Los Angeles County Municipal Storm Water Permit
(Order No. R4-2012-0175 as amended by Order WQ 2015-0075)
NPDES No. CAS004001

Annual Report
Individual Form
Reporting Year 15-16

This form includes items to be reported individually by each Permittee.

Permittee Name	City of Malibu
Permittee Program Contact	Jennifer Voccola Brown
Title	Senior Environmental Programs Coordinator
Address	23825 Stuart Ranch Road
City	Malibu
Zip Code	90265
Phone	(310) 456-2489 x 275
Email	jbrown@malibucity.org

1. Legal Authority and Certification

Complete the items on this page.

1.1 Answer the following questions on Legal Authority *[VI.A.2.b]*

	Yes	No
Is there a current statement certified by the Permittee's chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and the Permit?	☒	☐
Has the above statement been developed or updated within the reporting year? If yes, attach the updated legal authority statement to this report.	☐	☒

1.2 Completed the required certification below *[Attachment D, V.B.5]*:

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

Signature of either a principal executive officer, ranking elected official, or by a duly authorized representative of a principal executive officer or ranking elected official. A person is a duly authorized representative only if:

- **a. The authorization is made in writing by a principal executive officer or ranking elected official.**
- **b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)**
- **c. The written authorization is submitted to the Regional Board.**

If an authorization of a duly authorized representative is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization will be submitted to the Regional Board prior to or together with any reports, information, or applications, to be signed by an authorized representative.

Signature Robert L. Brager

Title: Public Works Director

Date: December 14, 2016

2. Fiscal Section

Complete the following items in this section.

2.1 Source(s) of funds used in the past year, and proposed for the coming year, to meet necessary expenditures on the Permittee's stormwater management program. *[Fiscal Resources (VI.A.3.b)]*

Funding to implement the program elements comes from the City of Malibu (City) General Fund, Solid Waste Fund, and Legacy Park Fund.

Various accounts in the General Fund are set up per Capital Improvement Project (CIP) process, wherein City funds from various sources (Community Development Block Grants, Parkland Funds, Reserve Funds, General Fund, Special Revenue Funds, etc.) are allocated and grant funds are designated when awarded to a project's budget. When the City Council formally accepts a project as a CIP, a dedicated account is set up.

The City also has a long history of seeking and being awarded grant funds to offset the cost of water quality improvement projects, and will continue to seek such opportunities. An application was submitted in January 2016 for funding from the Santa Monica Bay Restoration Commission to construct a project included in the North Santa Monica Bay Coastal Watersheds (NSMBCW) Enhanced Watershed Management Program (EWMP) Plan at Winter Canyon and Civic Center Way; the City was recently notified that it would not be awarded this grant. The City's grant writer continues to actively seek solicitations for applicable grant programs. The NSMBCW EWMP Group consists of the City, County of Los Angeles, and the Los Angeles County Flood Control District.

2.2 Complete the table on program expenditures below *[Attachment D – VII]*

<table>
<tr><th colspan="4">Table 2a: Program Expenditures</th></tr>
<tr><th colspan="2">Category</th><th>Expenditures for Reporting Year (15-16)</th><th>Anticipated Expenditures for Next Reporting Year (16-17)</th></tr>
<tr><td colspan="2">(1) Program Management</td><td>211,994</td><td>164,698</td></tr>
<tr><td rowspan="7">(2) Minimum Control Measures (MCMs)</td><td>Public Information and Participation Program</td><td>38,253</td><td>39,807</td></tr>
<tr><td>Industrial / Commercial Facilities Program</td><td>33,253</td><td>34,807</td></tr>
<tr><td>Planning and Land Development Program</td><td>39,386</td><td>47,543</td></tr>
<tr><td>Development Construction Program</td><td>51,655</td><td>51,257</td></tr>
<tr><td>Public Agency Activities Program</td><td>495,189</td><td>532,556</td></tr>
<tr><td>Illicit Connections and Illicit Discharges Program</td><td>62,132</td><td>64,357</td></tr>
<tr><td>Additional Institutional BMPs / "Enhanced" MCMs</td><td>0</td><td>0</td></tr>
<tr><td rowspan="3">(3) Projects</td><td>Distributed Projects and Green Streets</td><td>0</td><td>25,000</td></tr>
<tr><td>Regional Projects</td><td>0</td><td>0</td></tr>
<tr><td>Restoration Projects</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">(4) Monitoring</td><td>159,611</td><td>143,504</td></tr>
<tr><td colspan="2">(5) Other[1]</td><td>324,966</td><td>92,400</td></tr>
</table>

[1] Categories may be added to the table as necessary

TOTAL	1,416,440	1,195,929

2.3 Please add any additional comments on stormwater expenditures below:

Provide information within this space.

3. Discharge Prohibitions and Receiving Water Limitations

Complete the following items in this section.

3.1 Did you develop and implement procedures to ensure that a discharger, if not a named Permittee in this Order, fulfilled the requirements of Part III.A.4.a.i-vi? If so, provide a link to where the procedures may be found or attach to the Annual Report. [*III.A.4.a*]

Yes, there is a procedure. In simplest terms, the City does not allow discharges to its Municipal Separate Storm Sewer System (MS4) unless in compliance with a separate National Pollutant Discharge Elimination System (NPDES) permit or through a conditional exemption from the Regional Water Quality Control Board (Regional Board) or the State Water Resources Control Board (State Board). The municipal codes listing prohibited discharges, exemptions, and conditional exemptions are available online at http://qcode.us/codes/malibu/ in Chapter 13.04.

If the City is notified of a request for a planned discharge that is exempt or conditionally exempt under the permit, it will consider a variety of factors in whether to permit the discharge, including the size of the discharge, source of the water, and what receiving water is closest. If there is an existing water quality monitoring site reasonably near to the discharge that could be affected by that volume of water, the water quality data for the applicable sites would be looked at and used to determine whether to allow the discharge or if it needs to be contained and/or additional best management practices (BMPs) need to be implemented. However, there are very few actual discharge instances that the City would permit. There are few storm drain outlets from the City's MS4 that actually discharge on the shoreline. Most City drains convey water under a road to a dry canyon hillside. The City has authority to, and would, place conditions on the discharge as appropriate to the request. Regardless, more often than not, the City requires discharges to be trucked offsite and disposed in other ways such as at a wastewater treatment plant, for dust control, to landscaping, or to a retention or detention pond. The City's MS4 is mostly rural culverts and under road drains that collect small areas of individual public streets, and not an interconnected system. Therefore, it is not likely that a discharge would reach the shore or be above a water quality objective (WQO) if discharged a sufficient distance from the shore.

3.2 Did you develop and implement procedures that minimize the discharge of landscape irrigation water into the MS4? If so, provide a link to where the procedures may be found or attach to the Annual Report. [*Prohibitions – Non-Stormwater Control Measures (III.A.4.a.b)*]

Yes. The Malibu Municipal Code prohibits the discharge of landscape irrigation into the MS4 (9.20.020 Regulation of irrigation practices and 13.04.060 Prohibited activities). The Malibu Municipal Code is available online at http://qcode.us/codes/malibu/.

The City maintains an online Water Waster Report (www.malibucity.org/waterwaster) where anyone may notify the City of water violations, including the discharge of landscape irrigation water into the MS4. This online reporting form is in addition to the City's 24/7 Pollution Prevention Hotline, so incidents of irrigation water reaching the MS4 may be reported online or by phone at any time, or by calling or emailing staff directly during business hours. Most of the Water Waster reports are related to irrigation.

When a report comes in, the information is entered in the City's Illicit Connections/Illicit Discharge (IC/ID) database module. City staff then mails the property a warning letter notifying them of the reported issue and reminding them of the City's codes, the water quality impacts of urban runoff, and the current drought conditions. If applicable, information about the Area of Special Biological Significance (ASBS) and discharge prohibition is also provided. Outreach materials and staff contact information are included with the letter so the recipient may receive assistance if desired. If the City receives another complaint about the same problem after the initial warning letter, then staff will investigate the complaint further. If staff confirms that landscape water is reaching the MS4, the City issues a Notice to Comply letter. If the property still does not comply, the City will issue a notice to Cease and Desist Illicit Discharge, and the property owner will be required to submit a compliance report by a specific date or attend an office conference to set a compliance schedule. From the time that the Notice to Comply is sent until the resolution, staff will monitor the irrigation runoff for the case. If a property fails to remedy the irrigation runoff and refuses to work with City staff towards a solution, then City staff will engage the City Attorney for additional code enforcement (which could include office conferences, issuance of administrative citations, criminal prosecution, or civil litigation against the property owner). Additionally, the City refers water wasting cases to Los Angeles County Waterworks District 29 and they also provide notice to the property. City field staff is also trained to look out for irrigation runoff while working in the field and they are often a source of identifying irrigation runoff cases. When a staff member initially observes the irrigation runoff, they will try to notify someone at the property while they are onsite. If no one can be reached, the same steps as listed above are followed with the exception of confirming the complaint in the field. The City also offers a variety of educational resources and workshops to educate the public about protecting the environment, many of which also include best management practices for eliminating runoff due to irrigation.

3.3 Where Receiving Water Limitations were exceeded, describe efforts that were taken to determine whether discharges from the MS4 caused or contributed to the exceedances and all efforts that were taken to control the discharge of pollutants from the MS4 to those receiving waters in response to the exceedances. [*Integrated Monitoring Compliance Report (Attachment E – XVIII.A.5.e)*]

Receiving water monitoring identified per the Coordinated Integrated Monitoring Program (CIMP) (i.e., designated paired outfall and receiving water monitoring sites) began after the reporting period in July 2016; thus, there are no monitoring data or exceedances to report for this reporting period. The City has an approved EWMP in place to address exceedances identified through monitoring activities as approved in the CIMPs. Exceedances will generally be addressed though the implementation of the adaptive management process.

The NSMBCW EWMP Group understands this question to apply only to event monitoring data for paired outfall and receiving water sites identified in the CIMP. However, for water bodies subject to Total Maximum Daily Loads (TMDLs) the results from coordinated water quality monitoring programs were also considered (see response to Section 6.5 in the Watershed Form). Actions taken in response to TMDL coordinated monitoring observations are described in the response to Section 6.6 in the Watershed Form.

3.4 If receiving water limitations were exceeded, describe the BMPs that are currently being implemented and additional BMPs, including modifications to current BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of receiving water limitations. [*Receiving Water Limitations (Integrated Monitoring Compliance Report) (V.A.3.a)*]

Receiving water monitoring identified per the CIMP (i.e., designated paired outfall and receiving water monitoring sites) began after the reporting period in July 2016; thus, there is no monitoring data or exceedances to report for this reporting period. See Section 5 for summary of Minimum Control Measures and programs. Current BMPs and additional BMPs to be implemented are described in the City of Malibu's approved EWMP. As data becomes available, review of BMP implementation will be evaluated to address receiving water limitations.

The NSMBCW EWMP Group understands this question to apply only to event monitoring data for paired outfall and receiving water sites identified in the CIMP. However, for water bodies subject to TMDLs the results from coordinated water quality monitoring programs were also considered (see response to Section 6.5 in the Watershed Form). Actions taken in response to TMDL coordinated monitoring observations are described in the response to Section 6.6 in the Watershed Form, and additional information regarding the City's BMPs is provided in response to Section 12.

4. Monitoring

Complete the following items in this section.

4.1 Complete the following tables regarding your Non-Storm Water Outfall Based Screening and Monitoring Program [*Attachment E – XVIII.A.3.a-g*]: Note: The following information is repeated in the Watershed Form.

Table 4a: Summary of Non-Storm Water Based Screening and Monitoring

Receiving Water	No. of Major Outfalls	No. of Outfalls Screened	Total No. of Outfalls Screened Since Dec 28, 2012	Significant Non-Stormwater Discharges[2]			
				Total Confirmed	Total Abated	Total Attributed to Allowable Sources[3]	Total No. Being Monitored
Santa Monica Bay	10	3 (this reporting year)	10	0	N/A	N/A	0
Total	10	3	10	0	0	0	0

Table 4b: Summary of Non-Stormwater Discharges Abated

Abatement Method	Total No.
Low Flow Diversion	0
IC/ID Eliminated	0
Permitted	0
Retention	0
Treatment	0
Other (describe below)	0

4.2 How many of the conditionally exempt non-stormwater discharges in Part III.A.2.b of the Permit did you determine to be sources of pollutants that caused or contributed to an exceedance of receiving water limitations or WQBELs? If you made that determination, which type(s) of non-stormwater discharges in Part III.A.2.b were sources of pollutants? *[Permittee Requirements, Discharge Prohibitions (III.A.4.d)]*

None. Non-stormwater based screening was conducted in August 2014, October, 2014, and November 2015. No significant flows were observed at the major outfalls; therefore, water quality monitoring was not required or conducted. As a result, there were no conditionally exempt non-stormwater discharges (as per Part III.A.2.b of the Permit) determined to cause or contribute to an exceedance of receiving water limitations or water quality based effluent limitations (WQBELs).

4.3 Document changes to non-stormwater outfall based screening and monitoring program, if applicable. (must be re-assessed once during the permit term) *[Outfall Screening and Monitoring Plan Re-assessment (Attachment E – IX.B.2)]*

Not applicable. No changes were made to the non-stormwater outfall based screening and monitoring program.

[2] "Significant Non-Storm Water Discharges" as identified by the Permittee per Part IX.C.1 of the MRP
[3] "Allowable Sources" include NPDES permitted discharges, discharges subject to a Record of Decisions approved by USEPA pursuant to section 121 of CERCLA, conditionally exempt essential non-storm water discharges, and natural flows as defined in Part III.A.d of the permit.

5. Minimum Control Measures

Complete the following items in this section.

5.1 Public Information and Participation Program [*VI.D.5*]

Complete the following items regarding the Public Information and Participation Program.

5.1a) Summarize stormwater pollution prevention public service announcements and advertising campaigns. What pollutants were targeted? What audiences were targeted? Note whether activities were performed by the jurisdiction or as part of a watershed, regional, or county-wide group.

The following efforts were performed by the City specifically for its jurisdiction. However, there are benefits to the NSMBCW EWMP and Malibu Creek EWMP areas as well, since many marketing and outreach techniques expand beyond jurisdictional borders.

Targeted audiences include general residential community, local businesses, and students. Pollutants targeted are usually bacteria and nutrients from animal waste, nutrients from fertilizers, toxins from pesticides/herbicides, oil and grease (petroleum or fat-based) from businesses or vehicles, landscape greenwaste, litter, and water waste that carries deposited pollutants, among others.

Malibu Area Conservation Coalition: Cooperative effort of agencies responsible for water conservation, energy conservation, and natural resource protection. The City promoted outreach projects including the Landscaping Irrigation Efficiency Program, and Indoor and Outdoor Water Use Surveys.

“Keep It Clean, Malibu” campaign: Included the storm drain art project depicting ocean wildlife and rain gardens on four local storm drains and four public service announcements (PSAs) on urban runoff, which can be viewed at www.keepitcleanmalibu.com. The campaign launched in 2014, but continues to be promoted.

Clean Bay Restaurant Program: The City, the Bay Foundation, and other partners designed an inspection program that recognizes restaurants that choose to go above and beyond what is required by law to prevent ocean pollution www.malibucity.org/cleanbayeats.

Living Lightly Guide: The City and other partners updated the printed booklet and launched an electronic platform this reporting year www.livinglightlyguide.org.

City of Malibu Quarterly Newsletter and Recreation Guide: Articles on stormwater pollution prevention, water conservation, the ASBS and other related topics are published.

Environmental Videos: Content includes topics such as watersheds, Smart Gardening, and plastic debris; aired on the government access channel, on monitors in the City Hall lobby, and YouTube www.youtube.com/user/CityofMalibu/videos.

Malibu’s One Water Festival: A large community celebration of Malibu’s water resources with extensive educational information for children and adults on a wide variety of water topics, including stormwater pollution prevention. There were over 100 attendees, which is the greatest attendance for any City sponsored environmental event.

Social Media: The City regularly posts information related to stormwater pollution prevention on its social media accounts, which include Facebook, Twitter and Instagram.

5.1b) Which of the following public education materials did you distribute? (check yes or no)

	Yes	No
Information on the proper handling (i.e., disposal, storage and/or use) of Vehicle waste fluids?	☒	☐
Household waste materials (i.e., trash and household hazardous waste, including personal care products and pharmaceuticals)?	☒	☐
Construction waste materials?	☒	☐
Pesticides and fertilizers (including integrated pest management practices [IPM] to promote reduced use of pesticides)?	☒	☐
Green waste (including lawn clippings and leaves)?	☒	☐
Animal wastes?	☒	☐

5.1c) Did you distribute activity specific stormwater pollution prevention public education materials at the following points of purchase? If yes, provide the number of points of purchase within each category (if available).

Category	Yes	No	Number of Points of Purchase (if available)
Automotive Part Stores	☐	☒	
Home Improvement Centers, Lumber Yards, Hardware Stores, Paint Stores	☐	☒	
Landscaping, Gardening Centers	☐	☒	
Pet Shops, Feed Stores	☐	☒	
*Materials are provided to business representatives during inspection for their own use, but extras were not provided for general distribution during this reporting year.			

5.1d) Did you maintain stormwater websites or provide links to stormwater websites via your website, which included educational material and opportunities for the public to participate in stormwater pollution prevention and clean-up activities listed in Part VI.D.4? Provide links to the stormwater websites that you maintained and/or the location on your website where you provide links to stormwater websites.

Yes. www.malibucity.org/cleanwater

5.1e) Did you provide materials to educate school children (K-12) on stormwater pollution?

City staff attends community events and distributes information and giveaways related to stormwater pollution, including items that target school children. Staff engages children with a watershed model that shows how non-point source pollution can reach waterways and the ocean. Giveaways include coloring books and materials from the Keep it Clean, Malibu campaign which focuses on eliminating non-point source pollution and celebrating Malibu's coastal resources. This past year, City staff attended seven (7) events, including the Malibu Arts Festival, Malibu Farmers Market, Pepperdine University's Earth Day Festival, and the inaugural Malibu One Water Festival. Many school-aged children attend these events and are drawn to the watershed model and giveaways at the City's Environmental Programs booth. The One Water Festival also included a student competition that was promoted to all area schools for kids prior to the event to prepare a project – which could be a presentation, a study, a video, or art piece – based on watershed, pollution prevention, conservation, or other water issues.

Additionally, City staff notifies school principals and teachers of learning opportunities presented at the Los Angeles NPDES Permittee Public Education Quarterly meetings, so they may take advantage of free assemblies, field trips, and other unique activities.

5.1f) Did you tailor your public education and outreach program to address watershed priorities since the previous reporting year? If so, identify the watershed priorities addressed. Optional: If you made any changes to your program, elaborate.

Yes, the City's public education and outreach program addressed watershed priorities. Watershed priorities include:

- Bacteria and nutrients from animal waste
- Nutrients from fertilizers
- Toxins from pesticides, herbicides and rodenticides
- Oil and grease from businesses or vehicles
- Litter and green waste
- Dry weather runoff

The City's outreach programs target a broad range of constituents including residents, visitors, local businesses and students through a number of mechanisms including outreach materials, social media, web content, special events, workshops, the commercial inspection program, and the IC/ID program. Several enhancements were made to the program this year.

This year, City staff worked with a graphic designer to create an "Ocean Friendly Cleaning Tips" handout that addresses the key watershed priorities by providing residents with best practices to avoid causing or contributing to pollution. The handout is in English and Spanish.

The increase in water waste reporting during the drought provided an additional opportunity to educate residents and businesses about water quality in addition to water waste. Water waste potentially can flow off of a property as dry weather runoff, so the property received information about preventing urban runoff for water quality, as well as information about conserving water during the drought.

The commercial inspection program includes ongoing education and outreach for businesses and their staff. This year, additional outreach was provided on integrated pest management to reduce or eliminate the use of poisons, which is a priority for the Malibu City Council and the community. Additionally, nurseries received targeted outreach on the use of fertilizers, pesticides and herbicides.

5.2 <u>Industrial and Commercial Facilities Program [*VI.D.6*]</u>

Complete the following items regarding the Industrial and Commercial Facilities Program.

5.2a) Answer the questions below:

	Yes	No
Did you maintain and update a watershed-based inventory or database containing the latitude / longitude coordinates of all industrial and commercial facilities within its jurisdiction that are critical sources[4] of stormwater pollution?	☒	☐

	Number	
How many commercial facilities identified in Part VI.D.6.b did you inspect? If none, explain.	70	
	Yes	No
As part of the inspections conducted, did you evaluate that stormwater and non-stormwater BMPs are being effectively implemented in compliance with municipal ordinances?	☒	☐

	Number
How many initial mandatory compliance inspections did you conduct of industrial facilities identified in Part VI.D.6.b ? If none, explain. *There are not any industrial facilities within the City of Malibu.	0
How many facilities did you refer to the Regional Board for failing to obtain coverage under the Industrial General Permit and/or failure to have a Stormwater Pollution Prevention Plan (SWPPP) available on-site? *There are not any industrial facilities within the City of Malibu.	0

[4] Part VI.D.6.b.i of the LA County MS4 Permit summarizes "critical sources" to be tracked

5.2b) Describe the number and nature of any enforcement actions taken related to the industrial and commercial facilities program.

Some of the issues observed during the commercial inspections this past reporting year include lack of secondary containment and proper maintenance of grease disposal, lack of BMP signage for employees, and failure to keep trash areas clean with trash bin lids closed. The City is conservative on these matters and the inspector is directed to treat all issues as a violation, whether severe or minor. Additionally, businesses are held to very high quality standards when determining if a correction must be made. The City requires all issues to be corrected immediately following the inspection (with a reasonable time to cure if necessary), and educational materials are provided to the business. A notice is written by the inspector for each item that the business does not meet during its inspection and includes a date by which the correction must be completed. City staff conducts follow-up visits and communicates with the businesses to ensure the corrections are made.

A total of forty-five (45) restaurants, seven (7) retail gasoline outlets (RGOs) and automotive facilities, and three (3) nurseries received notices this reporting year. About 35% of 181 issued restaurant corrections were related to appropriately posting BMP signage and training staff in stormwater BMPs. Proper maintenance of the grease disposal area, including secondary containment and keeping the area free of spills, accounted for 24% of the restaurant corrections. Failure to use dry cleaning methods and drain liquid waste into an approved system only accounted for about 4% of restaurant corrections and less than 2% of the corrections were in response to an observed discharge to the storm drain system. There were a total of twenty-eight (28) notices written for RGOs and automotive facilities. The most common correction for RGO and automotive facilities was the failure to properly manage and dispose of waste materials and hazardous waste with six (6) corrections. About 43% of the RGO/automotive facility corrections were related to proper maintenance of the trash area, including keeping the area free of litter and keeping lids closed. Only one (1) instance of a discharge to the storm drain system was observed. A total of nine (9) notices were issued to nurseries. The corrections were primarily related to proper maintenance of trash areas. There was one (1) instance of an observed discharge to the storm drain system and two (2) instances where evidence of a past spill or illicit discharge was observed.

The Industrial/Commercial Facilities Inspection program is overseen by the City's Environmental Programs staff. However, Code Enforcement Officers, Public Works Inspector, and the Building Safety Inspectors have been trained to watch for stormwater BMPs infractions and are authorized to issue Correction Notices in the field. Repeat offenses are subject to increased enforcement procedures. Some violations may be subject to the City's administrative citation ordinance exposing the violator to civil penalties as well as traditional enforcement remedies. The City also implements a policy for the Clean Bay Certified Restaurant program whereby a business that has been certified is subject to having its Clean Bay Certified status rescinded for failing to maintain the program's criteria. Information on the program's criteria can be viewed at www.malibucity.org/cleanbayeats.

5.2c) Did you tailor your Industrial and Commercial Facilities Program to address watershed water quality concerns since the previous reporting year? If so, identify the water quality concerns and describe how the program was tailored to address each concern.

Optional: If you made any changes to your program, elaborate. [*Selection of Watershed Control Measures (VI.C.5.b.iv.)*]

Yes. The Industrial and Commercial Facilities Program is designed to address any non-compliance with the suite of inspection criteria selected to prevent possible pollutants from reaching nearby waterways and thus protects water quality. The City strives for continuous improvement of the program and facility compliance. The program is inherently tailored to site-specific improvements at each facility based on the criteria that it did not meet during its inspection. By regularly surpassing the frequency of inspection minimum requirements in the Permit and continually improving the efficacy of the Industrial and Commercial Facilities Program, the City aims to target all water quality concerns that could arise from these businesses. The City's program specifically addresses pollutants with TMDLs, which include bacteria, marine debris (trash) and toxics (DDT and PCBs). By more frequently inspecting trash and recycling areas, oil and grease disposal, water runoff, storage of hazardous materials, and other stormwater BMPs than required in the Permit, businesses are held to high standards to prevent them from contributing to water quality concerns. By expanding the commercial inspection program to include nurseries this year, the inspection program better protects against toxics including fertilizers, pesticides and herbicides from running off into nearby waterways or storm drains.

Since the adoption of the General Exception to the California Ocean Plan for Areas of Special Biological Significance Waste Discharge Prohibition for Storm Water and Nonpoint Source Discharges, with Special Protections, the City inspects each commercial facility that is tributary to the ASBS a minimum of two (2) times during the rainy season, as required by the Special Protections. This year, the City elected to expand this higher frequency of inspections to all facilities in the City limits, so that each facility receives a minimum of two (2) inspections per year. City staff is continually developing relationships and improving communication with facility owners and managers in order to have more frequent contact and resolve any issues more easily. Staff has increased its communication with shopping center managers as well in order to address center-wide issues that may not be captured in an inspection of a single facility or may be beyond the capacity of a single facility to remedy. These relationships and improved communication with facility staff allows the City to successfully promote beneficial programs and rebates that may help the facilities be more sustainable.

City staff is also working to improve the administration of this program. This past reporting year, a new database module was created to better track the Industrial and Commercial Facilities Program and new inspection forms were created for RGOs/Automotive Facilities and Nurseries. These new inspection forms are attached for reference in Appendix A.

5.3 Planning and Land Development Program [VI.D.7 and Attachment E-XVIII]

Complete the following items regarding the Planning and Land Development Program.

5.3a) New Development Projects: Complete the table below. Reporting new development projects by categories is optional. If different categories are used by the Permittee or new development and redevelopment activities are combined, the table may be edited to include those categories and/or information.

