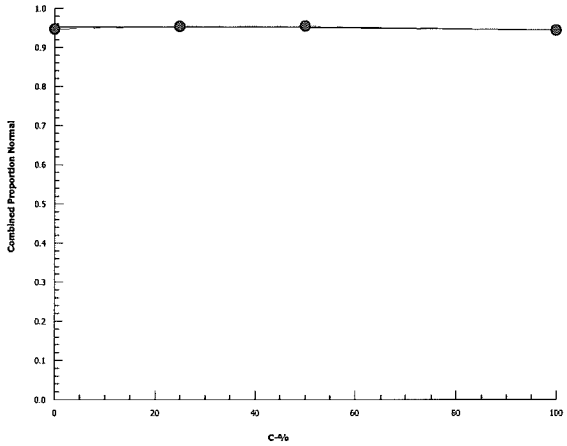
CETIS Analytical Report

Report Date: 13 May-16 10:54 (p 2 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0956-8785	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:53	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 13 May-16 10:54 (p 1 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-6768-5281	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Mar-16 13:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	16-4676-7952	**Code:**	WST0316.052m	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
25		2	6.7	4.159	9.241	6.5	6.9	0.2	0.2828	4.22%	0
50		2	6.35	4.444	8.256	6.2	6.5	0.15	0.2121	3.34%	0
100		2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
Overall		8	6.613			6.2	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		8	7.788			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 13 May-16 10:54 (p 2 of 2)
Test Code: WST0316.052myt | 09-3773-8294

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.8
25		6.5	6.9
50		6.2	6.5
100		6.6	6.8

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.8	7.8
50		7.8	7.7
100		7.7	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

May 13, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place, Suite 101
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. Test was set within holding time, reference toxicant was within limits, and all other TAC was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-030616-ASBS-S01-Post
DATE RECEIVED:	3/8/2016
ABC LAB. NO.:	WST0316.052

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
TUBE LENGTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 13 May-16 10:54 (p 1 of 2)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
21-0723-5558	Germination Rate	100	>100	NA	3.41%	1	Dunnett Multiple Comparison Test
01-4072-2856	Mean Length	100	>100	NA	2.31%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
02-6794-7528	Germination Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	
09-5289-7306	Mean Length	IC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		IC10	>100	N/A	N/A	<1	
		IC15	>100	N/A	N/A	<1	
		IC20	>100	N/A	N/A	<1	
		IC25	>100	N/A	N/A	<1	
		IC40	>100	N/A	N/A	<1	
		IC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-6794-7528	Germination Rate	Control Resp	0.934	0.7 - NL	Yes	Passes Acceptability Criteria
21-0723-5558	Germination Rate	Control Resp	0.934	0.7 - NL	Yes	Passes Acceptability Criteria
01-4072-2856	Mean Length	Control Resp	14.24	10 - NL	Yes	Passes Acceptability Criteria
09-5289-7306	Mean Length	Control Resp	14.24	10 - NL	Yes	Passes Acceptability Criteria
21-0723-5558	Germination Rate	PMSD	0.03412	NL - 0.2	No	Passes Acceptability Criteria
01-4072-2856	Mean Length	PMSD	0.02309	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.934	0.9114	0.9566	0.91	0.95	0.008124	0.01817	1.95%	0.0%
25		5	0.93	0.9052	0.9548	0.91	0.96	0.008944	0.02	2.15%	0.43%
50		5	0.926	0.9003	0.9517	0.9	0.95	0.009274	0.02074	2.24%	0.86%
100		5	0.93	0.9009	0.9591	0.91	0.97	0.01049	0.02345	2.52%	0.43%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.24	14.01	14.47	14	14.5	0.08124	0.1817	1.28%	0.0%
25		5	14.32	13.95	14.69	14	14.6	0.1319	0.295	2.06%	-0.56%
50		5	14.5	14.28	14.72	14.2	14.6	0.07746	0.1732	1.2%	-1.83%
100		5	14.46	14.14	14.78	14.2	14.8	0.1166	0.2608	1.8%	-1.55%