Table 5a: Summary of New Development Projects

Category (optional)[5]	Number of Projects Completed[6]	Number of Projects Addressed by Alternative Compliance Measures[7]	Area Addressed by Projects	Est. Total Volume (SWQDv) Retained Onsite (Not Including Alternative Compliance Projects)
Development Projects (≥ 1 acre disturbed area; adding ≥ 10,000 sf impervious area)	1	1	1.54 AC	0*
Industrial Parks (≥ 10,000 sf surface area)	0	NA	NA	NA
Commercial Malls (≥ 10,000 sf surface area)	0	NA	NA	NA
Retail Gasoline Outlets (≥ 5,000 sf surface area)	0	NA	NA	NA
Restaurants (≥ 5,000 sf surface area)	0	NA	NA	NA
Parking Lots (≥ 5,000 sf surface area or ≥ 25 parking spaces)	0	NA	NA	NA
Street and Road Construction (≥ 10,000 sf impervious surface area)	0	NA	NA	NA
Automotive Service Facilities (≥ 5,000 sf surface area)	0	NA	NA	NA
Applicable Projects near Significant Ecological Areas	0	NA	NA	NA
Single-family Hillside Homes	0	NA	NA	NA
TOTAL	1	1	1.54 AC	0*

*Please note that this project was approved in 2008 before the City Low Impact Development (LID) ordinance required redevelopment projects' BMPs to be designed using SWQDv. Onsite retention of the SWQDv for New Development/Redevelopment projects, as stated in Section VI.D.6.c.i.2, is impossible for most projects in Malibu due to high groundwater, geotechnical hazards and geologic instability, or due to conflicts with adjacent onsite wastewater treatment systems (OWTS). For similar reasons, offsite infiltration or bioretention is also usually infeasible. The only feasible option for most projects in the City is onsite biofiltration.

5.3b) Redevelopment Projects. Complete the table below. Reporting redevelopment projects by categories is optional. If different categories are used by the Permittee or new development and redevelopment activities are combined, the table may be edited to include those categories and/or information.

[5] Reporting new development projects by categories is optional. If different categories are used by the Permittee or new development and redevelopment activities are combined, the table may be edited to include those categories and/or information.
[6] "Number of Projects Completed" should only include projects that are completed and signed off by the Permittee during the reporting year. In progress projects that have been issued a permit but are not completed should not be included.
[7] "Alternative Compliance Measures" refer to the mitigation options listed in Part VI.D.7 of the permit. These options include: on-site biofiltration, offsite infiltration, groundwater replenishment projects, offsite retrofits of existing developments, and areas covered by a regional storm water mitigation program.

Table 5b: Summary of Redevelopment Projects				
Category (optional)[8]	**Number of Projects Completed[9]**	**Number of Projects Addressed by Alternative Compliance Measures**	**Area Addressed by Projects**	**Est. Total Volume (SWQDv) Retained Onsite* (Not Including Alternative Compliance Projects)**
Industrial Parks	0	NA	NA	NA
Commercial Malls	0	NA	NA	NA
Retail Gasoline Outlets	0	NA	NA	NA
Restaurants	0	NA	NA	NA
Parking Lots	0	NA	NA	NA
Street and Road Construction	0	NA	NA	NA
Automotive Service Facilities	0	NA	NA	NA
Applicable Projects near Significant Ecological Areas	0	NA	NA	NA
Other	0	NA	NA	NA
TOTAL	0	0	0	0

* Onsite retention of the SWQDv, for New Development/Redevelopment projects, as stated in Section VI.D.6.c.i.2, is impossible for most projects in Malibu due to high groundwater, geotechnical hazards and geologic instability, or where there are adjacent OWTS. For similar reasons, offsite infiltration or bioretention is also usually infeasible. The only feasible option for most projects in the City is onsite biofiltration.

5.3c) Planning and Land Development Efforts beyond Permit Requirements. If applicable, describe Planning and Land Development activities that went above and beyond the permit requirements (e.g. stricter LID ordinance, small-site LID). **Tables 5a and 5b** above may be edited or an additional table may be included here to include these activities.

The City's LID ordinance requires more New Development/Redevelopment project types than specified in the Permit to prepare Water Quality Mitigation Plans (WQMPs) to design, install, and maintain BMPs conforming to Permit requirements. Additional project types required to prepare WQMPs include: (a) beachfront residential New Development/Redevelopment and (b) all New Development/Redevelopment projects that result in the creation, addition, or replacement of 2,500 square feet of impervious surface area that discharge directly to or adjacent to an ASBS or is tributary to an ASBS.

The City of Malibu LID ordinance (Municipal Code Chapter 13.04) can be found at:

http://qcode.us/codes/malibu/

5.3d) Summary of New and Redevelopment Projects using Alternative Compliance Measures: Complete the table below.

[8] Reporting redevelopment projects by categories is optional. If different categories are used by the Permittee, the table may be edited to include those categories.
[9] "Number of Projects Completed" should only include projects that are completed and signed off by the Permittee during the reporting year. In progress projects that have been issued a permit but are not completed should not be included.

Table 5c: Alternative Compliance Measures for Development/Redevelopment Projects (where onsite retention of the SWQDv is infeasible)*					
Category[10]	Number of Projects Constructed	Area Addressed by Projects	Est. Volume Retained	Area Addressed by Biofiltration	Volume Addressed by Biofiltration[11]
Onsite Biofiltration	1	1.54 AC	none	1.54	Unknown*
Offsite Infiltration	0	NA	NA	NA	NA
Ground Water Replenishment Projects	0	NA	NA	NA	NA
Offsite Project – Retrofit Existing Development	0	NA	NA	NA	NA
Regional Storm Water Mitigation Program	0	NA	NA	NA	NA
TOTAL	1	1.54 AC	none	1.54	Unknown*

* Please note that this project was approved in 2008 before City LID ordinance required redevelopment projects' BMPs to be designed using stormwater quality design volume (SWQDv). Onsite retention of the SWQDv, as stated in Section VI.D.6.c.i.2, is impossible for most projects in Malibu due to high groundwater, geotechnical hazards and geologic instability, or where there are adjacent OWTS. For similar reasons, offsite infiltration or bioretention is also usually infeasible. The only feasible option for most projects in the City is onsite biofiltration.

5.3e) Alternative Compliance Measures – Offsite Projects[12] *[VI.D.7.c.iii.5.f]*: (If Applicable) Complete the table below.

Table 5d: Alternative Compliance Measures – Offsite Projects				
Total Offsite Project Funds Raised to Date	0			
Pending Offsite Projects	Location	General Design Concept	Volume of Water Expected to Be Retained	Total Estimated Budget
Pending Offsite Project 1	NA	NA	NA	NA
Pending Offsite Project 2	NA	NA	NA	NA
(Add rows as needed)	NA	NA	NA	NA

5.3f) Alternative Compliance Measures – Regional Storm Water Mitigation Program[13] [VI.D.7.c.vi]: (If Applicable) Complete the table below.

Table 5e: Alternative Compliance Measures – Regional Storm Water Mitigation Program					
Mitigation Program	Description	Area Addressed by Mitigation Program (in Acres)	Estimated Flow Reduction (from submitted design specifications)	Cumulative Number of New and Redevelopment Projects Addressed by Project	Flow Reduction Which Would Have Been Achieved by Retaining SWQDv on-site
Mitigation Project 1	NA	NA	NA	NA	NA

[10] Alternative Compliance Measures refer only to the alternative measures used to comply with Planning and Land Development Program requirements as described in Part VI.D.7.c.iii.(1)-(7)
[11] Volume Addressed by Biofiltration should represent the biofiltration volume (Bv), not the SWQDv.
[12] "Offsite projects" refers only to offsite projects being used as an alternative compliance measure for development/redevelopment project applicants that have demonstrated technical infeasibility for on-site retention of the SWQDv. This does not include on-site biofiltration; however it does include off-site biofiltration projects.
[13] "Regional Storm Water Mitigation Programs" are only applicable where the Permittee (or Permittee Group) has received approval of such a program from the Regional Water Board.

(Add rows as needed)	NA	NA	NA	NA	NA
TOTAL		0	0	0	0

5.3g) Control Measures for Projects Greater than 50 Acres [*Attachment E – XVIII.A.6.e*]: (If Applicable) Provide a detailed description of control measures to be applied to new development or redevelopment projects disturbing more than 50 acres:

Projects greater than 50 acres must comply with Malibu Municipal Code Chapter 13.04. This chapter includes LID, water quality, and hydromodification standards. Projects larger than 50 acres are required to undergo a rigorous grading permit approval process including ensuring that all stormwater best management practices are addressed in accordance to the MS4 Permit and LID Ordinance requirements.

For the reporting period, there were no new development or redevelopment projects disturbing more than 50 acres in the City of Malibu.

5.3h) Describe the number and nature of any enforcement actions taken related to the planning and land development program.

Although there are many ways in which the City requires correction of design and construction issues related to stormwater quality management, there is currently no centralized tracking of enforcement actions taken related to the Planning and Land Development Program. See response to Section 5.3i.

5.3i) If any of the requested information cannot be obtained, provide a discussion of the factor(s) limiting its acquisition and steps that will be taken to improve future data collection efforts.

The City does not currently perform centralized tracking of enforcement actions related to the Planning and Land Development Program (i.e., “enforcement” as indicated in Section 5.3h is not coordinated between various department’s land development reviews). If a post-construction BMP (i.e. LID or priority project requirement) is not designed or installed correctly, this can be (and is) addressed during the Development Planning process in several ways: prior to the correction of noted design and construction issues, Public Works will not approve the project design, Building & Safety Inspectors will not approve construction permits, and Planning will not provide final approval of the construction. Correction notices are issued by the various City departments to applicants, contractors, and property owners throughout the development process to ensure projects are built to conform with City requirements and specifications in the approved plans. Each City department independently tracks its own reviews and inspections; thus it has been impractical to globally track all issues, and doing so would not provide any valuable insight into the compliance status of the final construction.

5.4 Development Construction Program [*VI.D.8*]

Complete the following items regarding the Development Construction Program.

5.4a) Answer the questions below regarding construction sites 1 acre and greater *[VI.D.8.e-j]*:

	Yes	No
Did you use an electronic system to inventory grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance) that you issued?	☒	☐
Did you track the date that you approved the Erosion and Sediment Control Plans (ESCP) or CGP SWPPPs for new sites permitted and sites completed?	☒	☐
	Number	

How many inspections for the inventoried[14] construction sites were conducted during the reporting period?	19	
How many sites within your jurisdiction discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA § 303(d)? If not zero, answer questions (a) - (c) below.	0	
(a) How many inspections did you conduct during the reporting period when two or more consecutive days with greater than 50% chance of rainfall were predicted by NOAA?		
(b) How many inspections did you conduct within 48 hours of a ½-inch rain event?		
(c) How many additional inspections did you conduct to meet the at least once every two weeks inspection frequency requirement?		
How many sites within your jurisdiction were determined to be a significant threat to water quality? If not zero, answer questions (d) – (f) below.	0	
(d) How many inspections did you conduct during the reporting period when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA		
(e) How many inspections did you conduct within 48 hours of a ½-inch rain event,		
(f) How many additional inspections did you conduct to meet the at least once every two weeks inspection frequency requirement?		
How many construction sites within your jurisdiction posed no significant threat to water quality and did not discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA § 303(d)? If not zero, answer question (g) below.	7	
(g) How many inspections of those sites did you conduct during the reporting period to meet the minimum monthly inspection frequency requirement?	19	
How many completed construction sites did you inspect to ensure that all graded areas have reached final stabilization and that all trash, debris, and construction materials, and temporary erosion and sediment BMPs have been removed?	0	
	Yes	No
Did you develop procedures to review and approve an ESCP (or a SWPPP prepared in accordance with the requirements of the Construction General Permit) that contains appropriate site-specific construction site BMPs that meet the minimum requirements of a Permittee's erosion and sediment control ordinance?	☒	☐

5.4b) Answer the following question regarding construction sites less than 1 acre in area *[VI.D.8.d]*:

	Yes	No
For construction sites less than 1 acre, did you require the implementation of an effective combination of erosion and sediment control BMPs from Table 12 of the LA County MS4 Permit to prevent erosion and sediment loss, and the discharge of construction wastes through the use of the Permittee's erosion and sediment control ordinance or building permit?	☒	☐

5.4c) How did you ensure that all staff whose primary job duties are related to implementing the construction stormwater program is adequately trained? [*VI.D.8.l*]

The City of Malibu provides regular in-house training opportunities and promotes staff attendance at a variety of conferences and workshops. The City held a two-day NPDES training session for targeted staff in accordance with permit requirements. The stormwater certification training focused on the Clean Water Act, NPDES permit requirements, protocols for inspecting sites, BMPs, proper inspection documentation (with emphasis on illicit discharges), outreach and education. All staff that spends time in the field attended.

[14] "Inventoried" refers to sites included in the Permittee's electronic system to inventory grading permits, encroachment permits, demolition permits, building permits, or construction permits.

5.4d) Describe the number and nature of any enforcement actions taken related to the development construction program.

3 verbal warnings for inadequate construction BMPs.

1 Notice of Violation for inadequate construction BMPs.

5.4e) Did you tailor your Development Construction Program to address watershed water quality concerns since the previous reporting year? If so, identify the water quality concerns and describe how the program has been tailored to address each concern. Optional: If you made any changes to your program, elaborate. *[Selection of Watershed Control Measures (VI.C.5.b.iv.)]*

The City of Malibu's Development Construction Program focused on inspections of construction sites for implementation of applicable BMPs as described in the MS4 Permit. The City did not revise its Development Construction Program to address watershed water quality concerns since the previous reporting year.

5.5 Public Agency Activities Program (VI.D.9)

Complete the following items regarding the Public Agency Activities Program.

5.5a) Answer the following questions:

	Yes	No
Did you maintain an updated inventory of all Permittee-owned or operated (i.e., public) facilities within your jurisdiction that are potential sources of stormwater pollution?	☐	☒
Did you develop an inventory of retrofitting opportunities that meets the requirements of Part VI.D.9.d. of the LA MS4 Permit?	☐	☒
Were all Permittee-owned parking lots exposed to storm water cleaned at least once per month?	☒	☐

5.5b) What did you do to ensure effective source control BMPs for the activities listed in Table 18 of the LA MS4 Permit were implemented at Permittee-owned or operated facilities?:

Staff are trained annually in stormwater requirements and pollution control measures. Additionally, the City is not a full service agency, so it does not directly provide local essential services such as police, fire, water, wastewater, transit, or solid waste collection, nor does the City own or operate the facilities associated with such services. Many of those services are provided through County-operated districts. All CIP contracts include language that require preparation and implementation of a SWPPP, and staff monitors contractor activities. The City's ongoing general maintenance contractor is specifically required to comply with the municipal stormwater permit, and language to this effect is included in the City's service agreement with this contractor.

5.5c) What procedures (or standardized protocol) did you implement to try to ensure there was no application of pesticides or fertilizers (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA, (2) within 48 hours of a ½-inch rain event, or (3) when water is flowing off the area where the application is to occur?

The City requires its landscape maintenance contractor to refrain from fertilizing during wet conditions or prior to expected rainfall that may lead to runoff. To ensure fertilizers are applied at the appropriate time, the applications are coordinated by City staff. Irrigation is scheduled accordingly and weather conditions are monitored and considered. The City implements an IPM program and pesticides are not applied in City parks at any time.

5.5d) How did you ensure employees in targeted positions (whose interactions, jobs, and activities affect stormwater quality) were trained on the requirements of the overall stormwater management program, and contractors performing privatized/contracted municipal services were appropriately trained?

The City provides multiple opportunities for staff to be trained in environmental protections, including pollution prevention and best management practices, annually. There is not a large number of staff and the City is not full service, so there are few opportunities for public agency activities to affect stormwater quality. It is manageable to ensure all of those in targeted positions are appropriately trained. Conditions are placed in Professional Services Agreements for municipal services requiring that contractors comply with training and pollution prevention requirements.

5.5e) Public Agency Retrofit Projects: (If Applicable) Complete **Table 5f** below.

Table 5f. Public Agency Retrofit Projects and Other Projects that Intercept Runoff

	Number of Projects Constructed	Acres of Effective Impervious Area disconnected from MS4	Est. Total Runoff Volume retained onsite
Retrofit Projects	0	NA	NA
Other Projects that intercept runoff	0	NA	NA
Watershed TMDL related projects[15]	0	NA	NA

5.5f) Catch Basin Inspection and Cleaning Schedule (*VI.D.9.h.vii.*). Complete the table below for areas with no Trash TMDL:

Table 5g. Summary of Catch Basin Inspections and Cleaning Program (areas with no Trash TMDL)

Priority	Number of Catch Basins	Inspections Performed	Number Cleaned
A	0	0	0
B	23	46	Minimum 23, as needed (quantity during 2nd inspection not documented)
C	407	Minimum 407	Minimum 407, and as needed

5.5g) In areas that are not subject to a trash TMDL and when outfall trash capture is provided, provide any revisions to the schedule for inspection and cleanout of catch basins:

The City of Malibu did not utilize outfall trash capture systems.

5.5h) Channels and Drainage Structures: Complete the table below.

Table 5h. Summary of Publicly Owned Channels and Other Drainage Structures Inspections and Cleaning

Type	Miles of Open Channel	Description of Structure(s)	Frequency of Inspection	Debris Removed Prior to Wet Season (pounds)	Additional Notes
Open Channel	0		NA	NA	Only channel within City limits is owned and operation by the County FCD.
Other					

5.5i) Street Sweeping: Complete the table below:

[15] Report information regarding regional projects for which the regional project MOU has assigned the Permittee responsibility for reporting.

Table 5i. Summary of Street Sweeping Activities					
Priority A (greater than once per month) *weekly sweeping of PCH under shared contract and reimbursement with Caltrans		**Priority B (once per month)**		**Priority C (as needed, once per year minimum)**	
Total Curb Miles	**Curb Miles Swept**	**Total Curb Miles**	**Curb Miles Swept**	**Total Curb Miles**	**Curb Miles Swept**
42	42	90	90	NA	NA

5.5j) Did you tailor your Public Agency Activities Program to address watershed water quality concerns since the previous reporting year? If so, identify the water quality concerns and describe how the program has been tailored to address each concern. Optional: If you made any changes to your program, elaborate. [*Selection of Watershed Control Measures (VI.C.5.b.iv.)*]

The City operates two facilities that actively treat dry weather flows (Paradise Cove Stormwater Treatment Facility and Civic Center Stormwater Treatment Facility/Legacy Park). As such, maintenance of these facilities may be considered part of the City's public agency activities. The Paradise Cove Stormwater Treatment Facility must undergo routine maintenance to replace the filter media material and thoroughly clean related underground and above ground stormwater tanks. The stormwater filter media is scheduled for replacement every several years. While the most recent maintenance was performed outside the reporting year (September 2016), this activity is an example of how the program is being tailored by adding more extensive maintenance as a new element of the program. For the Civic Center Stormwater Treatment Facility/Legacy Park, stormwater diversion pumps systems were upgraded during the reporting year to optimize stormwater capture and treatment.

5.6 Illicit Connections and Illicit Discharges Elimination Program (VI.D.10)

Complete the following items regarding the Illicit Connections and Illicit Discharges Elimination Program.

5.6a) Answer the following questions regarding Illicit Discharges [*VI.D.10.b*][16]

	Number
How many reports of illicit discharges did you respond to?	31
How many investigation(s) did you initiate to identify and locate the source of reported illicit discharges?	31

5.6b) Provide summary of actions taken to eliminate illicit discharges consistent with IC/ID requirements.

The City of Malibu generally follows a modified version of the procedures in the Los Angeles County Model Program for the IC/ID Elimination Program. The model program is available online at http://ladpw.org/wmd/NPDES/model_links.cfm. The City has procedures for the variety of issues staff responds to and the actions that are taken to eliminate illicit discharges. The standard procedures and actions of the City used to eliminate illicit discharges are included below. These will be combined and updated into a formal plan. They are summarized below.

Illicit Discharge & Connection Response Procedure

The City implements requirements as a result of Order No. R4-2012-0175, and revisions were considered as part of the development of the NSMBCW EWMP. In general, the City takes a more proactive and restrictive approach to runoff to protect the Area of Special Biological Significance and to reduce discharges that could affect TMDL objectives. The City also began documenting community reports (received by phone, online, by hotline, and through staff observations) and compiling resulting investigations of illicit discharges, illicit connections, water wasting, and other environmental concerns in a new database module.

Potential illicit discharges and illicit connections are investigated by Environmental Sustainability staff, the Public Works Inspector, Code Enforcement Officer, or maintenance staff. Enforcement is incident specific. In general, a report is

[16] Illicit discharges and connections detected through other inspection programs should be included.

investigated, a warning/violation notice or letter requiring corrective actions is either provided onsite or mailed, education is provided, and a follow-up inspection is scheduled.

Staff direct dischargers to cease improper activities by providing notices in person (when dischargers are caught in the act) and in writing. Staff also provide educational material relative to the nature of the discharge. Further enforcement actions are pursued, if necessary to obtain compliance. If the discharge persists, staff issue a second written notice explaining the legal action that will be taken if the discharge does not cease. After second notice, the City will take legal action to abate, enjoin or otherwise compel the cessation of the illicit discharge.

Illicit connection investigations are handled similarly to illicit discharges initially. The tenant and/or property owner is directed to immediately cease the illicit connection and stop the use of all plumbing fixtures that are, or may be, connected to the drain until the fixtures are connected in a permitted manner. The source and type of discharge is investigated and confirmed. The discharger is responsible for the cleanup and disinfection of the affected drains and areas, and also for the cleanup of any future discharges. When compliance has been verified, the discharger is notified in the most appropriate manner, depending on the issue.

If an illicit discharge and/or connection is suspected to be coming from an illicit graywater source, the City requires inspection of the graywater connection and OWTS by a City of Malibu registered OWTS inspector. The inspection must be documented on the City's official inspection form (as part of the Comprehensive OWTS Inspection and Operating Permit Program; see below). This form is included at the end of the document. The inspector must also provide a separate report on the illicit graywater discharge, and identify how the illicit flows will be reconnected to an approved greywater system or OWTS. The reconnection must be documented before the illicit discharge is considered eliminated.

<u>Water Wasting Response Procedure</u>

In addition to the City's IC/ID program, staff receives and responds to water waste complaints. During the 2015-2016 reporting period, there were forty-two (42) water waste cases, independent of IC/ID cases. Complaints can include watering outside of allowable hours, as well as observed runoff or puddled water. This program not only helps conserve water during drought conditions, but it also helps reduce potential illicit discharges from water wasting activities. The City does not currently have a way to quantify how many water waste cases were due to runoff caused by excessive water use (as compared with other causes such as damaged irrigation systems). When a water waste complaint is received, the City mails a warning letter with educational materials to the property owner and/or tenant. If the water waste continues, enforcement action is taken and the case may become an illicit discharge case depending on the specific violation.

<u>Sewage Spills from Onsite Wastewater Treatment Systems Response Procedure</u>

The City has a program to prevent discharge of sewage to the MS4 and surface waters in the unlikely event of a spill. The City does not own or operate a municipal sanitary sewer system. The majority of private properties, residential and commercial, utilize septic systems, OWTS, or small privately operated treatment plants. Therefore, the information provided in response to this question refers only to septic systems, OWTS, or small privately operated treatment plants. Any potential discharge associated with one of these systems is likely of very small volume and localized where it can be contained, as opposed to the large, difficult to control spills that are experienced by agencies with large collection systems conveying sewage to a centralized wastewater treatment plant.

In addition, the City provides educational materials to OWTS owners, and the City's Environmental Health office has implemented a comprehensive program with a database to track OWTS' status (inspections, installation, upgrades etc.). More information follows in this document.

The following spill response program has been implemented to address the event of a septic/OWTS spill that is reported to the City. When notified of a potential spill, a City inspector is immediately dispatched. Upon confirmation that a spill has occurred, the following occurs:

1. The incident is investigated by the City.
2. Order immediate pumping of the OWTS; require that a copy of the pump receipt be provided to City by a date certain.
3. Order that the owner provide a report by a City registered OWTS inspector detailing the condition, location, and construction of the system and recommendation for repair, if any.
4. Order that any spilled effluent be properly cleaned up by a licensed professional, with necessary removal and disinfection of materials/surfaces without causing illicit discharge.
5. Code Enforcement issues a notice of violation and follows an enforcement response plan.

If the flow is continual, reaching a storm drain or other body of water, and the responsible party is unavailable, staff contacts the contract City street maintenance crew for assistance to contain the flow and a sewage pumping company is called upon to respond. The Los Angeles County Department of Public Health (LACDPH) is notified, and they have the authority to have the water shut off to terminate the continued flow of sewage, or close the business if at a commercial property and public health is threatened. Notifications are made consistent with the LACDPH protocol, including reporting to the Regional Water Quality Control Board. Requirements #2-4 listed above are then directed to the property owner.

Malibu's OWTS program also helps prevent spills. *Ordinance 321 a Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program Scheme* was adopted on March 10, 2008 by the Malibu City Council. Following EPA guidance regarding management options, this program provides a means of OWTS inventory, assurance of system functionality and system sustainability. This program requires that owners of real property served by OWTS obtain an inspection of the OWTS, apply for an operating permit, and make any necessary repairs or upgrades in accordance with the following schedule:

- New Developments – before a certificate of occupancy is issued
- Existing properties:
  - Whenever a permit for repair, alteration, replacement, renovation or relocation of an existing OWTS occurs
  - Whenever a remodeling or repair results in addition of plumbing fixtures or increase in load to the existing OWTS
  - Prior to any purchase or change in ownership

Once issued, renewal of operating permits, including a required inspection, must occur according to the following schedule:

- Commercial or multifamily uses – every two years
- Single-family uses with alternative OWTS technology – every three years
- Single-family uses with conventional OWTS technology – every five years

All Inspectors must be registered and approved by the City of Malibu. To qualify as an Inspector they must possess a valid California License as a Certified Engineering Geologist, Registered Professional Geotechnical, Civil Engineer, or a Registered Environmental Health Specialist, or a specialty sewage systems contractor (A or C-42 contractor license). All inspectors must have attended specific OWTS inspection training provided by a nationally recognized entity and a City sponsored training. Each OWTS component requires the successful completion of an examination.

More information about the City's wastewater management program is available online at www.malibucity.org/septic.

5.6c) Answer the following questions regarding Illicit Connections [*VI.D.10.c*][17]

	Number
How many investigations did you initiate upon discovery or upon receiving a report of a suspected illicit connection? *There were no investigations because no illicit connections were discovered nor reported.*	0
For the reported illicit connections for which you initiated an investigation, how many were eliminated within 180 days of completion of the illicit connection investigation? *There were no investigations because no illicit connections were discovered nor reported.*	0
If the number of illicit connections investigated does not equal the number of illicit connections eliminated, explain why	
Not applicable.	

.

[17] Illicit discharges and connections detected through other inspection programs should be included.

For investigations initiated, for how many inspections did you determine the following:	Number
(1) Source of the connection. *No investigations were initiated because there were not any illicit connections discovered or reported.*	0
(2) Nature and volume of discharge through the connection. *No investigations were initiated because there were not any illicit connections discovered or reported.*	0
(3) Responsible party for the connection. *No investigations were initiated because there were not any illicit connections discovered or reported.*	0

5.6d) Answer the following questions regarding Public Hotline and Training [*VI.D.10.d and VI.D.10.f*]

	Yes	No
Did you maintain or provide access to a hotline to enable the public to report illicit discharges/connections?	☒	☐
Did you continue to implement a training program regarding the identification of IC/IDs for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4?	☒	☐

5.6e) Describe the number and nature of any enforcement actions taken related to the illicit connections and illicit discharges elimination program.

Of the thirty-one (31) illicit discharge cases over the last reporting year, one was determined to have no evidence of discharge, and the remaining thirty (30) received enforcement action from the City. The City broadly interprets enforcement action as any action by staff to facilitate the termination of the illicit discharge and prevent it from happening again. This can include letters, phone calls, emails, site visits, office conferences, compliance reports and monitoring, as well as more aggressive enforcement including stop work orders, citations, or involvement by the City Attorney. City staff uses whichever tools will be most effective on the particular case. Most illicit discharge cases in Malibu are from residential properties and occur unintentionally or because the person is unaware of the illicit discharge rules. In these instances, City staff informs the property owner of the illicit discharge and how to comply, which is usually enough to terminate the discharge and gain compliance. Half (15) of the cases this reporting year were swimming pool-related discharges, including draining a pool, washing filters, or overfilling the pool. Eight cases were the result of outdoor cleaning activities, such as washing a car, hosing down an outdoor area, or cleaning equipment outside. Three cases were related to over-irrigation or a broken irrigation line. One case resulted from the discharge of graywater from a laundry machine, which concluded in the permitting and installation of a laundry-to-landscape graywater reuse system after enforcement action by City staff. Three cases were septic overflows, two from the same commercial property and one from a residential property. These received stringent code enforcement action and followed the City of Malibu specific procedure regarding sewage spills from OWTS described in Section 5.6b.

5.6f) Did you tailor your Illicit Connections and Illicit Discharges Elimination Program to address watershed water quality concerns since the previous reporting year? If so, identify the water quality concerns and describe how the program has been tailored to address each concern. Optional: If you made any changes to your program, elaborate. [*Selection of Watershed Control Measures (VI.C.5.b.iv.)*]

The City's Illicit Connections and Illicit Discharge (IC/ID) Elimination Program addressed watershed water quality concerns. The primary water quality concerns include:

- Dry weather runoff that can carry deposited pollutants to a storm drain or waterway
- Bacteria and detergents from cleaning activities
- Oil and grease from businesses

The IC/ID Elimination Program addressed dry weather runoff by utilizing a pollution prevention hotline, water waster online report form, and field staff observations to identify dry weather runoff. Staff contacted the responsible party and provided education and outreach to assist with abating the dry weather runoff. Dry weather runoff within the City of Malibu most frequently occurs on residential property and is often related to irrigation, cleaning, or pool maintenance activities, which are easily remedied once the property owner is made aware of the issue. In rare cases where the property or person was not immediately responsive, code enforcement was used to gain compliance.

The commercial inspection program incorporates the IC/ID Elimination Program by tailoring the inspections to identify and eliminate any illicit discharges. If an illicit discharge is present at a commercial business, it most commonly results from cleaning activities that could convey bacteria, detergents and oil/grease. The City inspector looks for signs of past or presently occurring illicit discharges while conducting inspections and provides outreach to staff on proper cleaning practices and disposal of oil/grease and wash water. If there is evidence of a past or present illicit discharge, the business is issued a notice and must immediately cease and desist the illicit discharge, as well as clean up the area.

No changes were made to the IC/ID Elimination Program implementation process during the reporting year.

5.7 Enhanced MCMs and MCM Modifications

Complete the following items regarding modified or additional MCMs.

5.7a) (If applicable) Describe any "enhanced" or other MCMs or additional institutional controls that were implemented during the reporting year, including, at a minimum, all commitments related to MCM implementation specifically identified in a WMP/EWMP with deadlines within the reporting year.

The following Enhanced MCMs were implemented during the reporting year:

- The new Living Lightly in the Santa Monica Mountains website was launched. It includes pages that are more information- and feature-rich than the hard copy guide.
- Malibu Area Conservation Coalition (MACC). The MACC continued to meet to plan public outreach and as a result, multiple events and incentive programs were developed and implemented
- Commercial businesses are now inspected twice annually with extra outreach and enforcement conducted related to trash area maintenance. Nurseries were added to the list of inspected businesses.
- Integrated Pest Management (IPM) information provided. There is more information on the City's website, and the Poison-Free brochure is provided to businesses during inspections. This brochure includes information about proper outdoor sanitation practices and alternatives to pesticides.
- The City's LID ordinance now requires more New Development/Redevelopment project types than specified in the Permit to prepare Water Quality Mitigation Plans (WQMPs) to design, install, and maintain BMPs conforming to Permit requirements. Additional project types being required to prepare WQMPs include: (a) beachfront residential New Development/Redevelopment and (b) New Development/Redevelopment projects that result in the creation, addition, or replacement of 2,500 square feet of impervious surface area that discharge directly to or adjacent to an ASBS or is tributary to an ASBS.
- Requirements of the City of Malibu's Local Coastal Program were implemented for New Development/Redevelopment projects, including water conservation, protection of native vegetation, and landscaping with native vegetation.

5.7b) (If applicable) Describe any anticipated changes to MCMs next year requiring Regional Water Board approval:

There are no anticipated changes to MCMs next year.

6. Stormwater Control Measures Summary

Complete the following items in this section.

If the information on stormwater control measure implementation requested in the following section will be included in a Watershed Form submitted by the Permittee, the Permittee may reference the Watershed Form and skip those items.

Aside from the calculation of *Effective Impervious Area* and the *Summary of Projects that Retain Runoff*, items in this section cover projects that are not part of the Planning and Land Development Program.

The tables within this section outline minimum information for reporting. The Permittee may reformat the sections regarding projects completed in the reporting year to include additional project descriptions and information (e.g. pictures, maps, funding information, etc.).

If any of the requested information cannot be obtained, please note in Subsection 6.10 below.

6.1 Effective Impervious Area [*Attachment E, XVIII.A.1*]: Summarize the estimated cumulative change in percent EIA since the effective date of the Permit for the entire area covered by the WMP/EWMP and, if possible, the estimated change in the stormwater runoff volume during the 85th percentile, 24-hour storm event for the entire area covered by the WMP/EWMP. Complete the table below.

Table 6a: Effective Impervious Area[18] within Jurisdiction

Receiving Water	Date	Effective Impervious Area (acres)	Estimated Stormwater Runoff Volume During 85th Percentile, 24-hour Storm (if available)
RW 1 Santa Monica Bay- All	Dec. 28, 2012 (baseline)	not available	not available
	Current	not available	not available
(Add rows as needed)	Dec. 28, 2012 (baseline)		
	Current		

City of Malibu staff seek Regional Board guidance on the methodology that should be used to determine a City-wide baseline Effective Impervious Area (EIA) value and procedures that should be used to track the change in stormwater runoff volume (from the 85th percentile storm event) attributable to BMPs, development projects, and redevelopment projects.

See also response to Watershed Form Section 2.1.

6.2 Summary of Projects that Retain Runoff (including New and Redevelopment Projects); Complete the summary tables below.

[18] Effective Impervious Area (EIA) is the portion of the surface area that is hydrologically connected to a drainage system via a hardened conveyance or impervious surface without any intervening median to mitigate the flow volume.

Table 6b: Summary of Projects that Retain Runoff Completed in the Reporting Year				
Receiving Water	**Number of New Development/Re-development Projects Completed in Reporting Year**	**Number of Other Projects Designed to Intercept Runoff Completed in Reporting Year**	**Area Addressed by Projects**	**Total BMP Retention Capacity of Projects**
Santa Monica Bay - All	0	0	NA	NA*

* Onsite retention of the SWQDv for New Development/Redevelopment projects, as stated in Section VI.D.6.c.i.2, is impossible for most projects in Malibu due to high groundwater, geotechnical hazards and geologic instability, or due to conflicts with adjacent OWTS. For similar reasons, offsite infiltration or bioretention is also usually infeasible. The only feasible option for most projects in the City is onsite biofiltration.

Table 6c: Cumulative Summary of Projects that Retain Runoff Completed since the Permit Effective Date					
Receiving Water	**Number of New Development/Re-development Projects Completed Since Permit Start**	**Number of Other Projects Designed to Intercept Runoff Completed Since Permit Start**	**Area Addressed by Projects Completed Since Permit Start**	**Total BMP Retention Capacity of Projects Completed Since Permit Start**	**Est. Total Runoff Volume Retained Onsite for the Reporting Year**
RW 1	0	NA	NA	NA	NA*
(Add rows as needed)	See data from Tables 6b, 6d, 6e, 6f and 6g (all reporting years)				

* Onsite retention of the SWQDv for New Development/Redevelopment projects, as stated in Section VI.D.6.c.i.2, is impossible for most projects in Malibu due to high groundwater, geotechnical hazards and geologic instability, or due to conflicts with adjacent OWTS. For similar reasons, offsite infiltration or bioretention is also usually infeasible. The only feasible option for most projects in the City is onsite biofiltration.

6.3 Regional Projects Completed in Reporting Year: Complete the table below for any regional projects completed in the reporting year.

Table 6d: Regional Projects Completed in the Reporting Year					
Receiving Water	**Name of Project**	**Completion Date**	**Capacity of BMP**	**Drainage Area Addressed by Project (in acres)**	**Est. Total Runoff Volume Retained for the Reporting Year (if available)**
Santa Monica Bay - All	0	NA	NA	NA	NA
(Add rows as needed)	*(Add rows as needed)*				

6.4 Green Streets Completed in Reporting Year: Complete the table below for any green streets projects completed in the reporting year.

Table 6e: Green Streets Projects Completed in the Reporting Year						
Receiving Water	**Name of Project**	**Completion Date**	**Miles of Street Addressed by Project**	**Capacity of BMP**	**Drainage Area Addressed by Project (in acres)**	**Est. Total Runoff Volume Retained for the Reporting Year (if available)**
Santa Monica Bay- All	Broad Beach Rd. Biofiltration	7/1/2015	1.5	0.0373 cfs	12.3	NA
Santa Monica Bay- All	Wildlife Rd. Storm Drain Improvements	7/1/2015	N/A	1.62 cfs	16.8	NA
Santa Monica Bay- All	Malibu Rd. Biofiltration	7/1/2015	N/A	0.0386 cfs	1.85	NA
Santa Monica Bay- All	Las Flores Cyn. Rd. Biofiltration	7/1/2015	.65	0.055 cfs	4.2	NA
(Add rows as needed)	*(Add rows as needed)*					

6.5 Riparian Buffer and Wetland Restoration Projects: Complete the table below for any riparian buffer or wetland restoration projects completed in the reporting year.

Table 6f: Riparian Buffer/Wetland Restoration Projects Completed			
Receiving Water	**Name of Project**	**Completion Date**	**Description of Project[19]**
NA	None	NA	NA
(Add rows as needed)	*(Add rows as needed)*		

6.6 Additional Projects Completed During the Reporting Year: Complete the table below for other projects (not included above) that were completed in the reporting year.

Table 6g: Additional Projects (e.g. Biofiltration) Completed in the Reporting Year						
Receiving Water	**Name of Project**	**Type of Project**	**Completion Date**	**Drainage Area Addressed by Project (in acres)**	**Est. Total Runoff Volume Retained for the Reporting Year (if available)**	**BMP Capacity and Additional Notes**
Malibu Creek and Lagoon	Optimization of Collection Pumps for Legacy Park	retention	7/1/2015	310	not available	Collection system optimized to increase stormwater capture.
(Add rows as needed)	*(Add rows as needed)*					

6.7 Status of Multi-Year Efforts: Provide the status of multi-year efforts, including TMDL implementation (not including Trash TMDLs), that were not completed in the current year and will continue into the subsequent year(s).

[19] For riparian buffer projects include width, length and vegetation type; for wetland restoration projects include acres restored, enhanced or created

For multi-year efforts, report on progress towards future milestones related to multi-year projects. Include the status of the project, which includes the status with regard to standard project implementation steps. These steps include, but are not limited to, adopted or potential future changes to municipal ordinances to implement the project, site selection, environmental review and permitting, project design, acquisition of grant or loan funding and/or municipal approval of project funding, contractor selection, construction schedule, start-up, and effectiveness evaluation (once operational), where applicable.

If applicable, for green streets implementation, Permittees shall report on progress toward a structured approach identifying a sufficient number of green streets projects to meet compliance milestones (e.g., a green streets master plan).

Also, include the following information:

- Name
- Subwatershed
- Receiving Water
- Project Type
- Location / Latitude and Longitude
- Permittee(s) Involved
- Status
- Expected Completion Date

The NSMBCW EWMP establishes multi-year implementation milestones for structural distributed BMPs, trash capture devices, and downspout retrofit incentives (see also Section 9 of this form). The implementation status of each of these projects is provided below.

Project	Funding Status[1]	Anticipated Planning/ Design Schedule[2]	Anticipated Construction/ Implementation Schedule[3]
Trash Capture Systems	Funding for storm drain trash screens allocated in FY 16-17 CIP budget	Dec. 2016 – Dec. 2018	Apr. 2017 – Jun. 2020
Downspout Retrofit Program	Part of regular staff budget	Dec. 2016 – Mar. 2018	Apr. 2018 – Jun. 2021
Ramirez Cyn. Green Street	Pending	Jul 2017. – Dec. 2019	Jan. 2020 – Jun. 2021
Latigo Cyn. Green Street	Pending	Jul 2017. – Dec. 2019	Jan. 2020 – Jun. 2021
Corral Cyn. Green Street	Pending	Jul 2018. – Dec. 2019	Jan. 2020 – Jun. 2021
Marie Cyn. Green Street	Funding for initial BMP project allocated in FY 16-17 CIP budget	Dec. 2016 – Dec. 2019	Jan. 2020 – Jun. 2021
Winter Cyn. Green Street	Funding for initial BMP project allocated in FY 16-17 CIP budget (part of Civic Center Way improvements)	Dec. 2016 – Dec. 2019	Jan. 2020 – Jun. 2021
Sweetwater Cyn. Green Street	Pending	Jul 2018. – Dec. 2019	Jan. 2020 – Jun. 2021
Las Flores Cyn. (W1-14)	Pending	Jul 2018. – Dec. 2019	Jan. 2020 – Jun. 2021
Las Flores Cyn. (S1-14)		Jul 2018. – Dec. 2019	Jan. 2020 – Jun. 2021

[1] Includes acquisition of grant or loan funding and/or approval of municipal sources of project funding.

[2] Includes adopted or potential future changes to municipal ordinances to implement the project, site selection, environmental review and permitting, and project design.

[3] Includes contractor selection, construction, start-up, and effectiveness evaluation.

6.8 Effectiveness Assessment of Stormwater Control Measures [*Attachment E – XVIII.A.2*]: Provide the following:

- An assessment as to whether the quality of stormwater discharges as measured at designated outfalls is improving, staying the same or declining;
- An assessment as to whether wet-weather receiving water quality within the jurisdiction of the Permittee is improving, staying the same or declining, when normalized for variations in rainfall patterns.
- A description of efforts that were taken to address stormwater discharges that exceeded one or more applicable water quality based effluent limitation, or caused or contributed to aquatic toxicity:
- Additional information on the status multi-year efforts not provided in the previous sections of this report.
- Any additional information on storm water control measure effectiveness that the Permittee would like to highlight.

Implementation of the CIMP began in July 2016 after the reporting period ended; thus there are no event monitoring data or exceedances to report for designated outfalls during this period. It is too early to evaluate the effectiveness or ineffectiveness of related control measures implemented due to limited availability of the monitoring data.

The NSMBCW EWMP Group understands this question to apply only to event monitoring data for paired outfall and receiving water sites identified in the CIMP. However, for water bodies subject to TMDLs the results from coordinated water quality monitoring programs were also considered (see response to Section 6.5 in the Watershed Form). Actions taken in response to TMDL coordinated monitoring observations are described in the response to Section 6.6 in the Watershed Form.

Evaluation of priority water quality concerns in the NSMBCW EWMP identified bacteria levels at Santa Monica Bay Beaches and Malibu Creek and Lagoon as key indicators of overall water quality status in the jurisdictional area. The results of analysis performed using bacteria TMDL monitoring data, as presented in Watershed Form Section 6.5, provide a basis upon which to assess whether water quality is improving, staying the same, or declining. For bacteria in Santa Monica Bay during wet weather, the results suggest that water quality conditions are improving because, overall, bacteria concentrations are decreasing. Similar overall trends were observed for dry weather (both summer and winter). For Malibu Creek and Lagoon, overall trends in bacteria concentrations were less consistent. This suggests that water quality is generally staying about the same. City staff is not aware of reliable methods for normalizing wet weather receiving water monitoring results for variations in rainfall patters, but would welcome guidance from the Regional Board on how to address this issue in future annual reports.

Despite the City's intensive and ongoing actions to control non-exempt non-stormwater flows, some bacteria concentrations in adjacent water bodies have been difficult to eliminate. Some of these conditions may be due to factors beyond the City's control (e.g., natural sources), and staffs of the City and Regional Board have discussed ways that such conditions might be addressed from a regulatory perspective in the future.

6.9 Integrated Monitoring Compliance Report, Stormwater Control Measures [*Attachment E – XVIII.A.5.d*]: Provide a description of efforts that were taken to address stormwater discharges that exceeded one or more applicable water quality based effluent limitation, or caused or contributed to aquatic toxicity:

Implementation of the CIMP began in July 2016 after the reporting period ended; thus there are no event monitoring data or exceedances to report for this reporting period. It is too early to evaluate the effectiveness or ineffectiveness of control measures implemented due to limited availability of the monitoring data.

6.10 Data Limitations: If any of the requested information cannot be obtained, provide a discussion of the factor(s) limiting its acquisition and steps that will be taken to improve future data collection efforts.

City of Malibu staff seek Regional Board guidance on: (a) the methodology that should be used to determine a City-wide baseline EIA value; (b) procedures that should be used to track the change in stormwater runoff volume (from the 85th percentile storm event) attributable to BMPs, development projects, and redevelopment projects; and (c) methods for calculating runoff volumes retained by BMPs for particular years and cumulatively for the permit term.

Please see Section 2.1 of the Watershed Form for more information related to EIA.

6.11 (optional) Additional Information: If available, the Permittee may include / attach the following items to their report:

- Hydrographs and Flow Data: Hydrographs or flow data of pre- and post-control activity for the 85th percentile, 24-hour rain event, if control measures were designed to reduce impervious cover or stormwater peak flow and flow duration.
- Reference Watershed Flow Duration Curves: For natural drainage systems, develop a reference watershed flow duration curve and compare it to a flow duration curve for the subwatershed under current conditions.
- GIS Project Files: If available, submit a GIS project file that maps all implementation of on-the-ground projects (e.g. riparian buffer/wetland restoration; distributed/green streets; regional projects; new development and redevelopment on-site; and new development and redevelopment off-site).

7. Non-Stormwater Control Measures Summary

Complete the following items in this section.

7.1 Summarize actions and projects related to addressing non-stormwater discharges. Include the specific non-stormwater actions completed within the WMG's jurisdictional area during the reporting year and, if applicable, the estimated total runoff volume retained on site by the implemented projects:

City actions to address non-stormwater discharges during the reporting year included the following preventative and response programs: extensive community outreach; a proactive illicit detection, response, and elimination program; providing multiple methods for the public to report discharges (via email, phone, or online 24 hours a day); implementation of the ASBS Compliance Plan, Pollution Prevention Plan, and other Special Protections requirements; implementing a robust water conservation outreach program that emphasizes efficiency measures that eliminate runoff; and increased frequency of commercial and construction inspections.

The City is proactive and forward thinking in its planning and implementation of stormwater and non-stormwater control projects. Projects addressing non-stormwater discharges completed this reporting year include: Broad Beach Road Green Street Improvements; Wildlife Road Green Street Improvements; Pump Capacity Upgrades to Legacy Park; Las Flores Canyon Road Biofilter; and Malibu Road Biofilter. Projects addressing non-stormwater discharges completed in previous reporting years which continue to address non-stormwater discharges include: Civic Center Stormwater Treatment Facility; Legacy Park; Paradise Cove Water Quality Improvement Facility; and Cross Creek Road LID Improvements (which have all been explained at great length in prior annual reports). Ongoing benefits of the City's completed projects include preventing non-stormwater discharges from reaching receiving waters, such as with LID features that treat stormwater (e.g. biofiltration, filtration, or disinfection) prior to discharge or reuse. Ongoing City efforts in connection with completed projects include operation and maintenance activities.

7.2 Provide a description of efforts that were taken to mitigate and/or eliminate all non-stormwater discharges that exceeded one or more applicable water quality based effluent limitations, non-stormwater action levels, or caused or contributed to Aquatic Toxicity [*Attachment E – XVIII.A.5.c*]:

The non-stormwater outfall monitoring program as described in the approved CIMPs has just begun. It is expected that future annual reports will include a detailed description of efforts made to mitigate non-stormwater discharges, if discharges exceed effluent limits and action levels as more data is collected and analyzed. Any exceedances found and attributed to non-stormwater discharges will be addressed through the EWMP adaptive management process or the IC/ID program. For additional information regarding the CIMPs and adaptive management through EWMP, see response to Section 3.3.

During the first round of screening major outfalls no significant non-stormwater discharges were observed; therefore no sampling was performed, and no water quality based effluent limitations, non-stormwater action levels, or Aquatic Toxicity limits were found to be exceeded. Hence, for this reporting period the City was not required to perform specific actions relevant to this question.

7.3 Provide the status of multi-year efforts, including TMDL implementation, related to the implementation or effectiveness assessment of non-stormwater control measures, that were not completed in the current year and will continue into the subsequent year(s) [*Attachment E – XVIII.A.3*]:

Please refer to Sections 6.7 and 9.1.

7.4 Provide an assessment of the effectiveness of the Permittee control measures in effectively prohibiting non-stormwater discharges through the MS4 to the receiving water. Additionally, include information quantifying the effectiveness of Storm Water Control Measures (Section 6 of this form) in addressing non-storm water discharges. This information should include the estimated amount of non-storm water flows captured by the storm water control measures implemented throughout the watershed and a description of the methodology and assumptions used to quantify effectiveness. [*Attachment E – XVIII.A.4*]:

Through its ordinances and extensive outreach and enforcement programs, the City prohibits all unauthorized non-stormwater discharges through its MS4. The outfall screening and monitoring program is expected to further reduce the possibility of significant non-exempt discharges being conveyed through the MS4. During the reporting year the City operated its existing stormwater control facilities (i.e., structural BMPs described in the NSMBCW EWMP and in the response to Section 6 above). These BMPs are considered to be generally effective for controlling non-stormwater flows. For the reporting year, the City has actively implemented its illicit detection, response, and elimination program. See responses in Section 5 for quantified measures of these activities' effectiveness. The City has not estimated non-stormwater flow amounts diverted as a result of its control measures, and seeks Regional Board guidance on appropriate methodologies for doing so.

See also responses to Section 7.2.

7.5 Provide an assessment as to whether the quality of non-stormwater discharges as measured at monitored outfalls is improving, staying the same or declining:

There were no significant non-stormwater discharges observed during outfall screening; therefore, no samples were collected and there is no analytical data for monitored outfalls. However, as a result of the City's strong water quality protection program including extensive outreach, structural BMPs, and restrictive development standards, the City believes water quality of non-stormwater discharges is not declining. In fact, there is a decreasing likelihood that any non-stormwater discharges will reach an outfall due to an informed community, proactive response program, and, to some extent, a disconnected and naturalized drainage area.

Furthermore, additional event monitoring for EWMP/CIMP implementation began after the end of the reporting period – the implementation program commenced in July 2016. Any resulting information pertinent to this question will be reported in the next annual report.

7.6 Provide an assessment as to whether receiving water quality within the jurisdiction of the Permittee is impaired, improving, staying the same or declining during dry-weather conditions. Each Permittee may compare water quality data from the reporting year to previous years with similar dry-weather flows, conduct trends analysis, draw from regional bioassessment studies, or use other means to develop and support its conclusions:

The non-stormwater outfall monitoring program as described in the approved CIMPs has just begun. It is expected that future annual reports will include a detailed description of efforts made to mitigate non-stormwater discharges that are above WQOs as more data is collected and analyzed. Any exceedances found and attributed to non-stormwater discharges will be addressed through the EWMP adaptive management process or the Illicit Connections/Illicit Discharges program. However, the City believes that as a result of its strong water quality protection program including extensive outreach, structural BMPs, and restrictive development standards, water quality during dry weather in this area is not declining.

The analysis performed using bacteria TMDL monitoring data, as presented in Watershed Form Section 6.5, provides a basis upon which to assess whether water quality is improving, staying the same, or declining. Evaluation of priority water quality concerns in the EWMP identified bacteria levels at Santa Monica Bay Beaches and Malibu Creek and Lagoon as key indicators of overall water quality status in the jurisdictional area. For bacteria in Santa Monica Bay during dry weather (both summer and winter), the analysis results suggest that water quality conditions are improving because, overall, bacteria concentrations are decreasing. For Malibu Creek and Lagoon, overall trends in bacteria concentrations were less consistent. This suggests that water quality in Malibu Creek and Lagoon is generally staying about the same.

Despite the City's intensive and ongoing actions to control non-exempt non-stormwater flows, some bacteria concentrations in adjacent water bodies remain above dry weather WQOs. Some of these conditions may be due to factors beyond the City's control (e.g., natural sources), and staffs of the City and Regional Board have discussed ways that such conditions might be addressed from a regulatory perspective in the future.

7.7 Describe sources of significant non-stormwater discharges determined to be a NPDES permitted discharge, a discharge subject to A Record of Decision approved by USEPA pursuant to section 121 of CERCLA, a conditional exempt essential non-stormwater discharge, or entirely comprised of natural flows. [Attachment E – IX.F.2]

Since there were no significant flows observed during screening at the major outfalls and no applicable illicit discharge response investigations, no specific sources of exempt or conditionally exempt non-stormwater discharges were identified. The NSMBCW EWMP Group will conduct additional non-stormwater screenings as required to ensure that there are no new significant non-stormwater discharges.

8. TMDL Reporting

Complete the following items in this section.

8.1 Trash TMDL Compliance Report [VI.E.5.c.i]

For Permittees subject to Trash TMDLs, submit a Trash TMDL Compliance Report detailing compliance with applicable interim and/or final effluent limitations. For Permittees demonstrating compliance using full capture systems, partial capture systems, and/or institutional controls, use the Excel worksheet found at:

http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/trash/index.shtml

8.2 TMDL Reporting [Attachment E, XIX]

Report on progress towards achieving interim or final milestones/WQBELs/RWLs based on applicable compliance schedules in Attachments L-R and any additional milestones and corresponding deadlines in an approved WMP/EWMP. If this information is reported in another document (e.g. Annual Report Watershed Form) or an attachment, clearly state and provide a reference to the pertinent document and section.

TMDL reporting items required per the applicable schedules outlined in Attachment E, Section XIX.A through XIX.G of the Permit may be provided here or as an attachment to this report.

See Section 6 of the Watershed Form.

9. WMP/EWMP Schedules and Implementation (If Applicable)

If you are participating in a WMP or EWMP, complete the following items in this section.

If the requested information will be included in a Watershed Form to be submitted, you may simply reference the Watershed Form and skip the corresponding item.