CETIS Summary Report

Report Date: 13 May-16 10:54 (p 2 of 2)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.92	0.91	0.95	0.94	0.95
25		0.92	0.91	0.96	0.94	0.92
50		0.91	0.9	0.93	0.95	0.94
100		0.92	0.93	0.91	0.97	0.92

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14	14.2	14.3	14.5	14.2
25		14	14.6	14.5	14.5	14
50		14.6	14.6	14.5	14.2	14.6
100		14.2	14.8	14.2	14.6	14.5

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	92/100	91/100	95/100	94/100	95/100
25		92/100	91/100	96/100	94/100	92/100
50		91/100	90/100	93/100	95/100	94/100
100		92/100	93/100	91/100	97/100	92/100

CETIS Analytical Report

Report Date:	13 May-16 10:53 (p 1 of 4)
Test Code:	WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-0723-5558	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.41%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	0.2745	2.227	0.060	8	0.6425	CDF	Non-Significant Effect
	50	0.5717	2.227	0.060	8	0.5130	CDF	Non-Significant Effect
	100	0.2228	2.227	0.060	8	0.6639	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.934	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.03412	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006065799	0.0002021933	3	0.1107	0.9526	Non-Significant Effect
Error	0.02921319	0.001825825	16			
Total	0.02981977		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.5401	11.34	0.9100	Equal Variances
Variances	Mod Levene Equality of Variance	0.008278	5.953	0.9989	Equal Variances
Variances	Levene Equality of Variance	0.06121	5.292	0.9795	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9277	0.866	0.1395	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2069	0.2235	0.0247	Normal Distribution
Distribution	D'Agostino Skewness	1.454	2.576	0.1459	Normal Distribution
Distribution	D'Agostino Kurtosis	0.03772	2.576	0.9699	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.116	9.21	0.3471	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.5843	3.878	0.1318	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.934	0.9114	0.9566	0.94	0.91	0.95	0.008124	1.95%	0.0%
25		5	0.93	0.9052	0.9548	0.92	0.91	0.96	0.008944	2.15%	0.43%
50		5	0.926	0.9003	0.9517	0.93	0.9	0.95	0.009273	2.24%	0.86%
100		5	0.93	0.9009	0.9591	0.92	0.91	0.97	0.01049	2.52%	0.43%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	5	1.313	1.268	1.358	1.323	1.266	1.345	0.01617	2.75%	0.0%
25		5	1.305	1.254	1.357	1.284	1.266	1.369	0.01855	3.18%	0.57%
50		5	1.297	1.248	1.347	1.303	1.249	1.345	0.01777	3.06%	1.18%
100		5	1.307	1.242	1.371	1.284	1.266	1.397	0.02323	3.98%	0.46%

CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 2 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-0723-5558	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.92	0.91	0.95	0.94	0.95
25		0.92	0.91	0.96	0.94	0.92
50		0.91	0.9	0.93	0.95	0.94
100		0.92	0.93	0.91	0.97	0.92

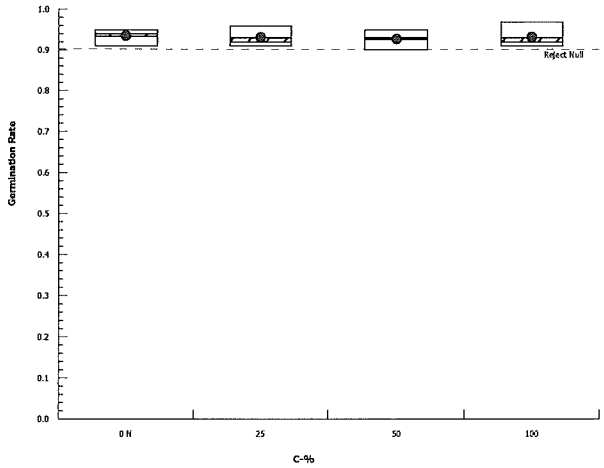
Angular (Corrected) Transformed Detail

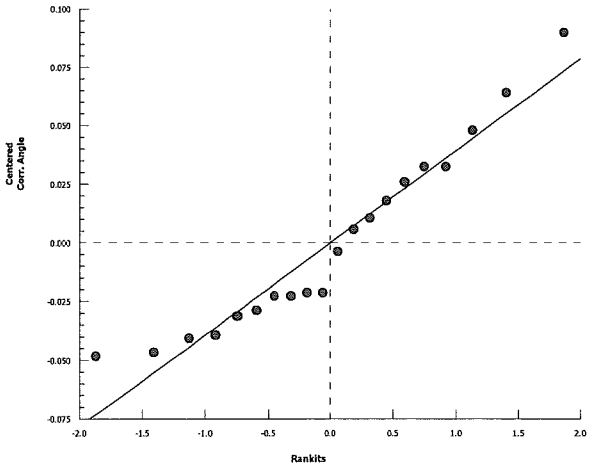
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.284	1.266	1.345	1.323	1.345
25		1.284	1.266	1.369	1.323	1.284
50		1.266	1.249	1.303	1.345	1.323
100		1.284	1.303	1.266	1.397	1.284

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	92/100	91/100	95/100	94/100	95/100
25		92/100	91/100	96/100	94/100	92/100
50		91/100	90/100	93/100	95/100	94/100
100		92/100	93/100	91/100	97/100	92/100

Graphics





CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 3 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-4072-2856	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	2.31%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-0.5418	2.227	0.329	8	0.8998	CDF	Non-Significant Effect
	50	-1.761	2.227	0.329	8	0.9943	CDF	Non-Significant Effect
	100	-1.49	2.227	0.329	8	0.9884	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.24	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.02309	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2200003	0.07333342	3	1.346	0.2949	Non-Significant Effect
Error	0.8720011	0.05450007	16			
Total	1.092001		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.484	11.34	0.6859	Equal Variances
Variances	Mod Levene Equality of Variance	0.6582	5.953	0.5933	Equal Variances
Variances	Levene Equality of Variance	1.968	5.292	0.1595	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9165	0.866	0.0847	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1687	0.2235	0.1416	Normal Distribution
Distribution	D'Agostino Skewness	0.5537	2.576	0.5798	Normal Distribution
Distribution	D'Agostino Kurtosis	1.689	2.576	0.0913	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	3.158	9.21	0.2062	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.7194	3.878	0.0604	Normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.24	14.01	14.47	14.2	14	14.5	0.08124	1.28%	0.0%
25		5	14.32	13.95	14.69	14.5	14	14.6	0.1319	2.06%	-0.56%
50		5	14.5	14.28	14.72	14.6	14.2	14.6	0.07745	1.19%	-1.83%
100		5	14.46	14.14	14.78	14.5	14.2	14.8	0.1166	1.8%	-1.55%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14	14.2	14.3	14.5	14.2
25		14	14.6	14.5	14.5	14
50		14.6	14.6	14.5	14.2	14.6
100		14.2	14.8	14.2	14.6	14.5