9.1 (If applicable) Provide comparison of control measures completed to date with control measures projected to be completed to date in the Permittee's jurisdictional area. List control measures projected to be completed within the next two years and the projected completion dates, as well as the status of implementation and funding. This also includes additional "enhanced" MCMs, institutional controls, and nonstructural BMPs that are not part of the permit's minimum control measures. [*Watershed Management Program Adaptive Management Process (VI.C.8.a)*]:

Table 9a: WMP/EWMP Schedules

Control Measure	Projected Completion (Date)	Actual Completion (Date)	Status of Implementation	Status of Funding
Trash Capture Systems	Apr. 2018 – Jun. 2020	not applicable	Planning/Design	Funding allocated in FY 16-17 CIP budget
Downspout Retrofit Program	Apr. 2018 – Jun. 2021	not applicable	Planning/Design	Part of regular staff budget
Marie Cyn. Green Street	Jun. 2021	not applicable	Planning/Design City is working with Pepperdine University and Los Angeles County to document existing BMPs and identify additional project opportunities.	Funding for initial BMP project allocated in FY 16-17 CIP budget. City is working with Pepperdine University and Los Angeles County to identify additional funding opportunities.
Winter Cyn. Green Street	Jun. 2021	not applicable	Planning/Design	Funding for initial BMP project allocated in FY 16-17 CIP budget (part of Civic Center Way improvements). City is seeking grant funding to assist in paying for additional BMP projects.
(Add rows as needed)				

9.2 (If applicable) Describe any modifications, including where appropriate new compliance deadlines and interim milestones, with the exception of those compliance deadlines established in a TMDL, necessary to improve the effectiveness of the WMP/EWMP:

None

10. Watershed Hydrology

Complete the following items in this section.

If the information on watershed hydrology requested in the following section is included in a Watershed Form or was previously included in a WMP or EWMP, you may simply reference those documents.

10.1 (If Applicable) Watershed Summary Information, Organization, and Content: Provide the information below in the odd year Annual Report (e.g., Year 1, 3, 5)[20], or any updates to the information below if previously provided. The requested information shall be provided for each watershed within the Permittee's jurisdiction [*Attachment E – XVII*]:

Provide the following information related to the Watershed Management Area: 1) Description of effective TMDLs, applicable WQBELs, receiving water limitations, implementation and reporting requirements, and compliance dates; 2) List of CWA Section 303(d) listings not addressed by TMDLs. 3) Results of regional bioassessment monitoring. (If applicable, a reference to the SMC will suffice here.) 4) Description of known hydromodification effects to receiving waters. 5) Description and location of natural drainage systems. 6) Description of groundwater recharge areas, including number and acres. 7) Maps and/or aerial photographs identifying ESAs, ASBS, natural drainage systems, and groundwater recharge areas.
Watershed information was developed as part of the EWMP for the NSMBCW and approved by the Regional Board on April 19, 2016. Additionally, as this Annual Report, Year 2015-2016, is an even year report, updates to the information requested will be provided in next odd year's annual report or future updates to the EWMPs as necessary.

Provide the following information related to the Subwatershed (HUC-12): 1) Description including HUC-12 number, name and a list of all tributaries named in the Basin Plan. 2) Land Use map of the HUC-12 subwatershed. 3) 85th percentile, 24-hour rainfall isohyetal map for the HUC-12 subwatershed, with identification of 85th percentile, 24-hour volume for the HUC-12 subwatershed. 4) One-year, one-hour storm intensity isohyetal map for the HUC-12 subwatershed, with identification of the one-year, one-hour storm intensity for the HUC-12 subwatershed. 5) MS4 map for the subwatershed, including major MS4 outfalls (as defined in Attachment A of the permit) and all low flow diversions, and corresponding table with identification numbers, geographic coordinates, jurisdiction, size of outfall, outfall catchment area (as available), and size and operational period/conditions of corresponding low-flow diversions.
See above response.

Provide the following information related to the Permittee(s) Drainage Area(s) within the Subwatershed: 1) A subwatershed map depicting the Permittee(s) jurisdictional area and the MS4, including major outfalls (with identification numbers), and low flow diversions (with identifying names or numbers) located, within the Permittee's jurisdiction. 2) Provide the estimated baseline percent of effective impervious area (EIA) within the Permittee(s) jurisdictional area as existed at the time that this Order became effective and, if possible, the estimated change in the stormwater runoff volume during the 85th percentile, 24-hour storm event.
See above response.

10.2 Rainfall Summary: Provide a rainfall summary for the reporting year including: (1) A summary of the number of storm events; (2) The highest volume event (inches/24 hours); (3) The highest number of consecutive days with measureable rainfall; and (4) The total rainfall during the reporting year compared to average annual rainfall for the subwatershed [*Attachment E – XVIII.A.2*]:

[20] Year 1 = 2012-13 Annual Report; Year 2 = 13-14; Year 3 = 14-15; Year 4 = 15-16; Year 5 = 16-17;…

Refer to Section 6 of the Watershed Form.

10.3 SW Monitoring Event Summary: Provide a summary table describing rainfall during stormwater outfall and wet-weather receiving water monitoring events. The summary description shall include the date, time that the storm commenced and the storm duration in hours, the highest 15-minute recorded storm intensity (converted to inches/hour), the total storm volume (inches), and the time between the storm event sampled and the end of the previous storm event.

Table 10a: Summary of Storm Water Outfall and Wet Weather Receiving Water Monitoring Events

Event	Date	Storm start time (AM/PM)	Storm Duration (hrs)	Highest storm intensity - 15min (in/hr)	TOTAL Storm Volume (in)	Span between sample event & previous storm event (hr)
Event 1	NA	NA	NA	NA	NA	NA
Event 2						
(Add rows as needed)						

Implementation of stormwater outfall monitoring began in the 2016-2017 storm season; thus there is no event monitoring data or exceedances to report for this reporting period.

11. Adaptive Management Strategies

Include the following information on Adaptive Management Strategies as required in Section XVIII.A.6 of the MRP.

11.1 Program Assessment
This section shall summarize the most effective and least effective control measures, as well as receiving water quality results in comparison to RAA projections.

(a) Control Measure Effectiveness

Assess the effect of control measures implemented within the Permittee's jurisdiction and include the following:

- Identification of the most effective control measures and a description of why the measures were effective.
- Identification of the least effective control measures and a description of why the measures were deemed ineffective.

It is too early to evaluate the relative effectiveness of specific EWMP control measures due to the current early position on the implementation timeline (i.e., there is currently limited availability of data and planned distributed BMP projects have not yet been constructed). However, BMP projects already constructed, and other water quality programs implemented by the City prior to the adoption of the current permit and development of the EWMP, are considered effective overall in preventing discharges and reducing the discharge of pollutants.

See response to Watershed Form Section 7.1(a) for information about the effectiveness of structural BMPs. With respect to receiving water quality results, the City attributes observed long term improvements in receiving water bacteriological quality (see response to Watershed Form Section 6.5) to its proactive approach to planning and implementing non-stormwater control and stormwater control measures.

11.2 Modifications and Changes to Control Measures

Describe changes to control measures, including the following (where applicable): • For those control measures identified as least effective, describe how the control measures will be modified or replaced. • Identification of significant changes to control measures during the prior year and the rationale for the changes. • Description of all significant changes to control measures anticipated to be made in the next year and the rationale for the changes. **Those changes requiring approval of the Regional Board or its Executive Officer shall be clearly identified at the beginning of the Annual Report.** • The status of all multi-year efforts that were not completed in the current year and will continue into the subsequent year(s). • An implementation schedule for additional BMPs, including modifications to current BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of receiving water limitations.
NA

11.3 Adaptive Management Process

(a) Adaptive Management Reporting: If the Group implemented an adaptive management process during this reporting year, provide the following information:

- On-the-ground structural control measures completed
- Non-structural control measures completed
- Monitoring data that evaluates the effectiveness of implemented control measures in improving water quality
- Comparison of the effectiveness of the control measures to the results projected by the RAA
- Comparison of control measures completed to date with control projected by the RAA
- Comparison of control measures completed to date with control measures projected to be completed to date pursuant to the EWMP
- Control measures proposed to be completed in the next two years pursuant to the EWMP and the schedule for completion of those control measures
- Status of funding and implementation for control measures proposed to be completed in the next two years

No adaptive management processes were implemented during the reporting year.

12. Additional Information (Optional)

Provide any additional information in this section.

You may use this section to report any additional information not specified in the Individual Permittee Report Form or to report any information in the Individual Form that is better presented outside of the report form structure.

You may also provide an additional detailed summary table describing control measures that are not otherwise described in the reporting requirements.

Appendix B includes additional information on the control measures the City has taken to address runoff within its jurisdiction. Appendix C includes the ASBS Special Protections Monitoring Report conducted by the City. A summary of this report is included in Section 6.3 of the Watershed Form

Appendix A: Industrial and Commerical Facilities Inspection Forms – Retail Gasoline Outlets (RGOs)/Automative Facilities and Nurseries

Stormwater Inspection Checklist for Automotive Related Business

Business Name:	
Type of Business:	
Site Address:	
Mailing Address:	
Owner/Operator:	
Staff Onsite During Inspection:	ASBS: Yes ☐ No ☐
Phone Number:	Date:
Email:	Time:

Activities Inspected (minimum BMPs required)	**BMP Effectiveness**			**Comments**
	Y	**N**	**N/A**	
Storm drain inlets are labeled				
Storm drain inlets are routinely inspected and cleaned (min. once per year)				
Area is free of visible discharges to the storm drain system				
Facility area is dry and staff understands that wash down of facility area to the storm drain is illegal				
Facility area does not have evidence of excessive staining				
Fuel dispensing areas are routinely swept for removal of litter and debris				
Leaks and drips are routinely cleaned at outdoor trash receptacles, fuel-dispensing areas, and air/water supply areas				
Rags and absorbents are ready for use in case of leaks and spills				
Watertight receptacles are used and lids are kept closed				
Garbage container area is free of trash				
Dumpsters and surrounding area are free of leakage and liquid waste				
Dumpster bin lids are closed				
Outdoor work and storage areas are protected to prevent contact of pollutants with rainfall and runoff				
Signs are posted near fuel dispensers warning customers against "topping off" of fuel tanks				
Automatic shutoff fuel dispensing nozzles are installed				
Waste waters are discharged to a sanitary sewer or onsite wastewater treatment system or transferred to a legal point of disposal				
Waste materials and hazardous waste are properly managed and disposed				
Housekeeping BMPs prevent spills and leaks in work/repair areas				
Employees are trained to properly manage hazardous materials and wastes				
Employees are trained in storm water pollution prevention practices				

CORRECTIONS / ADDITIONAL COMMENTS	**DUE DATE**

Inspector Signature   Date

Stormwater Inspection Checklist for Nurseries

Business Name:	
Type of Business:	
Site Address:	
Mailing Address:	
Owner/Operator:	
Staff Onsite During Inspection:	ASBS: Yes ☐ No ☐
Phone Number:	Date:
Email:	Time:

Activities Inspected (minimum Best Management Practices (BMPs) required)	**BMP Effectiveness**			**Comments**
	Y	**N**	**N/A**	
Storm drain inlets are labeled				
Storm drain inlets are routinely inspected and cleaned (min. once per year)				
Area is free of visible discharges to the storm drain system				
Site is kept free of litter, debris, and sediment using dry methods				
Outdoor areas are free of spills, leaks, excessive staining, and evidence of past spills or illicit discharges				
Roof downspouts are directed away from areas of potential pollutants				
Water from washing and maintenance activities is disposed of appropriately and does not enter the MS4				
Pesticides and fertilizer are properly managed; IPM used where feasible				
Adequate erosion prevention measures (vegetation or physical stabilization) are employed				
Over-watering/over-irrigation is eliminated				
Stockpiles are properly stored to prevent material transport				
Green waste is stored and disposed of properly				
Garbage container area is free of litter and debris				
Dumpsters and surrounding area are free of leakage and liquid waste				
Dumpster bin lids are kept closed				
Materials stored outside are covered to prevent contact from run-on				
Outdoor storage containers are labeled				
Liquid storage containers are equipped with secondary containment				
Secondary containment and surrounding area are kept free of spills				
There is an accessible, functional spill response kit onsite				
Loading and unloading areas are kept free of debris				
Employees are trained to properly manage hazardous materials and wastes				
Employees are trained in storm water pollution prevention practices				

CORRECTIONS / ADDITIONAL COMMENTS	**DUE DATE**

Inspector Signature

Date

Appendix B: Additional Information

Presented in this appendix is additional information about the City's stormwater and non-stormwater control measures, including details which extend the information provided in responses to questions in the Individual Form.

Clean Water Program Highlights and Accomplishments

The following is a list of highlights and accomplishments of the City's Clean Water Program

- Malibu Civic Center Stormwater Treatment Facility – This high capacity facility was constructed with active bacteria disinfection technologies including filtration and ozone treatment. Complete and Operational
- Legacy Park – the City's central park that includes stormwater detention basins linked to the Civic Center Stormwater Treatment Facility, intermittent wetlands, subsurface wetlands, restoration of riparian habitat and environmental education opportunities. This park has received seven prestigious awards since it was completed, including the American Society of Civil Engineers' prestigious Project of the Year Award
- Trancas Canyon Park – this City park has an area designated for walking dogs, and thus incorporates BMPs including permeable paving in parking area and a detention basin in the field, along with native plantings in the landscaping.
- Stream restoration projects – Solstice Creek Bridge Replacement, and Las Flores Canyon Creek Restoration and Park Project
- Paradise Cove Clean Ocean Facility – this facility includes active bacteria disinfection technologies including filtration and ultraviolet light. The facility treats dry-weather and stormwater flows from Ramirez Creek. Complete and Operational.
- Marie Canyon Water Quality Improvement Project – this County owned and operated County owned and operated facility includes six filtration units and an ultraviolet light disinfection system capable of treating 100 gallons per minute of dry-weather runoff. Operational.
- Cross Creek Road Improvements (with native vegetation landscaping and permeable surfaces) – Complete
- Broad Beach Road Biofiltration – Complete and Operational
- Wildlife Road Treatment and award-winning ASBS Focused Outreach Project – Complete and Operational
- Robust public outreach program (printed and online) with frequent notifications through newsletters, community calendars, social media, and the environmental programs section of the City's website.

Strengths of the City's Clean Water Program

The following is a list of the City of Malibu's Clean Water Program's major strengths

- Committed City Council, management and staff
- Progressive policy and regulations – Malibu Municipal Code includes: Storm Water Management and Discharge Control Ordinance; a restrictive zoning ordinance and Local Coastal Program; litter reducing ordinances banning smoking on beaches, polystyrene packaging and foodservice ware, and plastic shopping bags; OWTS point of sale inspections ordinance; and an administrative fines ordinance
- Malibu Area Conservation Coalition – efforts focusing on water quality protection and energy conservation through water conservation
- Robust and proactive commercial facilities inspection program - in particular the Clean Bay Restaurant Certification program, and that all targeted commercial facilities inspections are conducted annually rather than the required two times per permit cycle
- Responsive and active community
- Innovative use of technology to deliver public education messages, including through social media (Facebook, Instagram, and Twitter) and other content management systems
- Active collaboration between multiple City departments, several public agencies, and non-government organizations
- Extensive review process for all new development and construction to ensure projects are held to high environmental protection standards
- Continuous efforts to improve and develop the City's environmental programs with focus on Clean Water Program and sustainability projects
- In-house staff training includes sessions on internal procedures and documentation, construction BMPs, and low impact development, goes above minimum requirements by involving as many staff as possible and not just target employees
- Ongoing environmental professional development training for staff
- Continued improvements to complaint response and documentation procedures
- Continued improvements to construction inspection documentation.

Interagency Coordination

The City is involved in at least 13 interagency partnerships and committees which help to improve the City's storm water management program, and actively participates when these groups convene.

1. Malibu Creek Watershed Management Committee
2. LA County EWMP Coordinators meetings
3. LA County CIMP Coordinators meetings
4. LA County Public Outreach Strategy meetings
5. North Santa Monica Bay Coastal Watersheds EWMP & CIMP coordination meetings
6. Leadership Committee of the Greater Los Angeles County Integrated Regional Water Management Planning (IRWMP) Planning Group
7. North Santa Monica Bay Watersheds Steering Committee of the Greater Los Angeles County IRWMP Group
8. Malibu Creek Watershed - Monitoring Technical Advisory Committee
9. LA Stormwater Permit Group
10. Bight ASBS Subcommittee (anticipated to reconvene by 2018).
11. Malibu Area Conservation Coalition
12. Beach Water Quality Work Group
13. LA Marine Protected Area (MPA) Collaborative.

Rural Storm Drainage System and Natural Creek Outlets

In Malibu, there are approximately 232 total catch basins/culverts that the City maintains (cleans and marks with a "No Dumping" message), there are no open channels in Malibu's MS4, only a couple small channels in Malibu that are part of Los Angeles County Flood Control District's (LACFCD) MS4, and the City has approximately 21,755 feet of closed storm drain. Despite having other agencies and private entities own portions of MS4 in Malibu, the system is unlike most areas of Los Angeles County (where there is an elaborate system of co-mingled jurisdictions throughout the countywide MS4). Unlike most of the County, much of the City's MS4 is in rural and rugged settings and consists of a series of singular inlet structures (sometimes with an under-road connector pipe), which outfall to the sides of vegetated canyons.

The natural creek and storm drainage outlets adjacent to shoreline monitoring stations sampled as part of the Santa Monica Bay Beaches Bacteria TMDL Coordinated Shoreline Monitoring program are not owned or operated by the City. Most water quality monitoring in this program occurs at the shoreline next to mouths of natural creeks and gullies from canyons. Some of these subwatersheds have no contribution whatsoever from the City's MS4. There is minimal infrastructure in many of these areas, and the City does not own or operate an extensive or modern system of curb and gutter, drainage pipes or flood control channels.

Natural Sources of Fecal Indicator Bacteria

Scientific research continues to provide significant information on natural sources of bacteria. From these studies, the City and stakeholders are gaining a better understanding of MS4 discharges relative to water quality. For example, studies performed by the United States Geological Survey (USGS) in Santa Barbara and Malibu both showed kelp wrack as a major contributor of elevated fecal indicator bacteria (FIB) in environmental media.[1,2] The USGS Malibu study evaluated the occurrence, distribution and sources of FIB and nutrients in shallow groundwater, Malibu Lagoon and near-shore ocean waters in dry and wet weather. USGS also found that tide, temperature, wind and the time of day samples are collected all affected bacteria concentrations in Malibu. The results provided evidence that in dry weather, environmental FIB sources included surface deposits along the berm and nearby sand, as well as sediment at the bottom of Malibu Lagoon. The USGS also found that bacteria in the near-shore ocean were associated with tidal fluxes, with highest bacteria concentrations occurring during high tide. This correlated with wave run-up on the beach washing FIB from the wrack line and beach sands. Water movement through the berm at the mouth of the Lagoon was found to be a source of FIB to the near-shore ocean during low tide, and groundwater bacteria concentrations were low at low tide. Bacteria counts were higher at night when there is less chance for solar disinfection and much lower in the afternoon after the sun's heat penetrated the water to kill the bacteria. Bacteria counts were also highest during high tide. In summary, USGS found that natural and environmental sources of bacteria, in connection with tidal and temporal influences, impact the occurrence of bacteria in the near-shore environment. This likely affects the occurrence of FIB observed at the shoreline monitoring near the outlet of Malibu Creek and Lagoon. Tidal influences in concert with natural sources of FIB also may explain other shoreline exceedances.

The City's Paradise Cove Clean Ocean Facility has a total treatment capacity of 3,600 gpm for gross solids and sediment removal, and up to 900 gpm capacity for disinfection.[3] The treatment facility was designed to meet the water quality objectives set forth in the Santa Monica Bay Beaches Bacteria TMDL for summer and winter dry weather, and wet weather periods for all but the wettest of rainfall years.[4] Flow monitoring in the private channel upstream of the facility in the first wet season post-construction showed that the facility has the capacity to treat all dry weather flows and most wet weather events, with highest flows peaking around 4,000 gpm with some isolated un-sustained peaks of 10,000 gpm or greater (suspected due to higher storm flows or debris fouling the measurements). Even with all dry weather flows being treated, exceedances of FIB recreational standards in the wave wash at the beach persist. Additional sampling conducted over two years showed that once the treated water contacted the sand and kelp wrack, fecal indicator bacteria levels increased dramatically. This is another example of fecal indicator bacteria occurring on the beach at a creek outlet as a result of uncontrollable natural influences which are not related

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[1] J.A . Izbicki et aI., 2009. *Sources of Fecal Indicator Bacteria in Urban Streams and Ocean Beaches, Santa Barbara, California*. Annals of Environmental Science. Vol 3, 139-178

[2] Izbicki et al., 2012. *Sources of Fecal Indicator Bacteria to Groundwater, Malibu Lagoon and the Near-Shore Ocean, Malibu, California*. Annals of Environmental Science. Vol 6, 35-86

[3] Prior to construction of the facility in 2006, daily stream flows (as measured by Santa Monica Baykeeper) only exceeded 900 gallons per minute (gpm) following rain storms of greater than 1 inch, and stream flows dropped below 900 gpm approximately 24 hours following the rain events.

[4] J. Brown, 2011. Final Project Certification for the Paradise Cove Stormwater Treatment System Project. Prepared for: State Water Resources Control Board State Revolving Fund Project No. C-06-6969-110, Agreement. October 2011 No. 08-354-550 (Previously Agreement No. 06-298-550-0).

to discharges from the MS4. There are no City/County owned MS4 drainage facilities in the watershed tributary to this facility.

Using bacteria source identification tools, other scientific researchers have found that in both wet and dry weather, non-human influenced beaches have high bacteria levels even when there are no storm drain discharges present. Published research undertaken by UCLA and Stanford[5] confirms the USGS results that kelp and bird and brine fly feces deposited in the kelp wrack directly influence water quality. The studies have shown that the source or combination of sources of FIB to near-shore ocean water is not precisely known, but includes sources other than stormwater. Concurrently, the USEPA and a growing body of experts with peer-reviewed research have a greater understanding of the level of public health risk associated with natural and non-human sources of bacteria. Because the emerging science is critical to local decisions, the City is active in the State Board's Beach Water Quality Work Group that keeps track of best available science related to public health.

In an April 18, 2013 letter to the Regional Board Executive Officer, the City explained its desire to pursue a regulatory mechanism for removing obligations to control natural sources of bacteria under the Santa Monica Bay Beaches and Malibu Creek and Lagoon bacteria TMDLs. Environmental influences and sources of elevated bacteria in the rural watersheds of North Santa Monica Bay are complex. The City recognizes that in order for all stakeholders to fully understand these issues it is important to collaborate with other organizations and recognized experts.

[5] Imamura et. al., 2011. *Wrack Promotes the Persistence of Fecal Indicator Bacteria in Marine Sands and Seawater*. FEMS Microbiol Ecology. Vol 77, 40–49.

Appendix C: City of Malibu Special Protections Monitoring for Areas of Special Biological Significance

2015-2016 Season

December 2016

CITY OF MALIBU

Areas of Special Biological Significance Special Protections Monitoring

Monitoring Report

2015 - 2016 Season

City of Malibu:
Areas of Special Biological Significance
Special Protections Monitoring

2015-2016 Season

Monitoring Report

December 2016

Table of Contents

Appendices

List of Figures

List of Tables[1]

[1] Tables are included at the end of the report.

I. Introduction

Area of Special Biological Significance (ASBS) 24, which stretches from Latigo Point to Laguna Point, was established in 1974 by the State Water Resources Control Board (Water Board) to preserve sensitive marine habitat. Part of ASBS 24 is within the City of Malibu (City). The City is responsible for stormwater and non-stormwater discharges that flow to the ASBS through its storm drain system and must conduct water quality monitoring to comply with the Water Board's *General Exception to the California Ocean Plan (COP) for Selected Discharges Into Areas Of Special Biological Significance, Including Special Protections For Beneficial Uses* (General Exception) Attachment B entitled *Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges* (Special Protections).

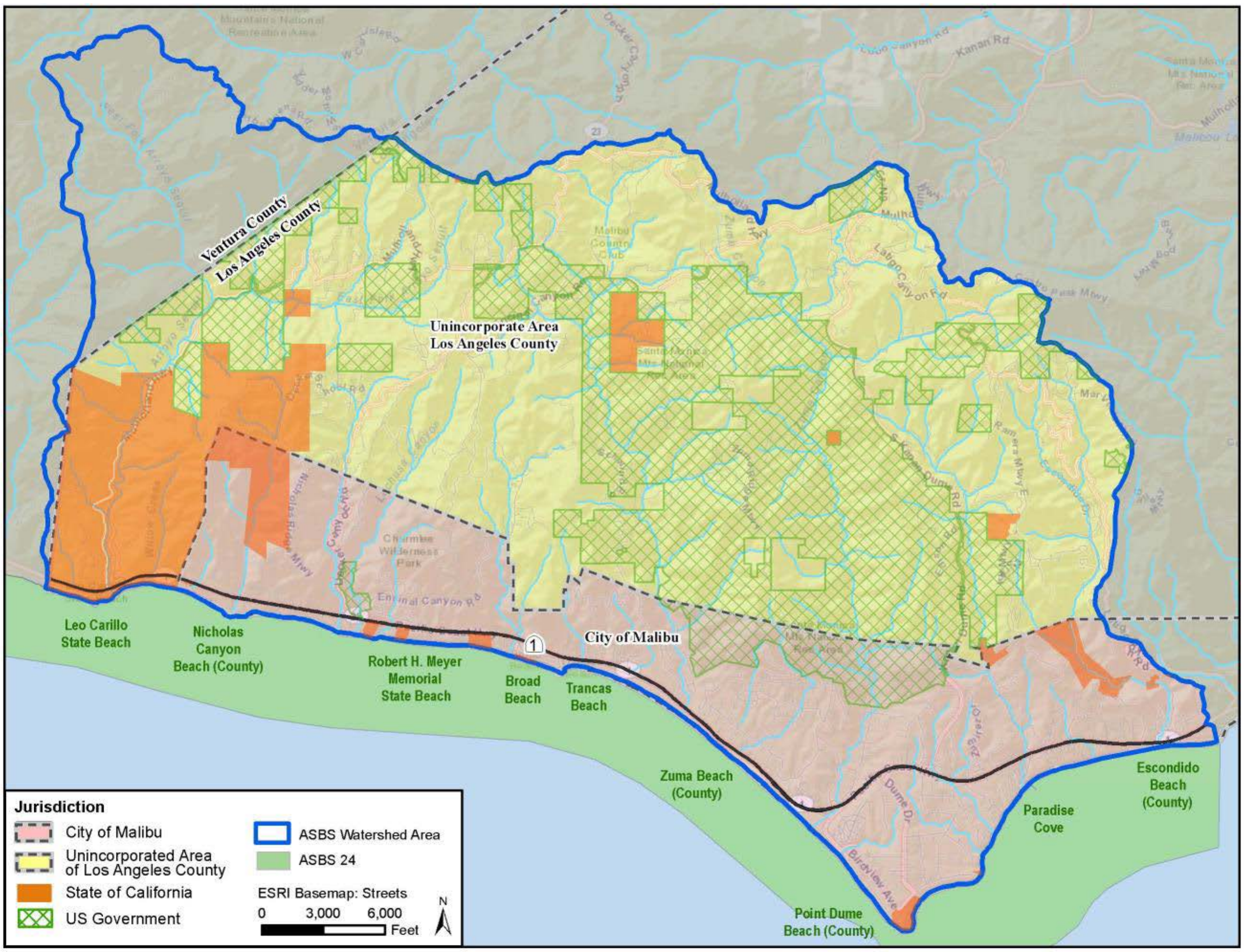


Figure 1. ASBS 24 Watershed and Jurisdictional Boundaries Map

In general, the Special Protections were developed to eliminate dry weather runoff, ensure that wet weather runoff does not alter natural water quality in the ASBS, and ensure that adequate monitoring be conducted to determine if natural water quality and the marine life beneficial use are protected.[2] The Special Protections include provisions that incentivize participation in a regional monitoring program, including the requirement to sample for one storm season. The City participated in the 2008 and 2013 Southern California Bight Regional Monitoring Program ASBS project led by the Southern California Coastal Water Research Project (SCCWRP). The lack of sufficient rain or safe access during the 2013-2014 wet weather season[3] prevented the City from successfully sampling three storm events all in one storm season.