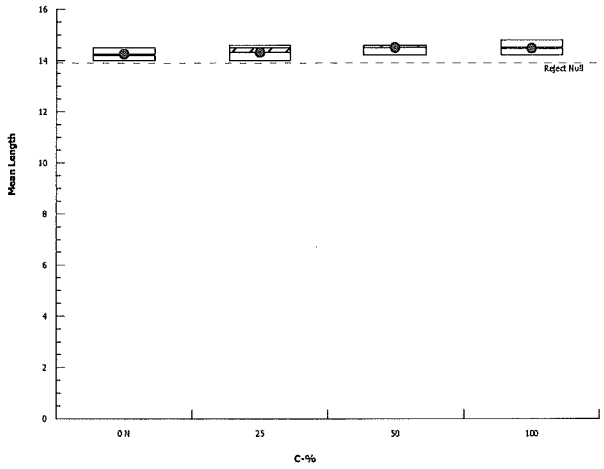
CETIS Analytical Report

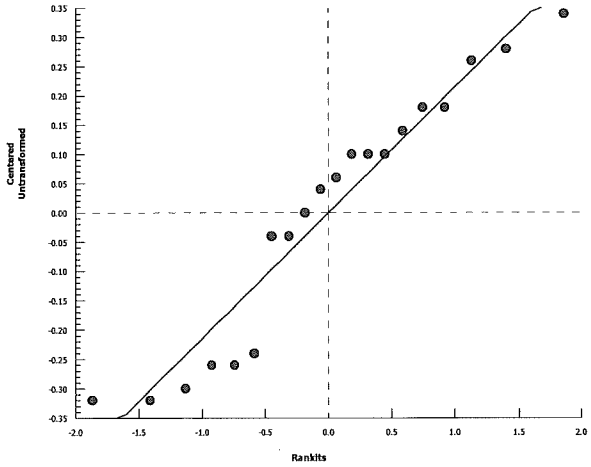
Report Date: 13 May-16 10:53 (p 4 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-4072-2856	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 1 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-6794-7528	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1799585	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.934	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Germination Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.934	0.91	0.95	0.008124	0.01817	1.95%	0.0%	467	500
25		5	0.93	0.91	0.96	0.008944	0.02	2.15%	0.43%	465	500
50		5	0.926	0.9	0.95	0.009273	0.02074	2.24%	0.86%	463	500
100		5	0.93	0.91	0.97	0.01049	0.02345	2.52%	0.43%	465	500

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.92	0.91	0.95	0.94	0.95
25		0.92	0.91	0.96	0.94	0.92
50		0.91	0.9	0.93	0.95	0.94
100		0.92	0.93	0.91	0.97	0.92

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	92/100	91/100	95/100	94/100	95/100
25		92/100	91/100	96/100	94/100	92/100
50		91/100	90/100	93/100	95/100	94/100
100		92/100	93/100	91/100	97/100	92/100

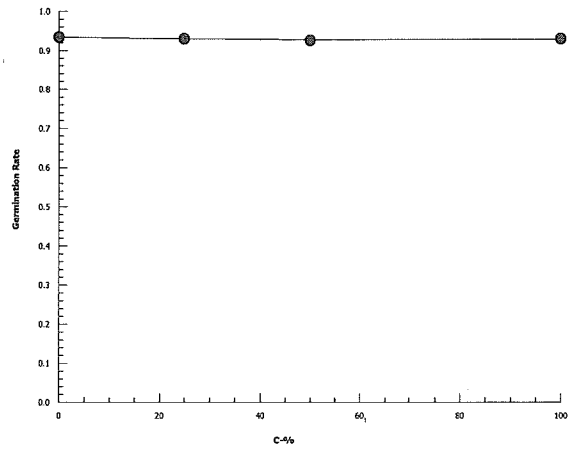
CETIS Analytical Report

Report Date:	13 May-16 10:53 (p 2 of 4)
Test Code:	WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-6794-7528	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 3 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-5289-7306	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1354081	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.24	10 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Length Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.24	14	14.5	0.08124	0.1817	1.28%	0.0%
25		5	14.32	14	14.6	0.1319	0.295	2.06%	-0.56%
50		5	14.5	14.2	14.6	0.07745	0.1732	1.19%	-1.83%
100		5	14.46	14.2	14.8	0.1166	0.2608	1.8%	-1.55%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14	14.2	14.3	14.5	14.2
25		14	14.6	14.5	14.5	14
50		14.6	14.6	14.5	14.2	14.6
100		14.2	14.8	14.2	14.6	14.5

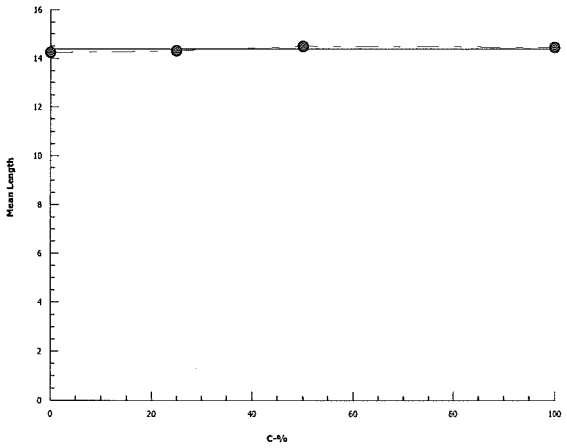
CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 4 of 4)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-5289-7306	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 13 May-16 10:54 (p 1 of 2)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	21-3175-0769	**Test Type:**	Growth-Germination	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	10 Mar-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	18-8651-9264	**Code:**	WST0316.052k	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
25		2	6.55	2.103	11	6.2	6.9	0.35	0.495	7.56%	0
50		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
100		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
Overall		8	6.488			6.1	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
50		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
100		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		8	7.813			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 13 May-16 10:54 (p 2 of 2)
Test Code: WST0316.052klp | 00-1704-6117