In comments to the September 20, 2014 *ASBS 24 Draft Compliance Plan for the County of Los Angeles and City of Malibu* (Compliance Plan), the Water Board requested that additional monitoring be conducted in order to more fully understand any potential water quality impacts from stormwater runoff to the ocean receiving water of ASBS 24. The City continued its receiving water and associated outfall monitoring through the 2014-2015 storm season and 2015-2016 storm season for a total of four successful sampling events during the three storm seasons that span 2013-2016. Monitoring was conducted in accordance with the methods and requirements set forth in the Special Protections. Monitoring results and assessment from the two storm events in February 2014 and December 2014 were included in the revised Compliance Plan dated September 20, 2015 and submitted to the Water Board. The 2015-2016 monitoring results from the two storm events in January 2016 and March 2016 are presented in this report along with the February 2014 and December 2014 monitoring results and an analysis of compliance with water quality protection requirements set forth in the Special Protections.

II. Objectives and Design

This ASBS 24 monitoring report is intended to supplement previous data collected during the 2013-2014 and 2014-2015 storm seasons in order to meet the monitoring requirements of the Special Protections, and to be consistent with the broader Regional ASBS Workplan[4] which the City participated in. The Special Protections set forth requirements for two types of monitoring: core discharge monitoring and ocean receiving water monitoring. Core discharge monitoring

[2] State Water Resources Control Board (SWRCB). "Consideration of a proposed Resolution approving an exception to the California Ocean Plan for Selected Discharges into Areas of Special Biological Significance, including Special Protections to protect beneficial uses, and approving a program environmental impact report." SWRCB Board Meeting Session – Division of Water Quality, Agenda Item 6. October 18, 2011. Accessed December 14, 2016. http://www.waterboards.ca.gov/board_info/agendas/2011/oct/101811_6res.pdf.

[3] Winter of 2012-2013 was the first opportunity to conduct a regional monitoring program past the March 20, 2012 adoption of the General Exception and Special Protections. There were no storms successfully sampled by Malibu that year, or few by other agencies participating in the Bight '13 ASBS study. Sampling was continued into 2013-2014. On January 17, 2014, Governor Brown declared a Drought State of Emergency.

[4] Bight '13 ASBS Planning Committee. "Southern California Bight 2013 Regional Monitoring Survey: Areas of Special Biological Significance Workplan." December 24, 2014.

included collecting and analyzing wet weather discharges from private storm drain outfalls that discharge to ASBS 24 during storm events, and ocean receiving water monitoring included collecting and analyzing samples from the ocean before and after[5] a storm event at two locations. Receiving water monitoring included one sample site directly in front of the outfall and one reference site at the mouth of a stream in an undeveloped watershed intended to represent natural water quality. A map of the sample sites is shown on Figure 2. These are the same sample sites used in the Bight 2008 (Bight ’08) and Bight 2013 (Bight ’13) regional monitoring studies. Table 1 summarizes the characteristics and locations of the sites that were monitored during the 2015-2016 storm season.

This report presents an evaluation of the results from core discharge monitoring and ocean receiving water monitoring during the 2015-2016 storm season in combination with available data from prior storm events and reference site monitoring data. The reference site monitoring was completed by SCCWRP as part of the Southern California Bight ‘13 Regional Monitoring Survey, and included data from five sampling events during the 2008-2009 and 2013-2014 storm seasons from the City’s reference site at Nicholas Canyon[6]. The 2015-2016 monitoring includes ocean receiving water monitoring pre- and post-storm directly in front of the outfall. The core discharge site 24-BB-03Z and its linked ocean receiving water site 24-BB-03R were monitored for two storm events and the core discharge site 24-BB-03Z was monitored for one storm event. With the addition of these sampling events, the City surpassed the Special Protections requirement to monitor for three storm events with a total of four monitored storm events. As previously reported to the Water Board, although the City maintains ownership of the inlets for each of the storm drains monitored as part of core discharge monitoring, the ownership status of the outfalls is privately owned.

[5] Core samples for post-storm events are actually collected during the event, or within relatively few minutes of it ending. The outfalls drain a small area and cease to flow shortly after rain ends.

[6] Schiff, Kenneth and Jeff Brown. “South Coast Areas of Special Biological Significance Regional Monitoring Program Year 2 Results.” Southern California Coastal Water Research Project: Technical Report 852. February 2015. Accessed December 14, 2016. http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/852_SouthCoastASBS_FinalRep.pdf.

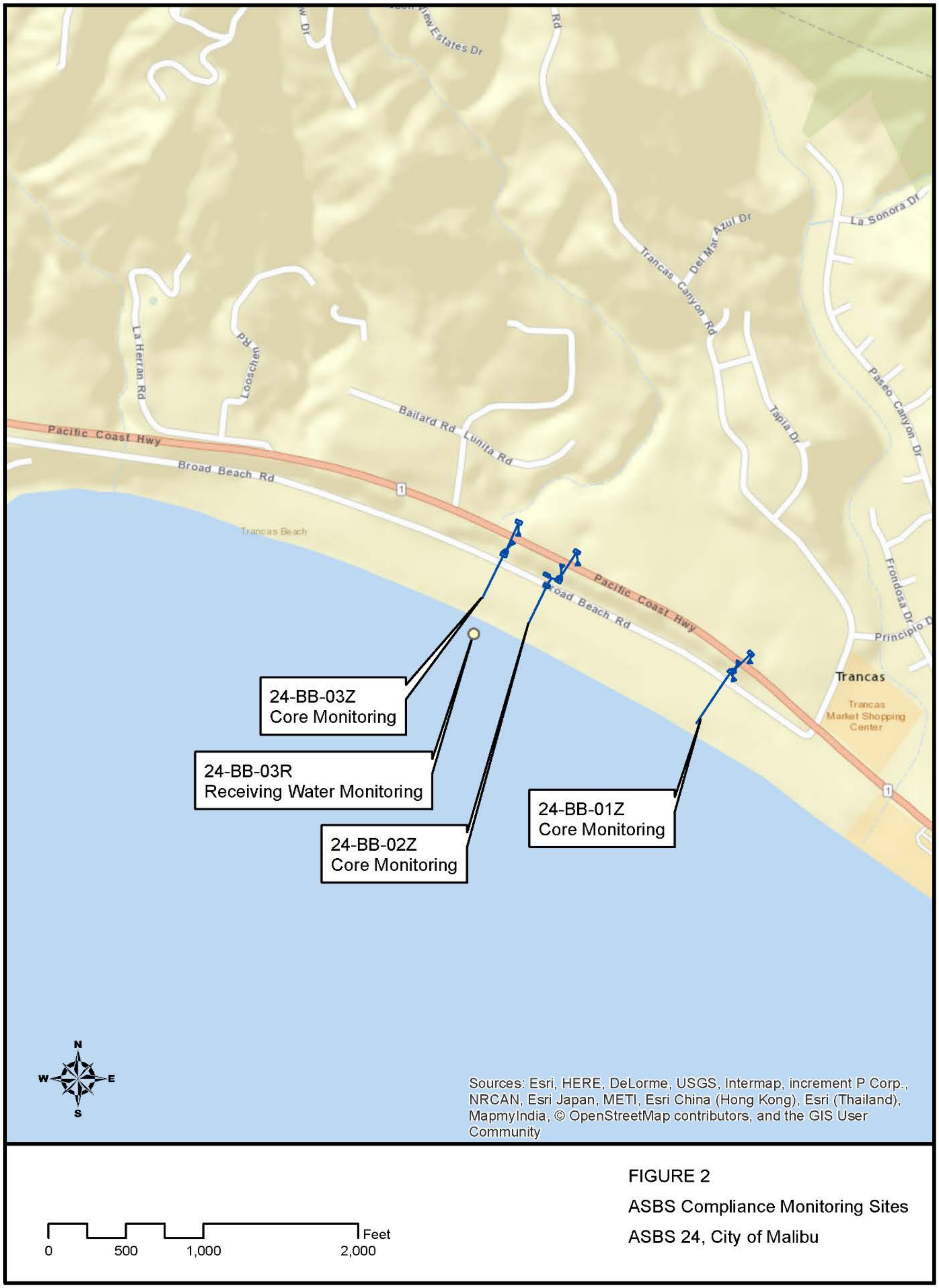


FIGURE 2

ASBS Compliance Monitoring Sites

ASBS 24, City of Malibu

According to guidance provided in the Special Protections, core discharge monitoring must include sampling for oil and grease and total suspended solids (TSS) at storm drain outfalls that are greater than 18 inches and less than 36 inches in diameter. None of the outfalls in the City's ASBS monitoring program are 36 inches or greater in diameter. If there are not any outfalls 36 inches or greater in diameter, then the Special Protections instruct that the storm drain outfall linked with the ocean receiving water site must be sampled for oil and grease, TSS, total metals, PAHs, pyrethroids, organophosphorus (OP) pesticides, ammonia, nitrate as N, and total phosphorus during each storm event. Additionally, the Special Protections require that chronic toxicity be measured during one storm event at each outfall. For the 2015-2016 storm season, outfall 24-BB-03Z with a 30" diameter was analyzed for the full list of constituents because it is the outfall linked with ocean receiving water site, while outfall 24-BB-02Z with a diameter of 18" was analyzed for oil and grease and TSS. The toxicity testing required for these outfalls was performed during the previous storm seasons, but the City chose to conduct additional toxicity analysis at 24-BB-03Z during the 2015-2016 storm season. As previously reported to the Water Board, although the City maintains ownership of the inlets for each of the storm drains monitored for toxicity as part of core discharge monitoring, the ownership status of the outfalls is privately owned.

As per the guidance in the Special Protections, ocean receiving water monitoring results representing conditions in the ASBS near major discharges are compared to natural or reference conditions prior to and immediately following a storm event. In the Bight '08 and Bight '13 Regional ASBS workplans, the concentrations of constituents observed at reference sites located at the mouths of streams in un-urbanized watersheds along the Southern California coast were used to define the range of "natural water quality". Input from the Natural Water Quality Committee further refined this approach by advising that a threshold level equivalent to the 85th percentile of reference site post-storm concentrations must be applied to eliminate uncertainty associated with outliers, thereby being more protective of water quality.[7]

The City's ocean receiving water monitoring included analysis of water chemistry, water toxicity and biological integrity. For the 2015-2016 storm season, ocean receiving water monitoring was conducted at site 24-BB-03R both prior to and during each storm event[8]. Ocean receiving water was analyzed both pre-storm and post-storm for the same constituents as the core discharge monitoring for the outfall linked to the receiving water site: oil and grease, TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate as N, and total phosphorus. Chronic toxicity

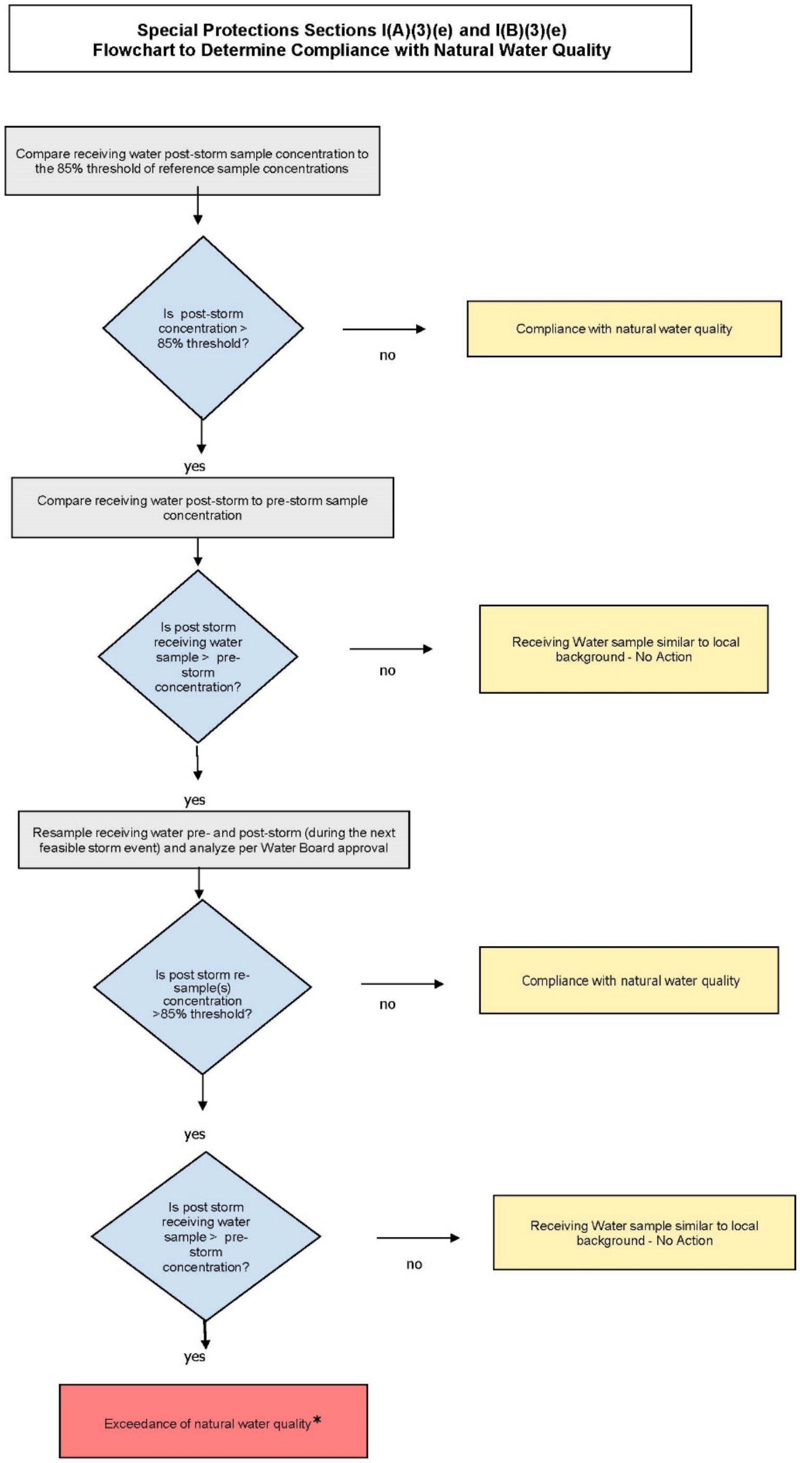
[7] Dickson, Andrew et al. "Summation of Findings Natural Water Quality Committee 2006-2009." Southern California Coastal Water Research Project: Technical Report 625. September 2010. Accessed December 2, 2016. ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/625_NWQC_FindingsSummary.pdf.

[8] Post-storm samples were collected during the storm events to ensure that stormwater discharge from the outfall was flowing into the receiving water. The City's ASBS outfalls drain small areas and will often cease to flow shortly after it stops raining, which prevents samplers from waiting until the storm stops to collect post-storm samples.

for three species (bivalve embryos, echinoderms, and kelp) was measured in one pre-storm sample and two post-storm samples.

The ocean receiving water monitoring results were then used to determine if natural water quality in the ASBS is being maintained. The process to determine compliance with natural water quality thresholds is depicted in the flowchart from the Special Protections (see Figure 3). The post-storm receiving water concentrations are compared to the pre-storm sample concentrations and the 85th percentile reference threshold for natural water quality determined by the Bight '08 and Bight '13 studies. If the post-storm concentration is greater than both the pre-storm concentration and the reference threshold, then the analyte is considered to cause or contribute to an alteration of natural ocean water quality in the ASBS, according to the Special Protections. If this condition occurs for the same analyte in two consecutive storms, including the one most recently sampled, then the Special Protections considers this an alteration of natural water quality and indicates that pollutant reductions may be necessary.

Pollutant reductions are required to result in discharge constituent concentrations below either the Table 1 Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the California Ocean Plan (COP) or a 90% reduction in pollutant loading during storm events for the applicant's total discharge. Constituents that are above the natural water quality threshold for the ASBS, and that also have an associated COP Table 1 Instantaneous Maximum WQO value, are compared with the Table 1 Instantaneous Maximum WQOs in order to determine the appropriate pollutant load reduction for compliance with the Special Protections.



*** 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.**

Figure 3. Natural Water Quality Flowchart

III. 2015-2016 Monitoring Results

The City conducted additional core discharge monitoring and ocean receiving water monitoring over two storm events during the 2015-2016 Storm Season. The first storm occurred on January 31, 2016 and the second storm occurred on March 11, 2016. Monitoring was successfully completed at the outfall and receiving water locations. The analyses performed for samples collected at each site are listed in Table 2.

A. Core Discharge Monitoring

Core discharge samples were collected from outfalls 24-BB-03Z and 24-BB-02Z during the storm events. Outfall 24-BB-01Z was not sampled because there was not sufficient flow during either storm. All of the core discharge sample sites are at outfalls with diameters between 18 and 36 inches. In accordance with the Special Protections, outfall 24-BB-02Z is sampled for oil and grease and TSS, while outfall 24-BB-03Z is affiliated with the receiving water sample site 24-BB-03R and is therefore sampled for oil and grease, TSS, total metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate as N, and total phosphorus.

The detected analyte concentrations from core discharge samples are shown in Table 3. When results were above the natural water quality threshold of the ASBS, and there is an associated COP Table 1 Instantaneous Maximum WQO, the post-storm sample result was compared with the Table 1 Instantaneous Maximum WQO in order to determine if pollutant load reduction is needed. If the constituent concentration is less than the COP Table 1 Instantaneous Maximum WQO, then additional BMPs are not required by the Special Protections.

January 31, 2016 Storm Event

During this storm event, 24-BB-02Z and 24-BB-03Z were successfully sampled. Copper was the only constituent with a concentration greater than the COP Table 1 Instantaneous Maximum WQO from the 24-BB-03Z sample. PAHs and pyrethroids were present in the sample, but there is not an instantaneous maximum value in the COP to compare these values to for reference.

March 11, 2016 Storm Event

During this storm event, 24-BB-03Z was successfully sampled. Outfall 24-BB-02Z was not sampled because stormwater did not flow from the outfall and reach the receiving water. None of the constituents were greater than the COP Table 1 Instantaneous Maximum WQOs.

PAHs and pyrethroids were present in the sample, but there is not an instantaneous maximum value in the COP to compare these values to for reference.

B. Ocean Receiving Water Monitoring

Ocean receiving water samples were collected at BB-24-03R in front of outfall BB-24-03Z during each of the storm events while stormwater runoff from the outfall was flowing into the receiving water. As per the Special Protections, constituent concentrations from ocean receiving water samples were compared to reference threshold concentrations, as defined by the 85th percentile of sample concentrations taken from reference sites in southern California during the Bight '08 and Bight '13 studies. A summary of the Receiving water analytical results for general chemistry, metals, PAHs, organophosphorus pesticides, and pyrethroid pesticides are presented in Tables 4, 5, 6, and 7, respectively. Aquatic toxicity results are presented in Tables 8 and 9.The full chemistry and aquatic toxicity reports are in Appendix A and Appendix B.

i. General Chemistry

January 31, 2016 Storm Event

General chemistry constituents included ammonia as N, nitrate as N, oil and grease, total orthophosphate as P, and TSS. The concentration of post-storm ammonia at 24-BB-03R was greater than the 85th percentile reference threshold, and slightly above the pre-storm concentration. Oil and grease and Nitrate as N concentrations were below the method detection limits (MDL). Orthophosphate as P had the same concentration in the pre-storm and post-storm samples, and was below the reference threshold. The TSS was a little higher in the pre-storm sample than the post-storm sample, and both values were well below the reference threshold.

March 11, 2016 Storm Event

The concentrations of ammonia as N and oil and grease were below the MDL. The pre-storm concentration of nitrate as N was double the post-storm concentration, and both were below the reference threshold. The post-storm concentration of orthophosphate as P was slightly above the pre-storm concentration and below the reference threshold. The post-storm TSS concentration was greater than the pre-storm concentration and below the reference threshold.

ii. Total Metals

January 1, 2016 Storm Event

In general, the post-storm metals concentrations in ocean receiving water samples at 24-BB-03R were either below the 85th percentile reference threshold or were below pre-storm concentrations. Selenium and silver were the only two metals with concentrations greater than the reference threshold and pre-storm samples. The concentrations for silver were close to one another with the 85th percentile threshold value at 0.08 µ/L, the pre-storm concentration 0.09 µ/L, and the post-storm concentration 0.10 µ/L.

March 11, 2016 Storm Event

Concentrations of arsenic, lead and selenium in the ocean receiving water samples at 24-BB-03R were above the 85th percentile reference threshold values. The pre-storm concentration of selenium was also greater than the 85th percentile reference threshold value. The concentration of silver was above the reference threshold, but the pre-storm concentration was greater than the post-storm concentration so the receiving water sample was similar to the local background concentration.

iii. Polynuclear Aromatic Hydrocarbons

Reference threshold concentrations for PAHs are expressed as totals for all individual PAH species combined. Calculated total PAH concentrations for the City's ocean receiving water monitoring are presented in Table 5.

January 1, 2016 Storm Event

The concentrations of PAHs from the January 31, 2016 post-storm sampling event were all below the MDL. Therefore, the total concentration of PAHs was not greater than the 85th percentile threshold value.

March 11, 2016 Storm Event

The calculated Total PAH concentrations for the pre-storm and post-storm samples both were greater than the 85th percentile reference threshold. The pre-storm sample concentration was greater than the post-storm sample concentration, so the post-storm receiving water sample was similar to the local background concentration.

iv. Organophosphorus Pesticides

Reference threshold concentrations for organophosphorus pesticides are expressed as totals for all individual species combined. Calculated total organophosphorus pesticide concentrations for the City's ocean receiving water monitoring are presented in Table 6.

January 31, 2016 Storm Event

The concentrations of pre-storm and post-storm organophosphorus pesticides from the January 31, 2016 sampling event were all below the MDL. Therefore, the total concentration of OP pesticides was not greater than the 85th percentile threshold value.

March 11, 2016 Storm Event

The concentrations of pre-storm and post-storm organophosphorus pesticides from the March 11, 2016 sampling event were all below the MDL. Therefore, the total concentration of OP pesticides did was not greater than the 85th percentile threshold value.

v. Pyrethroid Pesticides

Reference threshold concentrations for pyrethroid pesticides are expressed as totals for all individual species combined. Calculated total pyrethroid pesticide concentrations for the City's ocean receiving water monitoring are presented in Table 7.

January 31, 2016

The concentrations of pre-storm and post-storm pyrethroids from the January 31, 2016 sampling event were all below the detection limits. Therefore, the total concentration of pyrethroids was not greater than the 85th percentile threshold value.

March 11, 2016

Bifenthrin was the only pyrethroid with a concentration above the method detection limit, but below the reporting limit, in the post-storm sample collected from 24-BB-03Z on March 11, 2016. The concentration of Total PAHs remained below the 85th percentile reference threshold because the method detection limits for danitol (fenpropathrin), cis-permethrin and trans-permethrin decreased. The concentration for each of these pyrethroids was below the method detection limit, so half of the method detection limit was used, which was less than half of the method detection limit used in the Bight '13 study to establish the reference threshold.

vi. Aquatic Toxicity

Toxicity samples were collected during each storm event. Toxicity of ocean receiving water and the associated outfall 24-BB-03Z were tested for: Mytilis galloprovincialis (bivalve) development, Strongylocentrotus purpuratus (sea urchin) fertilization, and Macrocystis pyrifera (giant kelp) germination and growth. The toxicity results are presented in Table 8 and Table 9. The full toxicity reports for each storm event are provided in Appendix B.

In the aquatic toxicity testing results, no toxicity was observed for bivalve development, sea urchin fertilization, or giant kelp germination or growth in any of the samples taken from each monitored storm event during the 2014-2016 storm seasons. This is reflected in Table 8 which shows each result was greater than the evaluation threshold (80% of the control sample), and in Table 9 which shows the no observed effect concentration (NOEC) values of 100% for each of the bioassay tests for every sample taken.

IV. Determination of Compliance with Natural Water Quality Limits

The Compliance Plan sets forth natural water quality limits as criteria for compliance with requirements of the Special Protections. Compliance with these criteria for maintaining natural water quality was assessed by comparing post-storm receiving water data to the pre-storm data from the same site and to the 85th percentile reference threshold as shown in the flow chart depicted in Attachment 1 of the Special Protections (Figure 3). In order to comply with natural water quality criteria, the post-storm concentration must be equal to or less than the 85th percentile reference threshold, or the pre-storm concentration must be greater than the post-storm concentration (in the latter case the receiving water sample is considered similar to local background conditions). As per the flow chart, an exceedance of natural water quality criteria occurs when the post-storm concentration is greater than the 85th percentile, greater than the pre-storm concentration, and this occurs on two consecutive storm events, including the most recent sampling event.

Following the steps outlined in Attachment 1 of the Special Protections (Figure 3), Tables 10, 11, 12 and 13 present an evaluation of the monitoring data with respect to compliance with natural water quality criteria at receiving water sample site 24-BB-03R. Table 10 first compares the receiving water post-storm sample concentration to the 85th percentile threshold for natural water quality and denotes whether the post-storm sample concentration is greater than the threshold. The constituents with concentrations greater than the reference threshold are carried over into Table 11 where the post-storm concentrations are compared to the pre-storm concentrations. If the pre-storm sample concentration is greater than the post-storm sample concentration result, the post-storm sample is considered similar to local background and therefore does not require any action. If the post-storm sample concentration is greater than the pre-storm sample concentration, then the sequence of results shown in Table 12 and Table 13 is used to determine if this condition occurred during two consecutive storm events, including the most recent storm event, and therefore indicates an alteration of natural water quality criteria as defined by the Special Protections.

Selenium was the only constituent where the concentrations of receiving water samples were higher than the reference threshold for natural water quality (pre- and post-storm at 24-BB-03R). Although the detected concentrations of selenium were greater than the reference threshold, the receiving water sample concentration was four orders of magnitude below the COP Table 1 Instantaneous Maximum WQO value established for the protection of marine aquatic life (see Table 14). The outfall concentration at 24-BB-03Z was three orders of magnitude below the COP Table 1 Instantaneous Maximum WQO value for Selenium. The discussion below provides additional consideration of these results with respect to requirements of the Special Protections.

V. Discussion

The Special Protections state that the ASBS Compliance Plan shall describe how the necessary pollutant reductions in stormwater runoff will be achieved through prioritization of outfalls and implementation of BMPs to achieve end-of-pipe pollutant concentrations targets during a design storm. Pollutant reductions are required to result in discharge constituent concentrations below either the Table 1 Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the California Ocean Plan (COP) or a 90% reduction in pollutant loading during storm events for the applicant's total discharge.

For the City's ASBS 24 monitoring results, when the receiving water constituent concentrations exceeded the natural water quality reference threshold (85th percentile), and had an associated COP Table 1 Instantaneous Maximum WQO, the post-storm sample concentration was compared with the Table 1 Instantaneous Maximum WQO in order to determine the appropriate pollutant load reduction to meet the requirements of the Special Protections. The post-storm receiving water selenium concentration at 24-BB-03R exceeded the reference threshold for natural water quality. As such, the Special Protections (Section I.A.2.h) require submittal of a report that describes BMPs that are currently being implemented, BMPs that are identified for future implementation, and any additional BMPs that may be added to address the alteration of natural water quality. This report, along with information contained in the Compliance Plan, is intended to fulfill this requirement.

Prior to adoption of the ASBS General Exception and the Special Protections, and despite having no data that indicate pollutant reductions would be needed, in 2011 the City of Malibu obtained two Proposition 84 grant awards from the Water Board to proactively design and install BMPs at designated priority inlets owned by the City adjacent to the ASBS on Broad Beach Road and Wildlife Road, and to conduct an education and outreach program to increase public understanding of ASBS 24. Information about those two projects and the outreach program were among the BMPs and actions included in the Compliance Plan and Pollution Prevention Plan. Construction of the Broad Beach Road and Wildlife Road BMPs was completed in July 2015 and the City has continued promoting the outreach campaign.

The City, County of Los Angeles, and Los Angeles County Flood Control District jointly submitted an ASBS Compliance Plan and an ASBS Pollution Prevention Plan to the Water Board in accordance with the Special Protections that describe existing BMPs, BMPs to be employed in the future, and other actions by the agencies to protect and maintain natural water quality in ASBS 24 from point and non-point sources of pollution. Water quality data that was available at the time those plans were developed was taken into consideration, including updated data during the September 2015 revised Compliance Plan.

As the City BMPs described above have already been installed, and the outfall selenium concentration measured at 24-BB-03Z was less than the COP Table 1 Instantaneous Maximum WQO, the need for additional BMPs is not indicated. Furthermore, in consideration of relevant environmental factors discussed below, along with the City's ongoing implementation of the ASBS Compliance Plan and an ASBS Pollution Prevention Plan, the pollutant reduction requirements of the Special Protections (Section I.A.2.h) do not warrant the need for the City to develop additional BMPs.

A. Selenium Occurrence

Selenium was the only constituent for which monitoring results indicated the need for further consideration under Section I.A.2.h of the Special Protections. Selenium is a naturally occurring element found in sedimentary rocks, shales, coal and phosphate deposits and soils. There are around 40 rare known selenium-containing minerals, and they generally occur with sulfides of metals such as copper, zinc and lead. It often occurs in water due to natural sources like weathering and erosion. [9] Known anthropogenic sources generally include mining, coal-fired

[9] Environmental Protection Agency (EPA). "Aquatic Life Criterion – Selenium." Accessed December 7, 2016. https://www.epa.gov/wqc/aquatic-life-criterion-selenium.

power plants, and irrigated agriculture. There are no mines or power plants in Malibu. Further, with the exception of limited small vineyards and agriculturally zoned residential properties, there is not significant irrigated agriculture in Malibu, and certainly not in the nearshore vicinity or tributary to where these samples were taken. Therefore, sources of selenium offshore and in the nearshore environment are predominantly natural in origin.

Selenium is found in high concentrations in the Monterey/Modelo Formation.[10] The Monterey Formation is one of California's most important petroleum source rocks, with large offshore and onshore oil and gas deposits throughout the state. It is also a source of potentially hazardous levels of trace metals according to the US Geological Survey's Water Resources Division. "Elements that are highly positively correlated (r2> 0.75) with organic carbon in these rocks include chromium, copper, nickel, antimony, selenium, uranium, vanadium, and zinc."[11] This Miocene-age marine sedimentary formation runs in an east-west band from Santa Barbara to Orange County, with major exposures in the upper Ventura, Santa Clara, Los Angeles and Santa Ana river basins, as documented in a technical report prepared by the Las Virgenes Municipal Water District.[12] That report showed that selenium and many metals are found to be unusually high in both surface and groundwater in the Malibu Creek Watershed as a result of the Monterey/Modelo Formation. In addition to the Malibu Creek Watershed, there are several large deposits of this formation throughout the Santa Monica Mountains and at the headwaters of the coastal streams that outlet at the ocean in Malibu as shown in maps from the USGS (http://pubs.usgs.gov/of/2005/1019/ and http://pubs.usgs.gov/of/2005/1019/la1_map.pdf). The Monterey/Modelo Formation has extensive surface expressions in the study area (Zuma Beach and Point Dume), and may be a natural source for selenium found in receiving water samples.

B. Selenium Toxicity

SCCWRP calculated the 85th percentile reference threshold for selenium from the Bight '08 and Bight '13 data. In the reference data set, many of the selenium concentration values were below the method detection limit (MDL). SCCWRP used the value of half of the MDL for samples below the MDL, which led to the 85th percentile reference threshold for selenium also being set at half of the MDL, 0.0025 µg/L. As a result, any receiving water sample with a detectable amount of selenium will be greater than the 85th percentile reference threshold. The receiving water sampling results include detectable levels of selenium, and therefore concentrations greater than the 85th percentile reference threshold were observed. As mentioned above, the post-storm sample concentration was greater than the pre-storm sample concentration for two consecutive storm events, including the most recent. Given the reference threshold was set at half of the MDL, it is not surprising that the concentration of selenium found in the receiving water samples

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[10] Local exposures of the Monterey Formation in the Santa Monica Mountains are also known as the Modelo Formation.

[11] Keller, M.A., and Evans, K.J. "Hazardous Trace Element in Petroleum Source Rocks." U.S. Geological Survey 2002. Accessed July 14, 2010. http://geomaps.wr.usgs.gov/env/monterey.html.

[12] Orton, R., Dougal, J., and Gamble J. "Water quality in the Malibu Creek Watershed, 1971 – 2010: Existing conditions, historical trends and data inter-relationships." Las Virgenes Municipal Water District Report No. 2475.00. June 13, 2012. Accessed December 7, 2016. http://www.lvmwd.com/i-want-to/read/water-quality-in-the-malibu-creek-watershed.

was greater than this threshold in both pre-storm and post-storm samples for the four storm events sampled. However, the selenium concentration consistently remained four orders of magnitude below the COP Table 1 Instantaneous Maximum WQO and, with a naturally occurring selenium source as explained above, this concentration is not considered to be indicative of significantly altered natural water quality.

Additionally, the Federal Environmental Protection Agency (EPA) issued recommended selenium criteria for aquatic life toxicity in July 2016. The latest scientific information from EPA's findings indicates that selenium toxicity to aquatic life is based on organisms consuming selenium contaminated food, and not as a result of direct exposure to selenium dissolved in water.[13] Selenium bioaccumulates in the food chain and toxicity in fish occurs primarily through maternal transfer to the eggs. Therefore, they recommend that fish tissue samples take precedence over water samples for determining toxicity. EPA did, however, translate the criteria to a 30-day average water quality criteria to determine situations where elevated levels of selenium could result in bioaccumulation with potentially chronic effects to fish. The criteria are included in Appendix C to this report. The measured selenium concentrations post-storm event on March 11, 2016 at the outfall (0.198 µg/L) and receiving water (pre-storm: 0.01 µg/L, post-storm: 0.021 µg/L) were compared to EPA's recommended criteria, and these concentrations were far below the chronic exposure 30-day average (Lentic[14]: 1.5 µg/L, Lotic[15]: 3.1 µg/L). Additionally, the monitored outfall (24-BB-03Z) is not continuously flowing, and so the receiving water 30 day average selenium concentration attributable to the outfall, relative to the post-storm selenium concentration of 0.198 µg/L, would be very small in comparison to EPA's recommended criteria.

C. Bight '13 Study

The South Coast Areas of Special Biological Significance Regional Monitoring Program Year 2 Results final report prepared as part of the SCCWRP Bight '13 program found that "Based on the data reported in this study, water quality in southern California ASBS was generally comparable to natural water quality following storm events. On average, the range of post-storm pollutant concentrations in receiving waters sampled near ASBS discharge sites were not significantly different from post-storm concentrations at reference drainage sites, which included stormwater inputs free of (or minimally influenced by) anthropogenic sources ." Based on these findings, no significant anthropogenic impacts to natural water quality locally in ASBS 24 are expected.

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[13] Environmental Protection Agency (EPA). "Recommended Aquatic Life Ambient Water Quality for Selenium in Freshwater." Document No. 2016-16585. July 13, 2016. Accessed December 7, 2016. https://www.federalregister.gov/documents/2016/07/13/2016-16585/recommended-aquatic-life-ambient-water-quality-criterion-for-selenium-in-freshwater.

[14] Lentic, pertaining to organisms or habitats, means inhabiting or situated in still, fresh water.

[15] Lotic, pertaining to organisms or habitats, means inhabiting or situated in a rapidly moving fresh water.

VI. Summary and Conclusion

The City completed additional ASBS core discharge monitoring and ocean receiving water monitoring during the 2015-2016 storm season as requested by the Water Board. The City surpassed the minimum required monitoring of three storm events by sampling a total of four storm events during 2014 and 2016. The additional monitoring data collected during the 2015-2016 storm season allowed the City to more fully understand any potential water quality impacts from stormwater runoff to the ocean receiving water in ASBS 24 and assess whether natural water quality is being maintained as defined in the Special Protections.

The Special Protections require that if the results of the receiving water monitoring indicates that stormwater runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger must submit a report to the State Water Board and Regional Water Board that identifies the constituents in stormwater runoff that alter natural ocean water quality and the sources of these constituents. Additionally, the report shall describe BMPs that are currently being implemented, BMPs that are identified for future implementation, and any additional BMPs to address the alteration of natural water quality, including an implementation schedule. This report, along with the Compliance Plan, is intended to fulfill these requirements.

Aquatic toxicity testing results indicated no toxicity to bivalve development, sea urchin fertilization, or giant kelp germination or growth was observed in receiving water nor outfall samples from any of the four monitored storm events. For all other aspects of the City's Core Discharge and Receiving Water monitoring, except for selenium, no constituents were found at concentrations above the reference thresholds used to indicate an alternation of natural water quality in ASBS 24.

Water quality in ASBS 24 is being maintained in accordance with requirements of the Special Protections. Selenium was the only constituent for which receiving water sample concentrations exceeded the reference threshold for natural water quality. With the City's existing BMPs having already been installed, and with the outfall selenium concentration measured at 24-BB-03Z being less than the COP Table 1 Instantaneous Maximum WQO, the need for additional BMPs is not indicated. Also, because the selenium concentrations observed are likely derived from natural sources, and the results in both receiving water and from the outfall were well below the COP instantaneous maximum and the EPA's recommended criteria for aquatic life toxicity, no new BMPs or modifications to the Compliance Plan are considered necessary.

Evaluation of the ASBS Core Discharge and Receiving Water monitoring results according to criteria set forth in the Special Protections and Compliance Plan, along with other lines of evidence discussed herein, indicate that the City's efforts to control the discharge of pollutants, as detailed in the Compliance Plan and Pollution Prevention Plan, are effective at protecting natural water quality. The City of Malibu is a recognized leader in its proactive approach to protecting the environment and its water quality programs. The City will continue to comply with the General Exception and implement the requirements of the Special Protections.

Literature Cited

Bight '13 ASBS Planning Committee. "Southern California Bight 2013 Regional Monitoring Survey: Areas of Special Biological Significance Workplan." December 24, 2014.

Dickson, Andrew et al. "Summation of Findings Natural Water Quality Committee 2006-2009." Southern California Coastal Water Research Project: Technical Report 625. September 2010. Accessed December 2, 2016. ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/625_NWQC_FindingsSummary.pdf.

Environmental Protection Agency (EPA). "Recommended Aquatic Life Ambient Water Quality for Selenium in Freshwater." Document No. 2016-16585. July 13, 2016. Accessed December 7, 2016. https://www.federalregister.gov/documents/2016/07/13/2016-16585/recommended-aquatic-life-ambient-water-quality-criterion-for-selenium-in-freshwater.

Environmental Protection Agency (EPA). "Aquatic Life Criterion – Selenium." Accessed December 7, 2016. https://www.epa.gov/wqc/aquatic-life-criterion-selenium.

Keller, M.A., and Evans, K.J. "Hazardous Trace Element in Petroleum Source Rocks." U.S. Geological Survey 2002. Accessed July 14, 2010. http://geomaps.wr.usgs.gov/env/monterey.html.

Orton, R., Dougal, J., and Gamble J. "Water quality in the Malibu Creek Watershed, 1971 – 2010: Existing conditions, historical trends and data inter-relationships." Las Virgenes Municipal Water District Report No. 2475.00. June 13, 2012. Accessed December 7, 2016. http://www.lvmwd.com/i-want-to/read/water-quality-in-the-malibu-creek-watershed.

Schiff, Kenneth and Jeff Brown. "South Coast Areas of Special Biological Significance Regional Monitoring Program Year 2 Results." Southern California Coastal Water Research Project: Technical Report 852. February 2015. Accessed December 14, 2016. http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/852_SouthCoastASBS_FinalRep.pdf.

State Water Resources Control Board (SWRCB). "Consideration of a proposed Resolution approving an exception to the California Ocean Plan for Selected Discharges into Areas of Special Biological Significance, including Special Protections to protect beneficial uses, and approving a program environmental impact report." SWRCB Board Meeting Session – Division of Water Quality, Agenda Item 6. October 18, 2011. Accessed December 14, 2016. http://www.waterboards.ca.gov/board_info/agendas/2011/oct/101811_6res.pdf.

ASBS Report Tables

Table 1.
Monitoring Program Sites, Outfall Dimensions and Analysis Completed for the 2015-2016 Wet Weather Season

Monitoring Type	Beach Location	Site Name	Location Latitude	Location Longitude	Pipe Diameter (inches)	Chemical Analysis and Number of Storms Tested	Toxicity Testing and Number of Storms Tested
Core Monitoring	Broad Beach	24-BB-02Z	34.03302	-118.84988	18	Oil/Grease & TSS 1 storm	None
	Broad Beach	24-BB-03Z	34.0334	-118.85082	30	Full List* 2 storms	3 species** 1 storm
Receiving Water Monitoring	Broad Beach	24-BB-03Z	34.0328	-118.85128	N/A	Full List* 2 storms	3 species** 2 storm

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

Table 2.
Summary of Core Discharge and Ocean Receiving Water Sample Collection

Event	Sample Location	Outfall or Receiving Water	Storm Event 1		Storm Event 2		Storm Event 3		Storm Event 4	
			28-Feb-14		2-Dec-14		31-Jan-16		11-Mar-16	
			Chem	Tox	Chem	Tox	Chem	Tox	Chem	Tox
Pre-Storm	24-BB-03R	Receiving Water	x	x	x		x	x	x	
Post-Storm	24-BB-03R	Receiving Water	x	x	x	x	x	x	x	x
	24-BB-03Z	Outfall	x	x	x	x	x	x	x	
	24-BB-02Z	Outfall	x	x	x		x			

Table 3.
Summary of Core Discharge Results from 2014-2016 Monitored Storm Events

Analyte		Units	Outfall Post-Storm Concentrations						
			Storm Event 4	Storm Event 3		Storm Event 2		Storm Event 1	
			24-BB-03Z	24-BB-03Z	24-BB-02Z	24-BB-03Z	24-BB-02Z	24-BB-03Z	24-BB-02Z
			3/11/16	1/31/16	1/31/16	12/2/14	12/2/14	2/28/14	2/28/14
General Chemistry									
	Ammonia as N	mg/L	0.78	0.82	--	0.76	--	0.47	--
	Nitrate as N	mg/L	0.94	0.76	--	0.52	--	0.2	--
	Oil & Grease	mg/L	1.7	3	2.4	2.2	<1	<1	<1
	Total Orthophosphate as P	mg/L	0.19	0.13	--	0.31	--	0.34	--
	Total Suspended Solids	mg/L	211.4	62.6	21.1	480	555	393	82.8
Metals									
	Total Arsenic	µg/L	6.203	1.507	--	3.6	--	2.598	--
	Total Cadmium	µg/L	0.4005	0.1785	--	0.9106	--	0.5776	--
	Total Chromium	µg/L	13.9122	5.3697	--	14.335	--	22.759	--
	Total Copper	µg/L	28.952	39.649	--	43.64	--	28.435	--
	Total Lead	µg/L	11.2257	4.5642	--	18.316	--	16.33	--
	Total Mercury	µg/L	0.0224	<0.0012	--	<0.0012	--	<0.0012	--
	Total Nickel	µg/L	10.8771	6.2599	--	15.933	--	11.947	--
	Total Selenium	µg/L	0.198	0.132	--	0.304	--	0.099	--
	Total Silver	µg/L	<0.01	<0.01	--	0.1	--	0.02	--
	Total Zinc	µg/L	112.326	179.33	--	154.32	--	177.77	--
Organophosphorus Pesticides									
	None detected								
Polynuclear Aromatic Hydrocarbons									
	Acenaphthene	ng/L	<1	5.6	--	4 J	--	<1	--
	Acenaphthylene	ng/L	1.4 J	3.2 J	--	<1	--	5.3	--
	Anthracene	ng/L	7.3	<1	--	<1	--	19.3	--
	Benz(a)anthracene	ng/L	4.8 J	6.5	--	15	--	127.5	--
	Benzo(a)pyrene	ng/L	5.1	6.2	--	16.3	--	160.5	--
	Benzo(b)fluoranthene	ng/L	16.1	20.3	--	28.4	--	292.5	--
	Benzo(e)pyrene	ng/L	16.8	15.8	--	46.3	--	248.1	--
	Benzo(g,h,i)perylene	ng/L	15.5	15.7	--	35.2	--	141.1	--
	Benzo(k)fluoranthene	ng/L	3.7 J	3.5 J	--	17.4	--	138.4	--
	Biphenyl	ng/L	2.8 J	9.6	--	8.5	--	3.8 J	--
	Chrysene	ng/L	29.7	31.7	--	69.2	--	300	--
	Dibenz(a,h)anthracene	ng/L	<1	<1	--	<1	--	38	--
	Dibenzothiophene	ng/L	7.5	13.9	--	21.5	--	<1	--
	Dimethylnaphthalene, 2,6-	ng/L	1.1 J	1.8 J	--	10.1	--	3.4 J	--
	Fluoranthene	ng/L	23.9	21	--	47.5	--	210.7	--
	Fluorene	ng/L	1.2 J	<1	--	4.1 J	--	<1	--
	Indeno(1,2,3-c,d)pyrene	ng/L	5.7	5.2	--	<1	--	114.8	--
	Methylnaphthalene, 1-	ng/L	<1	2.6 J	--	10.2	--	3.4 J	--
	Methylnaphthalene, 2-	ng/L	1.7 J	1.9 J	--	9.2	--	5.3	--
	Methylphenanthrene, 1-	ng/L	30.2	7.7	--	8	--	14.9	--
	Naphthalene	ng/L	3.1 J	10.7	--	14.1	--	19.1	--
	Perylene	ng/L	11.1	6.3	--	33.7	--	43.4	--
	Phenanthrene	ng/L	14.8	14.6	--	33.9	--	86.5	--
	Pyrene	ng/L	27.3	26.8	--	65.2	--	209.2	--
	Trimethylnaphthalene, 2,3,5-	ng/L	<1	<1	--	35.3	--	<1	--
Pyrethroid Pesticides									
	Bifenthrin	ng/L	92.5	32.7	--	34.5	--	31.6	--
	Cyfluthrin	ng/L	<0.5	11.1	--	<0.5	--	44.6	--
	Danitol (Fenpropathrin)	ng/L	<0.5	12.4	--	<0.5	--	<0.5	--
	Esfenvalerate	ng/L	<0.5	6.5	--	<0.5	--	<0.5	--
	Fenvalerate	ng/L	<0.5	7.3	--	<0.5	--	<0.5	--
	Fluvalinate	ng/L	<0.5	6.2	--	<0.5	--	<0.5	--

J - The analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
< - result is less than the method detection limit
-- - not analyzed

Table 4.

Summary of Ocean Receiving Water Results for General Chemistry and Metals from Monitored Storm Events during the 2014-2016 Storm Seasons

Analyte		Units	24-BB-03R Pre-Storm 2/26/2014	24-BB-03R Post-Storm 2/28/2014	24-BB-03R Pre-Storm 12/1/2014	24-BB-03R Post-Storm 12/2/2014	24-BB-03R Pre-Storm 1/30/2016	24-BB-03R Post-Storm 1/31/2016	24-BB-03R Pre-Storm 3/10/2016	24-BB-03R Post-Storm 3/11/2016
General Chemistry										
	Ammonia as N	mg/L	<0.02	<0.02	<0.02	0.19	0.03	0.04	<0.02	<0.02
	Nitrate as N	mg/L	0.04	<0.01	0.03	0.02	<0.01	<0.01	0.1	0.05
	Oil & Grease	mg/L	<1	<1	<1	<1	<1	<1	<1	<1
	Total Orthophosphate as P	mg/L	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04
	Total Suspended Solids	mg/L	10.8	7.1	16.3	4.7	6.9	6.3	4.4	12.3
Metals										
	Arsenic	µg/L	1.388	1.322	1.321	1.387	1.537	1.616	1.575	2.607
	Cadmium	µg/L	0.0152	0.022	0.0257	0.0168	0.0162	0.0271	0.0294	0.0393
	Chromium	µg/L	1.4705	0.6962	0.5345	0.2928	0.6169	0.486	0.2519	1.092
	Copper	µg/L	0.167	0.646	0.577	0.317	0.33	0.559	0.239	1.011
	Lead	µg/L	<0.0025	0.2159	0.3221	0.2596	0.0836	0.112	0.0575	0.6868
	Mercury	µg/L	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012
	Nickel	µg/L	0.2951	0.4901	0.6118	0.2955	0.4617	0.4145	0.397	0.715
	Selenium	µg/L	0.012	0.026	<0.005	0.01	0.008	0.015	0.01	0.021
	Silver	µg/L	0.14	0.12	0.07	0.12	0.09	0.1	0.1	0.09
	Zinc	µg/L	2.9144	17.3532	6.6948	7.0005	4.0212	1.7625	2.1802	6.4486

< - Result is less than the method detection limit

J - Anaylte was detected at a concentration below the reporting limit. Reported value is estimated.

Table 5.
Calculated Total PAHs in Receiving Water Samples

Polynuclear Aromatic Hydrocarbons (PAHs)	Units	Method Detection Limit	Reporting Limit	Storm Event 4		Storm Event 3		Storm Event 2		Storm Event 1	
				24-BB-03R Pre-Storm 3/10/2016	24-BB-03R Post-Storm 3/11/2016	24-BB-03R Pre-Storm 1/30/2016	24-BB-03R Post-Storm 1/31/2016	24-BB-03R Pre-Storm 12/1/2014	24-BB-03R Post-Storm 12/2/2014	24-BB-03R Pre-Storm 2/26/2014	24-BB-03R Post-Storm 2/28/2014
Acenaphthene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Acenaphthylene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Anthracene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Benz(a)anthracene	ng/L	1	5	1.5 J	1.5 J	0.5 H	0.5 H	1.5 J	1.3 J	0.5 H	0.5 H
Benzo(a)pyrene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Benzo(b)fluoranthene	ng/L	1	5	22.5	5.5	0.5 H	0.5 H	1.6 J	0.5 H	0.5 H	0.5 H
Benzo(e)pyrene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	4.9 J	0.5 H	0.5 H	0.5 H
Benzo(g,h,i)perylene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Benzo(k)fluoranthene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Biphenyl	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Chrysene	ng/L	1	5	0.5 H	1.6 J	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Dibenz(a,h)anthracene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Dibenzothiophene	ng/L	1	5	0.5 H	1.6 J	0.5 H	0.5 H	2.2 J	2.1 J	0.5 H	0.5 H
Dimethylnaphthalene, 2,6-	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	2 J	3.8 J	2.6 J	1.8 J
Fluoranthene	ng/L	1	5	0.5 H	1.2 J	0.5 H	0.5 H	1.1 J	1.9 J	0.5 H	0.5 H
Fluorene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	1.2 J	0.5 H	0.5 H	0.5 H
Indeno(1,2,3-c,d)pyrene	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Methylnaphthalene, 1-	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	1.1 J	1.1 J	0.5 H	0.5 H
Methylnaphthalene, 2-	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	1.3 J	1.2 J	1.4 J	1.3 J
Methylphenanthrene, 1-	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Naphthalene	ng/L	1	5	0.5 H	1.5 J	0.5 H	0.5 H	2.9 J	3 J	2.3 J	2.4 J
Perylene	ng/L	1	5	0.5 H	0.5 H	1 J	0.5 H	19.3	21.9	0.5 H	1.8 H
Phenanthrene	ng/L	1	5	1.7 J	1.9 J	0.5 H	0.5 H	2.2 J	2.6 J	2.4 J	1.5 J
Pyrene	ng/L	1	5	0.5 H	1.3 J	0.5 H	0.5 H	0.5 H	2.5 J	0.5 H	0.5 H
Trimethylnaphthalene, 2,3,5-	ng/L	1	5	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5
Total PAHs	ng/L			36.7	24.6	13	12.5	47.8	48.9	19.2	18.8

H - The chemical concentration was below the method detection limit, so the value of half of the method detection limit was used (i.e. ND = 1/2MDL).
J - The chemical was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Total PAHs were calculated 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. J-flagged values were used as reported.

Table 6.
Calculated Total Organophosphorus Pesticides in Receiving Water Samples

Organophosphorus Pesticides	Units	Method Detection Limit	Reporting Limit	Storm Event 4		Storm Event 3		Storm Event 2		Storm Event 1	
				24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm
				3/10/2016	3/11/2016	1/30/2016	1/31/2016	12/1/2014	12/2/2014	2/26/2014	2/28/2014
Chlorpyrifos	ng/L	0.5	1	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Diazinon	ng/L	0.5	1	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Ethoprop (Ethoprofos)	ng/L	1	2	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Fenchlorphos (Ronnel)	ng/L	2	4	1 H	1 H	1 H	1 H	1 H	1 H	1 H	1 H
Malathion	ng/L	3	6	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H
Methyl parathion	ng/L	1	2	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Tokuthion	ng/L	3	6	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H	1.5 H
Trichloronate	ng/L	1	2	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H	0.5 H
Total Organophosphorus Pesticides	ng/L			6	6	6	6	6	6	6	6

H - The chemical concentration was below the method detection limit, so the value of half of the method detection limit was used (i.e. ND = 1/2MDL).
J - The chemical was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Total Organophosphorus Pesticides were calculated 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. J-flagged values were used as reported.