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.5
25		6.9	6.2
50		6.5	6.1
100		6.6	6.5

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.9	7.8
50		7.8	7.8
100		7.7	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

aquatic bioassay & consulting laboratories, inc

May 13, 2016

Mr. Dan McCoy
Weston Solutions
5817 Dryden Place
Carlsbad, CA 92008

Dear Mr. McCoy:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* "The concentration-response was normal. Test was set at 38 hours holding time which is beyond the prescribed 36 hour hold but within 72 hours. Reference toxicant was within limits and all other test acceptability criteria was met. This is a valid test." Results were as follows:

CLIENT:	Weston Solutions
SAMPLE I.D.:	LACDPW-030616-ASBS-S01-Post
DATE RECEIVED:	3/8/2016
ABC LAB. NO.:	WST0316.052

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

R. Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 13 May-16 10:53 (p 1 of 1)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-7089-7442	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Mar-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-2045-9441	**Code:**	WST0316.052uf	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
16-1132-4759	Fertilization Rate	100	>100	NA	4.36%	1	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
17-4576-1071	Fertilization Rate	EC5	>100	N/A	N/A	<1	Linear Interpolation (ICPIN)
		EC10	>100	N/A	N/A	<1	
		EC15	>100	N/A	N/A	<1	
		EC20	>100	N/A	N/A	<1	
		EC25	>100	N/A	N/A	<1	
		EC40	>100	N/A	N/A	<1	
		EC50	>100	N/A	N/A	<1	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
16-1132-4759	Fertilization Rate	Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
17-4576-1071	Fertilization Rate	Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
16-1132-4759	Fertilization Rate	PMSD	0.04361	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.92	0.894	0.946	0.9	0.94	0.008165	0.01633	1.78%	0.0%
25		4	0.9475	0.9077	0.9873	0.92	0.98	0.0125	0.025	2.64%	-2.99%
50		4	0.9325	0.8972	0.9678	0.91	0.96	0.01109	0.02217	2.38%	-1.36%
100		4	0.95	0.937	0.963	0.94	0.96	0.004083	0.008165	0.86%	-3.26%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.92	0.94	0.92
25		0.94	0.98	0.95	0.92
50		0.94	0.96	0.92	0.91
100		0.95	0.95	0.94	0.96

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	92/100	94/100	92/100
25		94/100	98/100	95/100	92/100
50		94/100	96/100	92/100	91/100
100		95/100	95/100	94/100	96/100

CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 1 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	16-1132-4759	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	01-7089-7442	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Mar-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-2045-9441	**Code:**	WST0316.052uf	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.36%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	25	-2.02	2.287	0.068	6	0.9965	CDF	Non-Significant Effect
	50	-0.8586	2.287	0.068	6	0.9465	CDF	Non-Significant Effect
	100	-2.035	2.287	0.068	6	0.9966	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04361	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01040986	0.003469953	3	1.949	0.1756	Non-Significant Effect
Error	0.0213615	0.001780125	12			
Total	0.03177136		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.588	11.34	0.3095	Equal Variances
Variances	Mod Levene Equality of Variance	1.188	5.953	0.3557	Equal Variances
Variances	Levene Equality of Variance	1.287	5.953	0.3235	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9579	0.8408	0.6244	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1886	0.2471	0.1340	Normal Distribution
Distribution	D'Agostino Skewness	1.162	2.576	0.2451	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4024	3.878	0.3625	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.92	0.894	0.946	0.92	0.9	0.94	0.008165	1.78%	0.0%
25		4	0.9475	0.9077	0.9873	0.945	0.92	0.98	0.0125	2.64%	-2.99%
50		4	0.9325	0.8972	0.9678	0.93	0.91	0.96	0.01109	2.38%	-1.36%
100		4	0.95	0.937	0.963	0.95	0.94	0.96	0.004083	0.86%	-3.26%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contro	4	1.285	1.237	1.333	1.284	1.249	1.323	0.01518	2.36%	0.0%
25		4	1.345	1.248	1.443	1.334	1.284	1.429	0.03058	4.55%	-4.69%
50		4	1.311	1.238	1.384	1.304	1.266	1.369	0.02293	3.5%	-1.99%
100		4	1.346	1.316	1.376	1.345	1.323	1.369	0.009417	1.4%	-4.73%

CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 2 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	16-1132-4759	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.92	0.94	0.92
25		0.94	0.98	0.95	0.92
50		0.94	0.96	0.92	0.91
100		0.95	0.95	0.94	0.96

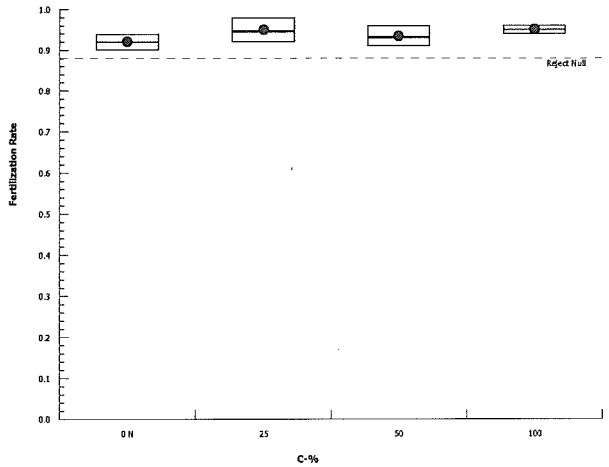
Angular (Corrected) Transformed Detail

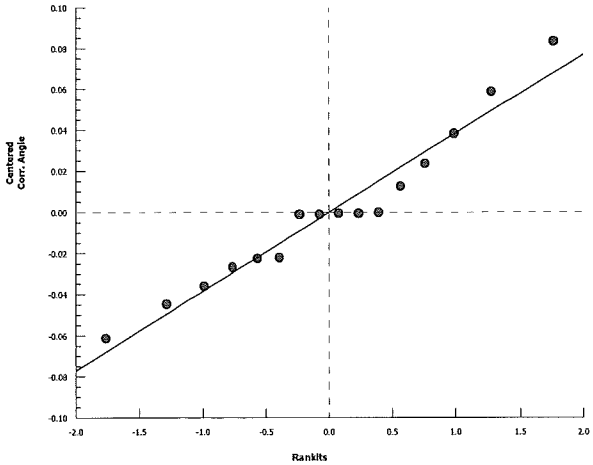
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.249	1.284	1.323	1.284
25		1.323	1.429	1.345	1.284
50		1.323	1.369	1.284	1.266
100		1.345	1.345	1.323	1.369

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	92/100	94/100	92/100
25		94/100	98/100	95/100	92/100
50		94/100	96/100	92/100	91/100
100		95/100	95/100	94/100	96/100

Graphics





CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 1 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4576-1071	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	01-7089-7442	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Mar-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-2045-9441	**Code:**	WST0316.052uf	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Fertilization Rate Summary

										Calculated Variate(A/B)	
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.92	0.9	0.94	0.008165	0.01633	1.78%	0.0%	368	400
25		4	0.9475	0.92	0.98	0.0125	0.025	2.64%	-2.99%	379	400
50		4	0.9325	0.91	0.96	0.01109	0.02217	2.38%	-1.36%	373	400
100		4	0.95	0.94	0.96	0.004083	0.008165	0.86%	-3.26%	380	400

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	0.92	0.94	0.92
25		0.94	0.98	0.95	0.92
50		0.94	0.96	0.92	0.91
100		0.95	0.95	0.94	0.96