Table 7.
Calculated Total Pyrethroid Pesticides in Receiving Water Samples

Pyrethroid Pesticides	Units	Method Detection Limit	Reporting Limit	Storm Event 4		Storm Event 3		Storm Event 2		Storm Event 1	
				24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm	24-BB-03R Pre-Storm	24-BB-03R Post-Storm
				3/10/2016	3/11/2016	1/30/2016	1/31/2016	12/1/2014	12/2/2014	2/26/2014	2/28/2014
Bifenthrin	ng/L	0.5	2	0.25 H	1 J	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Cyfluthrin	ng/L	0.5	2	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Cyhalothrin, Total Lambda	ng/L	0.5	2	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Cypermethrin	ng/L	0.5	2	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Danitol (Fenpropathrin)	ng/L	0.5/0.3 [1]	2	0.15 H	0.15 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Deltamethrin/Tralomethrin	ng/L	0.5	2	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Esfenvalerate/Fenvalerate, total	ng/L	0.5	2	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H	0.25 H
Permethrin, cis-	ng/L	5/2 [2]	10/4 [3]	1 H	1 H	2.5 H	2.5 H	2.5 H	2.5 H	2.5 H	2.5 H
Permethrin, trans-	ng/L	5/1 [4]	10/2 [5]	0.5 H	0.5 H	2.5 H	2.5 H	2.5 H	2.5 H	2.5 H	2.5 H
Total Pyrethroid Pesticides	ng/L			3.15	3.9	6.75	6.75	6.75	6.75	6.75	6.75

H - The chemical concentration was below the method detection limit, so the value of half of the method detection limit was used (i.e. ND = 1/2MDL).
J - The chemical was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
[1] The MDL for Danitol was 0.5ng/L for Storm Events 1-3 and 0.3ng/L for Storm Event 4
[2] The MDL for Permethrin, cis- was 5ng/L for Storm Events 1-3 and 2ng/L for Storm Event 4
[3] The RL for Permethrin, cis was 10ng/L for Storm Events 1-3 and 4ng/L for Storm Event 4
[4] The MDL for Permethrin, trans- was 5ng/L for Storm Events 1-3 and 1ng/L for Storm Event 4
[5] The RL for Permethrin, trans- was 10ng/L for Storm Events 1-3 and 2ng/L for Storm Event 4

Total Pyrethroid Pesticides were calculated 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. J-flagged values were used as reported.

Table 8.
Toxicity Results from 2014-2016 Monitored Storm Events

Sample Date	Storm Event	Station ID	Organism	Analyte	Mean	Significant Effect
3/11/2016	Post-Storm	24-BB-03R	Macrocystis pyrifera	Germination (%)	93.4	NSG
				Growth (length, mm)	0.01448	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	97.74	NSG
			Strongylocentrotus purpuratus	Fertilization	95	NSG
1/30/2016	Pre-Storm	24-BB-03R	Macrocystis pyrifera	Germination (%)	91.9	NSG
				Growth (length, mm)	0.01455	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	95.64	NSG
			Strongylocentrotus purpuratus	Fertilization	93	NSG
1/31/2016	Post-Storm	24-BB-03Z	Macrocystis pyrifera	Germination (%)	94.3	NSG
				Growth (length, mm)	0.0145	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	93.44	NSG
			Strongylocentrotus purpuratus	Fertilization	100	NSG
		24-BB-03R	Macrocystis pyrifera	Germination (%)	93.4	NSG
				Growth (length, mm)	0.01437	SG
			Mytilis galloprovincialis	Mortality/Normality (%)	93.04	NSG
			Strongylocentrotus purpuratus	Fertilization	100	NSG
12/2/2014	Post-Storm	24-BB-03Z	Macrocystis pyrifera	Germination (%)	91.6	NSG
				Growth (length, mm)	0.016	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	96.5	NSG
			Strongylocentrotus purpuratus	Fertilization	96.5	NSG
		24-BB-03R	Macrocystis pyrifera	Germination (%)	91.8	NSG
				Growth (length, mm)	0.01612	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	96.2	NSG
			Strongylocentrotus purpuratus	Fertilization	96.5	NSG
2/26/2014	Pre-Storm	24-BB-03R	Macrocystis pyrifera	Germination (%)	94	NSG
				Growth (length, mm)	0.01592	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	95.29	NSG
			Strongylocentrotus purpuratus	Fertilization	98	NSG
2/28/2014	Post-Storm	24-BB-03Z	Macrocystis pyrifera	Germination (%)	93	NSG
				Growth (length, mm)	0.01636	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	92.64	NSG
			Strongylocentrotus purpuratus	Fertilization	100	NSG
		24-BB-03R	Macrocystis pyrifera	Germination (%)	91.6	NSG
				Growth (length, mm)	0.0162	NSG
			Mytilis galloprovincialis	Mortality/Normality (%)	91.4	NSG
			Strongylocentrotus purpuratus	Fertilization	100	NSG
		24-BB-02Z	Strongylocentrotus purpuratus	Fertilization	98	NSG

NSG = Not statistically significant, AND result is greater than evaluation threshold.
SG= Statistically significant, AND result is greater than evaluation threshold.

Table 9.
Summary of Toxicity Results from 2014-2016 Monitored Storm Events

Sample Date	Storm Event	Sample Site	Toxicity Test	NOEC (%)	EC_{25} (%)	EC_{50} (%)	TU_c
2/26/2014	Pre-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
2/28/2014	Post-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
		24-BB-03Z	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
		24-BB-02Z	Sea Urchin Fertilization	100	>100	>100	1
12/2/2014	Post-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
		24-BB-03Z	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
1/30/2016	Pre-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
1/31/2016	Post-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
		24-BB-03Z	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1
3/11/2016	Post-Storm	24-BB-03R	Bivalve Development	100	>100	>100	1
			Sea Urchin Fertilization	100	>100	>100	1
			Kelp Germination	100	>100	>100	1
			Kelp Growth	100	>100	>100	1

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

Table 10.

Evaluation of Compliance with Natural Water Quality in Receiving Waters of ASBS #24

Step 1: Compare receiving water post-storm sample concentration to the 85th threshold of reference sample concentrations.
Is post-storm concentration > 85% threshold?

Analyte		Units	Natural Water Quality 85th Percentile	Storm Event 1		Storm Event 2		Storm Event 3		Storm Event 4	
				24-BB-03R Post-Storm 2/28/2014	Post-storm concentration > 85% threshold?	24-BB-03R Post-Storm 12/2/2014	Post-storm concentration > 85% threshold?	24-BB-03R Post-Storm 1/31/2016	Post-storm concentration > 85% threshold?	24-BB-03R Post-Storm 3/11/2016	Post-storm concentration > 85% threshold?
General Chemistry											
	Ammonia as N	mg/L	0.015	0.01 H	No	0.19	**Yes**	0.04	**Yes**	0.01 H	No
	Nitrate as N	mg/L	0.34	0.005 H	No	0.02	No	0.005 H	No	0.05	No
	Oil & Grease	mg/L	0.5	0.5 H	No	0.5 H	No	0.5 H	No	0.5 H	No
	Total Orthophosphate as P	mg/L	0.1	0.02	No	0.02	No	0.03	No	0.04	No
	Total Suspended Solids	mg/L	48	7.1	No	4.7	No	6.3	No	12.3	No
Metals											
	Arsenic	µg/L	1.8	1.322	No	1.387	No	1.616	No	2.607	**Yes**
	Cadmium	µg/L	0.15	0.022	No	0.0168	No	0.0271	No	0.0393	No
	Chromium	µg/L	1.90	0.6962	No	0.2928	No	0.486	No	1.092	No
	Copper	µg/L	1.5	0.646	No	0.317	No	0.559	No	1.011	No
	Lead	µg/L	0.5	0.2159	No	0.2596	No	0.112	No	0.6868	**Yes**
	Mercury	µg/L	0.0006	0.0006 H	No	0.0006 H	No	0.0006 H	No	0.0006 H	No
	Nickel	µg/L	1.3	0.4901	No	0.2955	No	0.4145	No	0.715	No
	Selenium	µg/L	0.0025	0.026	**Yes**	0.01 J	**Yes**	0.015	**Yes**	0.021	**Yes**
	Silver	µg/L	0.08	0.12	**Yes**	0.12	**Yes**	0.1	**Yes**	0.09	**Yes**
	Zinc	µg/L	18.6	17.3532	No	7.0005	No	1.7625	No	6.4486	No
Organophosphorus Pesticides											
	Total Organophosphorus pesticides	µg/L	0.006	0.006	No	0.006	No	0.006	No	0.006	No
Polynuclear Aromatic Hydrocarbons											
	Total PAHs	µg/L	0.0125	0.0188	**Yes**	0.0489	**Yes**	0.0125	No	0.0246	**Yes**
Pyrethroid Pesticides											
	Total Pyrethroid pesticides	µg/L	0.00675	0.00675	No	0.00675	No	0.00675	No	0.0039	No

H - The analyte concentration was below the method detection limit, so the value of half of the method detection limit was used (i.e. ND = 1/2MDL).

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

Table 11.

Evaluation of Compliance with Natural Water Quality in Receiving Waters of ASBS #24

Step 2: Compare receiving water post-storm to pre-storm sample concentration.
Is post-storm receiving water sample > pre-storm concentration?

Analyte		Units	Storm Event 1			Storm Event 2			Storm Event 3			Storm Event 4		
			24-BB-03R Pre-Storm 2/26/2014	24-BB-03R Post-Storm 2/28/2014	Post-storm > Pre-storm concentration	24-BB-03R Pre-Storm 12/1/2014	24-BB-03R Post-Storm 12/2/2014	Post-storm > Pre-storm concentration	24-BB-03R Pre-Storm 1/30/2016	24-BB-03R Post-Storm 1/31/2016	Post-storm > Pre-storm concentration	24-BB-03R Pre-Storm 3/10/2016	24-BB-03R Post-Storm 3/11/2016	Post-storm > Pre-storm concentration
General Chemistry														
	Ammonia as N	mg/L				0.01 H	0.19	**Yes**	0.03	0.04	**Yes**			
Metals														
	Arsenic	µg/L										1.575	2.607	**Yes**
	Lead	µg/L										0.0575	0.6868	**Yes**
	Selenium	µg/L	0.012 J	0.026	**Yes**	0.0025 H	0.01 J	**Yes**	0.008 J	0.015	**Yes**	0.01 J	0.021	**Yes**
	Silver	µg/L	0.14	0.12	No	0.07	0.12	**Yes**	0.09	0.1	**Yes**	0.1	0.09	No
Polynuclear Aromatic Hydrocarbons														
	Total PAHs	µg/L	0.0192	0.0188	No	0.0478	0.0489	**Yes**				0.0367	0.0246	No

H - The analyte concentration was below the method detection limit, so the value of half of the method detection limit was used (i.e. ND = 1/2MDL)

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

cells are shaded if the post-storm sample concentration did not exceed the 85th percentile threshold and thus demonstrated compliance with natural water quality as shown in Table X-X.

Table 12.

Evaluation of Compliance with Natural Water Quality in Receiving Waters of ASBS #24

Step 3: Are there two consecutive storm events, including the most recent storm event, where an analyte concentration is greater than the 85th percentile reference threshold and greater than the pre-storm concentration? This constitutes an exceedance of natural water quality as defined by the Special Protections.

Constituents with post-storm receiving water concentrations that were greater than the 85th percentile reference threshold and the pre-storm concentration

24-BB-03R				
Analyte	Storm 1	Storm 2	Storm 3	Storm 4
	2/28/2014	12/2/2014	1/31/2016	3/11/2016
	analyte > 85% threshold and > pre-storm concentration?			
Selenium	**Yes**	**Yes**	**Yes**	**Yes**
Silver	no	**Yes**	**Yes**	no
Ammonia	no	**Yes**	**Yes**	no
Total PAHs	no	**Yes**	no	no
Arsenic	no	no	no	**Yes**
Lead	no	no	no	**Yes**

Table 13.
Evaluation of Compliance with Natural Water Quality in Receiving Waters of ASBS #24

Step 4: Are there two consecutive storm events, including the most recent storm event, where an analyte concentration is greater than the 85th percentile reference threshold and greater than the pre-storm concentration? This constitutes an exceedance of natural water quality as defined by the Special Protections.

Exceedance of Natural Water Quality as defined by the Special Protections (exceeds the 85th percentile threshold for 2 consecutive storm events including the most recent event)

Analyte	Exceedance of Natural Water Quality
Ammonia	No
Arsenic	No
Lead	No
Selenium	**Yes**
Silver	No
Total PAHs	No

Table 14.
Comparison of 24-BB-03Z Outfall Concentration to Pre-Storm and Post-Storm Ocean Receiving Water Concentrations for 24-BB-03R

Constituent	Units	COP IMAX	Natural Water Quality 85th Percentile	Outfall 24-BB-03Z	Ocean Receiving Water 24-BB-03R	
				Post-storm 3/11/16	Pre-storm 3/10/16	Post-storm 3/11/16
Selenium	µg/L	150	0.0025	0.198	0.01	0.021

Appendices

APPENDIX A

2016 Chemistry Reports

PHYSIS
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March 14, 2016

Karin Patrick
Aquatic Bioassay & Consulting Laboratories, Inc.
29 N. Olive Street
Ventura, CA 93001

Project Name: City of Malibu ASBS
Physis Project ID: 1212004-008

Dear Karin,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 2/1/2016. A total of 4 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 & Dissolved 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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PROJECT SAMPLE LIST

Aquatic Bioassay & Consulting Laboratories, Inc. — PHYSIS Project ID: 1212004-008

City of Malibu ASBS — Total Samples: 4

PHYSIS ID	Sample ID	Description	Date	Time	Matrix
38929	24-BB-02Z		1/31/2016	10:58	Freshwater
38930	24-BB-03Z		1/31/2016	10:32	Freshwater
38931	24-BB-03R		1/30/2016	10:30	Seawater
38932	24-BB-03R		1/31/2016	10:50	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.

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

ANALYTICAL REPORT

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Conventionals ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38929-R1	**24-BB-02Z**	**Matrix: Freshwater**		**Sampled: 31-Jan-16 10:58**		**Received: 01-Feb-16**
	Method: SM 2540 D	Batch ID: C-17153		Prepared: 04-Feb-16		Analyzed: 04-Feb-16
Total Suspended Solids	NA	21.1	0.5	0.5	mg/L	
	Method: EPA 1664B	Batch ID: C-19051		Prepared: 23-Feb-16		Analyzed: 23-Feb-16
Oil & Grease	NA	2.4	1	1	mg/L	
Sample ID: 38930-R1	**24-BB-03Z**	**Matrix: Freshwater**		**Sampled: 31-Jan-16 10:32**		**Received: 01-Feb-16**
	Method: SM 2540 D	Batch ID: C-17153		Prepared: 04-Feb-16		Analyzed: 04-Feb-16
Total Suspended Solids	NA	62.6	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18118		Prepared: 16-Feb-16		Analyzed: 16-Feb-16
Ammonia as N	NA	0.82	0.02	0.05	mg/L	
	Method: EPA 1664B	Batch ID: C-19051		Prepared: 23-Feb-16		Analyzed: 23-Feb-16
Oil & Grease	NA	3	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-28005		Prepared: 01-Feb-16		Analyzed: 01-Feb-16
Total Orthophosphate as P	NA	0.13	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28019		Prepared: 01-Feb-16		Analyzed: 25-Feb-16
Nitrate as N	NA	0.76	0.01	0.05	mg/L	
Sample ID: 38931-R1	**24-BB-03R**	**Matrix: Seawater**		**Sampled: 30-Jan-16 10:30**		**Received: 01-Feb-16**
	Method: SM 2540 D	Batch ID: C-17153		Prepared: 04-Feb-16		Analyzed: 04-Feb-16
Total Suspended Solids	NA	6.9	0.5	0.5	mg/L	
	Method: SM 4500-NH3 D	Batch ID: C-18118		Prepared: 16-Feb-16		Analyzed: 16-Feb-16
Ammonia as N	NA	0.03	0.02	0.05	mg/L	J
	Method: EPA 1664B	Batch ID: C-19051		Prepared: 23-Feb-16		Analyzed: 23-Feb-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-28005		Prepared: 01-Feb-16		Analyzed: 01-Feb-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28019		Prepared: 01-Feb-16		Analyzed: 25-Feb-16
Nitrate as N	NA	ND	0.01	0.05	mg/L	
Sample ID: 38932-R1	**24-BB-03R**	**Matrix: Seawater**		**Sampled: 31-Jan-16 10:50**		**Received: 01-Feb-16**
	Method: SM 2540 D	Batch ID: C-17153		Prepared: 04-Feb-16		Analyzed: 04-Feb-16
Total Suspended Solids	NA	6.3	0.5	0.5	mg/L	

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Conventionals ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
	Method: SM 4500-NH3 D	Batch ID: C-18118		Prepared: 16-Feb-16		Analyzed: 16-Feb-16
Ammonia as N	NA	0.04	0.02	0.05	mg/L	J
	Method: EPA 1664B	Batch ID: C-19051		Prepared: 23-Feb-16		Analyzed: 23-Feb-16
Oil & Grease	NA	ND	1	1	mg/L	
	Method: SM 4500-P E	Batch ID: C-28005		Prepared: 01-Feb-16		Analyzed: 01-Feb-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28019		Prepared: 01-Feb-16		Analyzed: 25-Feb-16
Nitrate as N	NA	ND	0.01	0.05	mg/L	

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Elements ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38930-R1	**24-BB-03Z** Method: EPA 1640	**Matrix: Freshwater** Batch ID: E-10074		**Sampled: 31-Jan-16 10:32** Prepared: 11-Feb-16		**Received: 01-Feb-16** Analyzed: 20-Feb-16
Arsenic (As)	Total	1.507	0.005	0.015	µg/L	
Arsenic (As)	Dissolved	0.953	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.1785	0.0025	0.005	µg/L	
Cadmium (Cd)	Dissolved	0.033	0.0025	0.005	µg/L	
Chromium (Cr)	Total	5.3697	0.0125	0.025	µg/L	
Chromium (Cr)	Dissolved	0.7003	0.0125	0.025	µg/L	
Copper (Cu)	Total	39.649	0.005	0.01	µg/L	
Copper (Cu)	Dissolved	24.617	0.005	0.01	µg/L	
Lead (Pb)	Total	4.5642	0.0025	0.005	µg/L	
Lead (Pb)	Dissolved	0.1104	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Mercury (Hg)	Dissolved	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	6.2599	0.0025	0.005	µg/L	
Nickel (Ni)	Dissolved	2.0839	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.132	0.005	0.015	µg/L	
Selenium (Se)	Dissolved	0.11	0.005	0.015	µg/L	
Silver (Ag)	Total	ND	0.01	0.02	µg/L	
Silver (Ag)	Dissolved	ND	0.01	0.02	µg/L	
Zinc (Zn)	Total	179.331	0.0025	0.005	µg/L	
Zinc (Zn)	Dissolved	109.8574	0.0025	0.005	µg/L	
Sample ID: 38931-R1	**24-BB-03R** Method: EPA 1640	**Matrix: Seawater** Batch ID: E-10074		**Sampled: 30-Jan-16 10:30** Prepared: 11-Feb-16		**Received: 01-Feb-16** Analyzed: 20-Feb-16
Arsenic (As)	Total	1.537	0.005	0.015	µg/L	
Arsenic (As)	Dissolved	1.307	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0162	0.0025	0.005	µg/L	
Cadmium (Cd)	Dissolved	0.0147	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.6169	0.0125	0.025	µg/L	
Chromium (Cr)	Dissolved	0.1679	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.33	0.005	0.01	µg/L	

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Elements ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Copper (Cu)	Dissolved	0.19	0.005	0.01	µg/L	
Lead (Pb)	Total	0.0836	0.0025	0.005	µg/L	
Lead (Pb)	Dissolved	ND	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Mercury (Hg)	Dissolved	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.4617	0.0025	0.005	µg/L	
Nickel (Ni)	Dissolved	0.1919	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.008	0.005	0.015	µg/L	J
Selenium (Se)	Dissolved	0.012	0.005	0.015	µg/L	J
Silver (Ag)	Total	0.09	0.01	0.02	µg/L	
Silver (Ag)	Dissolved	0.08	0.01	0.02	µg/L	
Zinc (Zn)	Total	4.0212	0.0025	0.005	µg/L	
Zinc (Zn)	Dissolved	2.6924	0.0025	0.005	µg/L	

Sample ID: 38932-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 31-Jan-16 10:50** **Received: 01-Feb-16**

Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Arsenic (As)	Total	1.616	0.005	0.015	µg/L	
Arsenic (As)	Dissolved	1.475	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0271	0.0025	0.005	µg/L	
Cadmium (Cd)	Dissolved	0.0131	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.486	0.0125	0.025	µg/L	
Chromium (Cr)	Dissolved	0.1806	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.559	0.005	0.01	µg/L	
Copper (Cu)	Dissolved	0.267	0.005	0.01	µg/L	
Lead (Pb)	Total	0.112	0.0025	0.005	µg/L	
Lead (Pb)	Dissolved	ND	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Mercury (Hg)	Dissolved	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.4145	0.0025	0.005	µg/L	
Nickel (Ni)	Dissolved	0.198	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.015	0.005	0.015	µg/L	
Selenium (Se)	Dissolved	0.008	0.005	0.015	µg/L	J
Silver (Ag)	Total	0.1	0.01	0.02	µg/L	

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Innovative Solutions for Nature
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Elements

ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Silver (Ag)	Dissolved	0.08	0.01	0.02	µg/L	
Zinc (Zn)	Total	1.7625	0.0025	0.005	µg/L	
Zinc (Zn)	Dissolved	1.5632	0.0025	0.005	µg/L	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38930-R1 **24-BB-03Z** Method: EPA 625		**Matrix: Freshwater** Batch ID: O-9094		**Sampled: 31-Jan-16 10:32** Prepared: 01-Feb-16		**Received: 01-Feb-16** Analyzed: 03-Mar-16
(PCB030)	Total	73			% Recovery	
(PCB112)	Total	76			% Recovery	
(PCB198)	Total	73			% Recovery	
(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: 38931-R1 **24-BB-03R** Method: EPA 625		**Matrix: Seawater** Batch ID: O-9094		**Sampled: 30-Jan-16 10:30** Prepared: 01-Feb-16		**Received: 01-Feb-16** Analyzed: 03-Mar-16
(PCB030)	Total	64			% Recovery	
(PCB112)	Total	76			% Recovery	
(PCB198)	Total	83			% Recovery	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(TCMX)	Total	53			% 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: 38932-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 31-Jan-16 10:50** **Received: 01-Feb-16**
Method: EPA 625 Batch ID: O-9094 Prepared: 01-Feb-16 Analyzed: 03-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(PCB030)	Total	55			% Recovery	
(PCB112)	Total	64			% Recovery	
(PCB198)	Total	68			% Recovery	
(TCMX)	Total	43			% 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	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 38930-R1 **24-BB-03Z** **Matrix: Freshwater** **Sampled: 31-Jan-16 10:32** **Received: 01-Feb-16**
Method: EPA 625 Batch ID: O-9094 Prepared: 01-Feb-16 Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	90			% Recovery	
(d10-Phenanthrene)	Total	90			% Recovery	
(d12-Chrysene)	Total	113			% Recovery	
(d8-Naphthalene)	Total	89			% Recovery	
1-Methylnaphthalene	Total	2.6	1	5	ng/L	J
1-Methylphenanthrene	Total	7.7	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	1.9	1	5	ng/L	J
Acenaphthene	Total	5.6	1	5	ng/L	
Acenaphthylene	Total	3.2	1	5	ng/L	J
Anthracene	Total	ND	1	5	ng/L	
Benz[a]anthracene	Total	6.5	1	5	ng/L	
Benzo[a]pyrene	Total	6.2	1	5	ng/L	
Benzo[b]fluoranthene	Total	20.3	1	5	ng/L	
Benzo[e]pyrene	Total	15.8	1	5	ng/L	
Benzo[g,h,i]perylene	Total	15.7	1	5	ng/L	
Benzo[k]fluoranthene	Total	3.5	1	5	ng/L	J
Biphenyl	Total	9.6	1	5	ng/L	
Chrysene	Total	31.7	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	13.9	1	5	ng/L	
Fluoranthene	Total	21	1	5	ng/L	
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	5.2	1	5	ng/L	
Naphthalene	Total	10.7	1	5	ng/L	
Perylene	Total	6.3	1	5	ng/L	
Phenanthrene	Total	14.6	1	5	ng/L	
Pyrene	Total	26.8	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 38931-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 30-Jan-16 10:30** **Received: 01-Feb-16**
Method: EPA 625 Batch ID: O-9094 Prepared: 01-Feb-16 Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	58			% Recovery	
(d10-Phenanthrene)	Total	79			% Recovery	
(d12-Chrysene)	Total	91			% Recovery	
(d8-Naphthalene)	Total	45			% 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	1	1	5	ng/L	J
Phenanthrene	Total	ND	1	5	ng/L	
Pyrene	Total	ND	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 38932-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 31-Jan-16 10:50** **Received: 01-Feb-16**

Method: EPA 625 Batch ID: O-9094 Prepared: 01-Feb-16 Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	56			% Recovery	
(d10-Phenanthrene)	Total	74			% Recovery	
(d12-Chrysene)	Total	88			% Recovery	
(d8-Naphthalene)	Total	43			% 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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Pyrethroids ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 38930-R1	**24-BB-03Z** Method: EPA 625-NCI	**Matrix: Freshwater** Batch ID: O-9094		**Sampled: 31-Jan-16 10:32** Prepared: 01-Feb-16		**Received: 01-Feb-16** Analyzed: 02-Mar-16
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	32.7	0.5	2	ng/L	
Cyfluthrin	Total	11.1	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	12.4	0.5	2	ng/L	
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L	
Esfenvalerate	Total	6.5	0.5	2	ng/L	
Fenvalerate	Total	7.3	0.5	2	ng/L	
Fluvalinate	Total	6.2	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: 38931-R1	**24-BB-03R** Method: EPA 625-NCI	**Matrix: Seawater** Batch ID: O-9094		**Sampled: 30-Jan-16 10:30** Prepared: 01-Feb-16		**Received: 01-Feb-16** Analyzed: 02-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	1.5	0.5	2	ng/L	J
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	

Pyrethroids ANALYTICAL REPORT

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

Sample ID: 38932-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 31-Jan-16 10:50** **Received: 01-Feb-16**
Method: EPA 625-NCI Batch ID: O-9094 Prepared: 01-Feb-16 Analyzed: 02-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
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	

QUALITY CONTROL REPORT

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Conventionals QUALITY CONTROL REPORT

Ammonia as N — Method: SM 4500-NH3 D — Fraction: NA — Prepared: 16-Feb-16 — Analyzed: 16-Feb-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
38927-B1	QAQC Procedural Blank	C-18118	ND	0.02	0.05	mg/L									
38927-BS1	QAQC Procedural Blank	C-18118	0.25	0.02	0.05	mg/L	0.25	0	100	80 - 120%	PASS				
38927-BS2	QAQC Procedural Blank	C-18118	0.24	0.02	0.05	mg/L	0.25	0	96	80 - 120%	PASS	4	25	PASS	
38931-MS1	24-BB-03R	C-18118	0.28	0.02	0.05	mg/L	0.25	0.03	100	80 - 120%	PASS				
38931-MS2	24-BB-03R	C-18118	0.28	0.02	0.05	mg/L	0.25	0.03	100	80 - 120%	PASS	0	25	PASS	
38931-R2	24-BB-03R	C-18118	0.03	0.02	0.05	mg/L						0	25	PASS	J