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	90/100	92/100	94/100	92/100
25		94/100	98/100	95/100	92/100
50		94/100	96/100	92/100	91/100
100		95/100	95/100	94/100	96/100

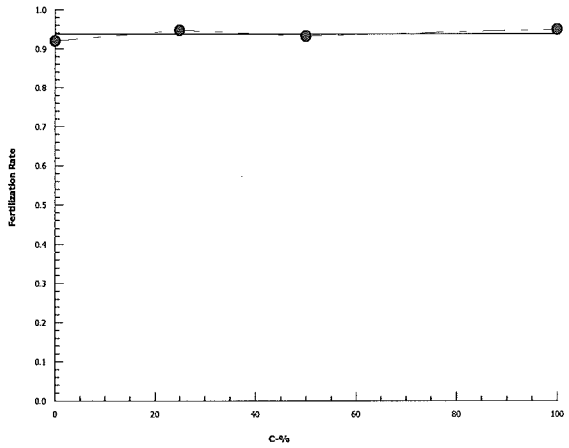
CETIS Analytical Report

Report Date: 13 May-16 10:53 (p 2 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4576-1071	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 May-16 10:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Report Date: 13 May-16 10:53 (p 1 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-7089-7442	**Test Type:**	Fertilization	**Analyst:**	Joe Freas
Start Date:	08 Mar-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	08 Mar-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-2045-9441	**Code:**	WST0316.052uf	**Client:**	Weston Solutions
Sample Date:	06 Mar-16	**Material:**	Sample Water	**Project:**	LACDPW MALIBU ASBS
Receive Date:	08 Mar-16 10:20	**Source:**	Bioassay Report		
Sample Age:	61h (1 °C)	**Station:**	LACDPW-030616-ASBS-S01-Post		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.8	14.9	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
25		2	6.35	4.444	8.256	6.2	6.5	0.15	0.2121	3.34%	0
50		2	6.4	5.129	7.671	6.3	6.5	0.1	0.1414	2.21%	0
100		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
Overall		8	6.5			6.2	6.8				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		8	7.788			7.7	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contro	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
25		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
50		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

CETIS Measurement Report

Report Date: 13 May-16 10:53 (p 2 of 2)
Test Code: WST0316.052urcf | 10-0824-7618

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.8
25		6.5	6.2
50		6.3	6.5
100		6.6	6.5

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
25		7.8	7.8
50		7.8	7.7
100		7.7	7.7

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
25		34	34
50		34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
25		14.8	14.9
50		14.8	14.9
100		14.8	14.9

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☐ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 428 Thirteenth St., Ste B, 6th Floor • Oakland, CA 94612 • (510) 788-3800, FAX 891-9710

CHAIN OF CUSTODY

33276

DATE 3/6/16 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LACDPW MALIBU ASBS
PROJECT MANAGER / CONTACT: DAN McCOY
CLIENT: WESTON SOLUTIONS
ADDRESS: SEE ABOVE
PHONE / FAX / EMAIL: "

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	TOX - BIVALVE	TOX - ECHINO	TOX - KELP					PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
ASBS-S01	LACDPW-030616-ASBS-S01-POST	3/6/16		SLT	P/4L	1	X	X	X					ICE		052

Temp. deg. C = 1.0°C
Chlorine (mg/L) = <0.1
NH3 (mg/L) = 0.0

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____
Container Code: G=glass P=plastic B=bags ☐ O=other _____
Shipped By: ☐ Courier ☐ UPS ☒ FedEx ☐ USPS ☐ Client drop off ☐ Other _____
Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other _____
Reporting Requirements: ☒ PDF ☒ EDD ☐ Hard Copy ☐ Email ☒ Other CEDEN

SAMPLED BY: PRINT DAN McCOY SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS
3 CONC FOR ALL → (25, 50, 100%)

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. DAN McCOY		WESTON	3/7/16 09:00	G. MANNING		ABC LABS.	3-8-16
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

Please refer to the Los Angeles County Flood Control District's 2015-2016 Individual Annual Report for the 2013-2014 and 2015-2016 Malibu ASBS Monitoring Data in CEDEN format.