Nitrate as N — Method: SM 4500-NO3 E — Fraction: NA — Prepared: 01-Feb-16 — Analyzed: 25-Feb-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
38927-B1	QAQC Procedural Blank	C-28019	ND	0.01	0.05	mg/L									
38927-BS1	QAQC Procedural Blank	C-28019	0.49	0.01	0.05	mg/L	0.5	0	98	80 - 120%	PASS				
38927-BS2	QAQC Procedural Blank	C-28019	0.49	0.01	0.05	mg/L	0.5	0	98	80 - 120%	PASS	0	25	PASS	
38931-MS1	24-BB-03R	C-28019	0.59	0.01	0.05	mg/L	0.5	0	118	80 - 120%	PASS				
38931-MS2	24-BB-03R	C-28019	0.6	0.01	0.05	mg/L	0.5	0	120	80 - 120%	PASS	2	25	PASS	
38931-R2	24-BB-03R	C-28019	ND	0.01	0.05	mg/L						0	25	PASS	

Oil & Grease — Method: EPA 1664B — Fraction: NA — Prepared: 23-Feb-16 — Analyzed: 23-Feb-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
38927-B1	QAQC Procedural Blank	C-19051	ND	1	1	mg/L									
38927-BS1	QAQC Procedural Blank	C-19051	38.4	1	1	mg/L	40	0	96	80 - 120%	PASS				
38927-BS2	QAQC Procedural Blank	C-19051	38.6	1	1	mg/L	40	0	96	80 - 120%	PASS	0	25	PASS	

Total Orthophosphate as P — Method: SM 4500-P E — Fraction: NA — Prepared: 01-Feb-16 — Analyzed: 01-Feb-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
38927-B1	QAQC Procedural Blank	C-28005	ND	0.01	0.02	mg/L									
38927-BS1	QAQC Procedural Blank	C-28005	0.22	0.01	0.02	mg/L	0.2	0	110	80 - 120%	PASS				
38927-BS2	QAQC Procedural Blank	C-28005	0.22	0.01	0.02	mg/L	0.2	0	110	80 - 120%	PASS	0	25	PASS	
38931-MS1	24-BB-03R	C-28005	0.24	0.01	0.02	mg/L	0.2	0.03	105	80 - 120%	PASS				
38931-MS2	24-BB-03R	C-28005	0.25	0.01	0.02	mg/L	0.2	0.03	110	80 - 120%	PASS	5	25	PASS	
38931-R2	24-BB-03R	C-28005	0.03	0.01	0.02	mg/L						0	25	PASS	

Total Suspended Solids — Method: SM 2540 D — Fraction: NA — Prepared: 04-Feb-16 — Analyzed: 04-Feb-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
38927-B1	QAQC Procedural Blank	C-17153	ND	0.5	0.5	mg/L									
38929-R2	24-BB-02Z	C-17153	24.1	0.5	0.5	mg/L						13	25	PASS	

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Elements — QUALITY CONTROL REPORT

Sample ID: 38927-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Arsenic (As)	Dissolved	ND	0.005	0.015	µg/L							
Arsenic (As)	Total	ND	0.005	0.015	µg/L							
Cadmium (Cd)	Dissolved	ND	0.0025	0.005	µg/L							
Cadmium (Cd)	Total	ND	0.0025	0.005	µg/L							
Chromium (Cr)	Dissolved	ND	0.0125	0.025	µg/L							
Chromium (Cr)	Total	ND	0.0125	0.025	µg/L							
Copper (Cu)	Dissolved	ND	0.005	0.01	µg/L							
Copper (Cu)	Total	ND	0.005	0.01	µg/L							
Lead (Pb)	Dissolved	ND	0.0025	0.005	µg/L							
Lead (Pb)	Total	ND	0.0025	0.005	µg/L							
Mercury (Hg)	Dissolved	ND	0.0012	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Dissolved	ND	0.0025	0.005	µg/L							
Nickel (Ni)	Total	ND	0.0025	0.005	µg/L							
Selenium (Se)	Dissolved	ND	0.005	0.015	µg/L							
Selenium (Se)	Total	ND	0.005	0.015	µg/L							
Silver (Ag)	Dissolved	ND	0.01	0.02	µg/L							
Silver (Ag)	Total	ND	0.01	0.02	µg/L							
Zinc (Zn)	Dissolved	ND	0.0025	0.005	µg/L							
Zinc (Zn)	Total	ND	0.0025	0.005	µg/L							

Sample ID: 38928-LCM1 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Arsenic (As)	Total	1.755	0.005	0.015	µg/L							
Cadmium (Cd)	Total	0.0894	0.0025	0.005	µg/L							
Chromium (Cr)	Total	0.2109	0.0125	0.025	µg/L							
Copper (Cu)	Total	0.148	0.005	0.01	µg/L							
Lead (Pb)	Total	0.0065	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							

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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
Nickel (Ni)	Total	0.3479	0.0025	0.005	µg/L									
Selenium (Se)	Total	0.027	0.005	0.015	µg/L									
Silver (Ag)	Total	0.08	0.01	0.02	µg/L									
Zinc (Zn)	Total	0.9216	0.0025	0.005	µg/L									

Sample ID: 38928-LCS1 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Arsenic (As)	Total	22.917	0.005	0.015	µg/L	20	1.755	106	75 - 125%	PASS				
Cadmium (Cd)	Total	17.0664	0.0025	0.005	µg/L	20	0.0894	85	75 - 125%	PASS				
Chromium (Cr)	Total	21.3274	0.0125	0.025	µg/L	20	0.2109	106	75 - 125%	PASS				
Copper (Cu)	Total	19.319	0.005	0.01	µg/L	20	0.148	96	75 - 125%	PASS				
Lead (Pb)	Total	18.6242	0.0025	0.005	µg/L	20	0.0065	93	75 - 125%	PASS				
Mercury (Hg)	Total	8.5729	0.0012	0.005	µg/L	10	0	86	75 - 125%	PASS				
Nickel (Ni)	Total	18.6441	0.0025	0.005	µg/L	20	0.3479	91	75 - 125%	PASS				
Selenium (Se)	Total	19.737	0.005	0.015	µg/L	20	0.027	99	75 - 125%	PASS				
Silver (Ag)	Total	9.52	0.01	0.02	µg/L	10	0.08	94	75 - 125%	PASS				
Zinc (Zn)	Total	17.3985	0.0025	0.005	µg/L	20	0.9216	82	75 - 125%	PASS				

Sample ID: 38928-LCS2 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Arsenic (As)	Total	21.865	0.005	0.015	µg/L	20	1.755	101	75 - 125%	PASS	5	25	PASS	
Cadmium (Cd)	Total	16.5135	0.0025	0.005	µg/L	20	0.0894	82	75 - 125%	PASS	4	25	PASS	
Chromium (Cr)	Total	21.1094	0.0125	0.025	µg/L	20	0.2109	104	75 - 125%	PASS	2	25	PASS	
Copper (Cu)	Total	18.904	0.005	0.01	µg/L	20	0.148	94	75 - 125%	PASS	2	25	PASS	
Lead (Pb)	Total	18.2753	0.0025	0.005	µg/L	20	0.0065	91	75 - 125%	PASS	2	25	PASS	
Mercury (Hg)	Total	8.4051	0.0012	0.005	µg/L	10	0	84	75 - 125%	PASS	2	25	PASS	
Nickel (Ni)	Total	18.113	0.0025	0.005	µg/L	20	0.3479	89	75 - 125%	PASS	2	25	PASS	
Selenium (Se)	Total	19.495	0.005	0.015	µg/L	20	0.027	97	75 - 125%	PASS	2	25	PASS	
Silver (Ag)	Total	9.41	0.01	0.02	µg/L	10	0.08	93	75 - 125%	PASS	1	25	PASS	
Zinc (Zn)	Total	16.822	0.0025	0.005	µg/L	20	0.9216	80	75 - 125%	PASS	2	25	PASS	

Sample ID: 38932-R2 **24-BB-03R** **Matrix: Seawater** **Sampled: 31-Jan-16 10:50** **Received: 01-Feb-16**
Method: EPA 1640 Batch ID: E-10074 Prepared: 11-Feb-16 Analyzed: 20-Feb-16

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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
Arsenic (As)	Dissolved	1.425	0.005	0.015	µg/L					3	25	PASS	
Arsenic (As)	Total	1.521	0.005	0.015	µg/L					6	25	PASS	
Cadmium (Cd)	Dissolved	0.012	0.0025	0.005	µg/L					9	25	PASS	
Cadmium (Cd)	Total	0.0275	0.0025	0.005	µg/L					1	25	PASS	
Chromium (Cr)	Dissolved	0.1666	0.0125	0.025	µg/L					8	25	PASS	
Chromium (Cr)	Total	0.4882	0.0125	0.025	µg/L					0	25	PASS	
Copper (Cu)	Dissolved	0.241	0.005	0.01	µg/L					10	25	PASS	
Copper (Cu)	Total	0.544	0.005	0.01	µg/L					3	25	PASS	
Lead (Pb)	Dissolved	ND	0.0025	0.005	µg/L					0	25	PASS	
Lead (Pb)	Total	0.1253	0.0025	0.005	µg/L					11	25	PASS	
Mercury (Hg)	Dissolved	ND	0.0012	0.005	µg/L					0	25	PASS	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L					0	25	PASS	
Nickel (Ni)	Dissolved	0.1944	0.0025	0.005	µg/L					2	25	PASS	
Nickel (Ni)	Total	0.4397	0.0025	0.005	µg/L					6	25	PASS	
Selenium (Se)	Dissolved	0.009	0.005	0.015	µg/L					12	25	PASS	J
Selenium (Se)	Total	0.01	0.005	0.015	µg/L					40	25	FAIL	J,SL
Silver (Ag)	Dissolved	0.09	0.01	0.02	µg/L					12	25	PASS	
Silver (Ag)	Total	0.1	0.01	0.02	µg/L					0	25	PASS	
Zinc (Zn)	Dissolved	1.5944	0.0025	0.005	µg/L					2	25	PASS	
Zinc (Zn)	Total	1.8951	0.0025	0.005	µg/L					7	25	PASS	

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Organophosphorus Pesticides — QUALITY CONTROL REPORT

Sample ID: 38927-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 03-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB030)	Total	63			% Recovery	100		63	57 - 133%	PASS			
(PCB112)	Total	66			% Recovery	100		66	65 - 133%	PASS			
(PCB198)	Total	71			% Recovery	100		71	69 - 133%	PASS			
(TCMX)	Total	60			% Recovery	100		60	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: 38927-BS1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 03-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB030)	Total	75			% Recovery	100	0	75	57 - 133%	PASS			
(PCB112)	Total	81			% Recovery	100	0	81	65 - 133%	PASS			

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1904 E. Wright Circle, Anaheim CA 92806 main: (714) 602-5320 fax: (714) 602-5321 www.physislabs.com info@physislabs.com CA ELAP #2769

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	82			% Recovery	100	0	82	69 - 133%	PASS				
(TCMX)	Total	75			% Recovery	100	0	75	39 - 135%	PASS				
Bolstar (Sulprofos)	Total	600.3	2	4	ng/L	500	0	120	50 - 150%	PASS				
Chlorpyrifos	Total	476.9	0.5	1	ng/L	500	0	95	50 - 150%	PASS				
Demeton	Total	343.5	1	2	ng/L	500	0	69	50 - 150%	PASS				
Diazinon	Total	526.6	0.5	1	ng/L	500	0	105	50 - 150%	PASS				
Dichlorvos	Total	445.4	3	6	ng/L	500	0	89	50 - 150%	PASS				
Dimethoate	Total	253.3	5	10	ng/L	500	0	51	50 - 150%	PASS				
Disulfoton	Total	396.9	1	2	ng/L	500	0	79	50 - 150%	PASS				
Ethoprop (Ethoprofos)	Total	478	1	2	ng/L	500	0	96	50 - 150%	PASS				
Fenchlorphos (Ronnel)	Total	492.4	2	4	ng/L	500	0	98	50 - 150%	PASS				
Fensulfothion	Total	439.7	1	2	ng/L	500	0	88	50 - 150%	PASS				
Fenthion	Total	482.7	2	4	ng/L	500	0	97	50 - 150%	PASS				
Malathion	Total	477.4	3	6	ng/L	500	0	95	50 - 150%	PASS				
Methidathion	Total	539.3	5	10	ng/L	500	0	108	50 - 150%	PASS				
Methyl parathion	Total	485.4	1	2	ng/L	500	0	97	50 - 150%	PASS				
Mevinphos (Phosdrin)	Total	393.8	5	10	ng/L	500	0	79	50 - 150%	PASS				
Phorate	Total	423.7	5	10	ng/L	500	0	85	50 - 150%	PASS				
Phosmet	Total	482.2	5	10	ng/L	500	0	96	50 - 150%	PASS				
Tetrachlorvinphos (Stirofos)	Total	571.7	2	4	ng/L	500	0	114	50 - 150%	PASS				
Tokuthion	Total	547.8	3	6	ng/L	500	0	110	50 - 150%	PASS				
Trichloronate	Total	467	1	2	ng/L	500	0	93	50 - 150%	PASS				

Sample ID: 38927-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 03-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
(PCB030)	Total	75			% Recovery	100	0	75	57 - 133%	PASS	0	30	PASS	
(PCB112)	Total	84			% Recovery	100	0	84	65 - 133%	PASS	4	30	PASS	
(PCB198)	Total	83			% Recovery	100	0	83	69 - 133%	PASS	1	30	PASS	
(TCMX)	Total	71			% Recovery	100	0	71	39 - 135%	PASS	5	30	PASS	
Bolstar (Sulprofos)	Total	610.9	2	4	ng/L	500	0	122	50 - 150%	PASS	2	25	PASS	
Chlorpyrifos	Total	501.5	0.5	1	ng/L	500	0	100	50 - 150%	PASS	5	25	PASS	
Demeton	Total	367.3	1	2	ng/L	500	0	73	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	529.5	0.5	1	ng/L	500	0	106	50 - 150%	PASS	1	25	PASS	
Dichlorvos	Total	426.5	3	6	ng/L	500	0	85	50 - 150%	PASS	5	25	PASS	
Dimethoate	Total	276.7	5	10	ng/L	500	0	55	50 - 150%	PASS	8	25	PASS	
Disulfoton	Total	459	1	2	ng/L	500	0	92	50 - 150%	PASS	15	25	PASS	
Ethoprop (Ethoprofos)	Total	469.5	1	2	ng/L	500	0	94	50 - 150%	PASS	2	25	PASS	
Fenchlorphos (Ronnel)	Total	495	2	4	ng/L	500	0	99	50 - 150%	PASS	1	25	PASS	
Fensulfothion	Total	527.4	1	2	ng/L	500	0	105	50 - 150%	PASS	18	25	PASS	
Fenthion	Total	513.3	2	4	ng/L	500	0	103	50 - 150%	PASS	6	25	PASS	
Malathion	Total	501.3	3	6	ng/L	500	0	100	50 - 150%	PASS	5	25	PASS	
Methidathion	Total	536.8	5	10	ng/L	500	0	107	50 - 150%	PASS	1	25	PASS	
Methyl parathion	Total	493.5	1	2	ng/L	500	0	99	50 - 150%	PASS	2	25	PASS	
Mevinphos (Phosdrin)	Total	414.7	5	10	ng/L	500	0	83	50 - 150%	PASS	5	25	PASS	
Phorate	Total	435.3	5	10	ng/L	500	0	87	50 - 150%	PASS	2	25	PASS	
Phosmet	Total	474.4	5	10	ng/L	500	0	95	50 - 150%	PASS	1	25	PASS	
Tetrachlorvinphos (Stirofos)	Total	585.9	2	4	ng/L	500	0	117	50 - 150%	PASS	3	25	PASS	
Tokuthion	Total	576.1	3	6	ng/L	500	0	115	50 - 150%	PASS	4	25	PASS	
Trichloronate	Total	477.9	1	2	ng/L	500	0	96	50 - 150%	PASS	3	25	PASS	

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 38927-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
(d10-Acenaphthene)	Total	71			% Recovery	100		71	65 - 113% PASS			
(d10-Phenanthrene)	Total	81			% Recovery	100		81	80 - 111% PASS			
(d12-Chrysene)	Total	73			% Recovery	100		73	60 - 139% PASS			
(d8-Naphthalene)	Total	73			% Recovery	100		73	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: 38927-BS1 **QAQC Procedural Blank** Method: EPA 625 **Matrix: DI Water** Batch ID: O-9094 **Sampled:** Prepared: 30-Jan-16 **Received:** Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(d10-Acenaphthene)	Total	84			% Recovery	100	0	84	65 - 113%	PASS			
(d10-Phenanthrene)	Total	87			% Recovery	100	0	87	80 - 111%	PASS			
(d12-Chrysene)	Total	96			% Recovery	100	0	96	60 - 139%	PASS			
(d8-Naphthalene)	Total	78			% Recovery	100	0	78	44 - 119%	PASS			
1-Methylnaphthalene	Total	480	1	5	ng/L	500	0	96	50 - 150%	PASS			
1-Methylphenanthrene	Total	455.7	1	5	ng/L	500	0	91	50 - 150%	PASS			
2,3,5-Trimethylnaphthalene	Total	474.5	1	5	ng/L	500	0	95	50 - 150%	PASS			
2,6-Dimethylnaphthalene	Total	478.5	1	5	ng/L	500	0	96	50 - 150%	PASS			
2-Methylnaphthalene	Total	483.8	1	5	ng/L	500	0	97	50 - 150%	PASS			
Acenaphthene	Total	483.8	1	5	ng/L	500	0	97	50 - 150%	PASS			
Acenaphthylene	Total	463.1	1	5	ng/L	500	0	93	50 - 150%	PASS			
Anthracene	Total	458.1	1	5	ng/L	500	0	92	50 - 150%	PASS			
Benz[a]anthracene	Total	455.3	1	5	ng/L	500	0	91	50 - 150%	PASS			
Benzo[a]pyrene	Total	468.4	1	5	ng/L	500	0	94	50 - 150%	PASS			
Benzo[b]fluoranthene	Total	456.8	1	5	ng/L	500	0	91	50 - 150%	PASS			
Benzo[e]pyrene	Total	481.9	1	5	ng/L	500	0	96	50 - 150%	PASS			
Benzo[g,h,i]perylene	Total	541.4	1	5	ng/L	500	0	108	50 - 150%	PASS			
Benzo[k]fluoranthene	Total	469.9	1	5	ng/L	500	0	94	50 - 150%	PASS			
Biphenyl	Total	490.7	1	5	ng/L	500	0	98	50 - 150%	PASS			
Chrysene	Total	470.4	1	5	ng/L	500	0	94	50 - 150%	PASS			
Dibenz[a,h]anthracene	Total	494.7	1	5	ng/L	500	0	99	50 - 150%	PASS			
Dibenzothiophene	Total	462.5	1	5	ng/L	500	0	93	50 - 150%	PASS			
Fluoranthene	Total	443.6	1	5	ng/L	500	0	89	50 - 150%	PASS			
Fluorene	Total	464.6	1	5	ng/L	500	0	93	50 - 150%	PASS			
Indeno[1,2,3-c,d]pyrene	Total	503.6	1	5	ng/L	500	0	101	50 - 150%	PASS			
Naphthalene	Total	470.1	1	5	ng/L	500	0	94	50 - 150%	PASS			
Perylene	Total	466.5	1	5	ng/L	500	0	93	50 - 150%	PASS			
Phenanthrene	Total	457.1	1	5	ng/L	500	0	91	50 - 150%	PASS			
Pyrene	Total	438.2	1	5	ng/L	500	0	88	50 - 150%	PASS			

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 38927-BS2 **QAQC Procedural Blank** Method: EPA 625 **Matrix: DI Water** Batch ID: O-9094 **Sampled:** Prepared: 30-Jan-16 **Received:** Analyzed: 24-Feb-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
(d10-Acenaphthene)	Total	82			% Recovery	100	0	82	65 - 113%	PASS	2	30	PASS	
(d10-Phenanthrene)	Total	85			% Recovery	100	0	85	80 - 111%	PASS	2	30	PASS	
(d12-Chrysene)	Total	91			% Recovery	100	0	91	60 - 139%	PASS	5	30	PASS	
(d8-Naphthalene)	Total	68			% Recovery	100	0	68	44 - 119%	PASS	14	30	PASS	
1-Methylnaphthalene	Total	462.6	1	5	ng/L	500	0	93	50 - 150%	PASS	3	25	PASS	
1-Methylphenanthrene	Total	449.7	1	5	ng/L	500	0	90	50 - 150%	PASS	1	25	PASS	
2,3,5-Trimethylnaphthalene	Total	485.3	1	5	ng/L	500	0	97	50 - 150%	PASS	2	25	PASS	
2,6-Dimethylnaphthalene	Total	481.1	1	5	ng/L	500	0	96	50 - 150%	PASS	0	25	PASS	
2-Methylnaphthalene	Total	463	1	5	ng/L	500	0	93	50 - 150%	PASS	4	25	PASS	
Acenaphthene	Total	483.6	1	5	ng/L	500	0	97	50 - 150%	PASS	0	25	PASS	
Acenaphthylene	Total	465.2	1	5	ng/L	500	0	93	50 - 150%	PASS	0	25	PASS	
Anthracene	Total	463.1	1	5	ng/L	500	0	93	50 - 150%	PASS	1	25	PASS	
Benz[a]anthracene	Total	447.4	1	5	ng/L	500	0	89	50 - 150%	PASS	2	25	PASS	
Benzo[a]pyrene	Total	467.1	1	5	ng/L	500	0	93	50 - 150%	PASS	1	25	PASS	
Benzo[b]fluoranthene	Total	450.7	1	5	ng/L	500	0	90	50 - 150%	PASS	1	25	PASS	
Benzo[e]pyrene	Total	483.1	1	5	ng/L	500	0	97	50 - 150%	PASS	1	25	PASS	
Benzo[g,h,i]perylene	Total	553.6	1	5	ng/L	500	0	111	50 - 150%	PASS	3	25	PASS	
Benzo[k]fluoranthene	Total	469.5	1	5	ng/L	500	0	94	50 - 150%	PASS	0	25	PASS	
Biphenyl	Total	486.1	1	5	ng/L	500	0	97	50 - 150%	PASS	1	25	PASS	
Chrysene	Total	464.1	1	5	ng/L	500	0	93	50 - 150%	PASS	1	25	PASS	
Dibenz[a,h]anthracene	Total	508.8	1	5	ng/L	500	0	102	50 - 150%	PASS	3	25	PASS	
Dibenzothiophene	Total	467.1	1	5	ng/L	500	0	93	50 - 150%	PASS	1	25	PASS	
Fluoranthene	Total	439.9	1	5	ng/L	500	0	88	50 - 150%	PASS	1	25	PASS	
Fluorene	Total	475.2	1	5	ng/L	500	0	95	50 - 150%	PASS	2	25	PASS	
Indeno[1,2,3-c,d]pyrene	Total	514.6	1	5	ng/L	500	0	103	50 - 150%	PASS	2	25	PASS	
Naphthalene	Total	424.7	1	5	ng/L	500	0	85	50 - 150%	PASS	10	25	PASS	
Perylene	Total	469.5	1	5	ng/L	500	0	94	50 - 150%	PASS	1	25	PASS	
Phenanthrene	Total	463	1	5	ng/L	500	0	93	50 - 150%	PASS	2	25	PASS	
Pyrene	Total	441.5	1	5	ng/L	500	0	88	50 - 150%	PASS	0	25	PASS	

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Pyrethroids QUALITY CONTROL REPORT

Sample ID: 38927-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625-NCI Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 01-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
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: 38927-BS1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625-NCI Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 01-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
Allethrin	Total	585.7	0.5	2	ng/L	500	0	117	50 - 150%	PASS			
Bifenthrin	Total	589.6	0.5	2	ng/L	500	0	118	50 - 150%	PASS			
Cyfluthrin	Total	597.7	0.5	2	ng/L	500	0	120	50 - 150%	PASS			
Cyhalothrin, Total Lambda	Total	582.8	0.5	2	ng/L	500	0	117	50 - 150%	PASS			
Cypermethrin	Total	595.6	0.5	2	ng/L	500	0	119	50 - 150%	PASS			
Danitol (Fenpropathrin)	Total	592.9	0.5	2	ng/L	500	0	119	50 - 150%	PASS			
Deltamethrin/Tralomethrin	Total	1045.2	0.5	2	ng/L	1000	0	105	50 - 150%	PASS			
Esfenvalerate	Total	582.7	0.5	2	ng/L	500	0	117	50 - 150%	PASS			
Fenvalerate	Total	591.4	0.5	2	ng/L	500	0	118	50 - 150%	PASS			
Fluvalinate	Total	589.7	0.5	2	ng/L	500	0	118	50 - 150%	PASS			
Permethrin, cis-	Total	209.3	5	10	ng/L	133.5	0	157	50 - 150%	PASS		PASS	Q
Permethrin, trans-	Total	424	5	10	ng/L	358	0	118	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	571	0.5	2	ng/L	500	0	114	50 - 150%	PASS				
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS			PASS	Q

Sample ID: 38927-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625-NCI Batch ID: O-9094 Prepared: 30-Jan-16 Analyzed: 01-Mar-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Allethrin	Total	586.5	0.5	2	ng/L	500	0	117	50 - 150%	PASS	0	25	PASS	
Bifenthrin	Total	571.2	0.5	2	ng/L	500	0	114	50 - 150%	PASS	3	25	PASS	
Cyfluthrin	Total	591.3	0.5	2	ng/L	500	0	118	50 - 150%	PASS	2	25	PASS	
Cyhalothrin, Total Lambda	Total	575.7	0.5	2	ng/L	500	0	115	50 - 150%	PASS	2	25	PASS	
Cypermethrin	Total	599.1	0.5	2	ng/L	500	0	120	50 - 150%	PASS	1	25	PASS	
Danitol (Fenpropathrin)	Total	593.7	0.5	2	ng/L	500	0	119	50 - 150%	PASS	0	25	PASS	
Deltamethrin/Tralomethrin	Total	1034.6	0.5	2	ng/L	1000	0	103	50 - 150%	PASS	2	25	PASS	
Esfenvalerate	Total	589.3	0.5	2	ng/L	500	0	118	50 - 150%	PASS	1	25	PASS	
Fenvalerate	Total	589.7	0.5	2	ng/L	500	0	118	50 - 150%	PASS	0	25	PASS	
Fluvalinate	Total	580.9	0.5	2	ng/L	500	0	116	50 - 150%	PASS	2	25	PASS	
Permethrin, cis-	Total	158.8	5	10	ng/L	133.5	0	119	50 - 150%	PASS	28	25	PASS	Q
Permethrin, trans-	Total	427.6	5	10	ng/L	358	0	119	50 - 150%	PASS	1	25	PASS	
Prallethrin	Total	577.4	0.5	2	ng/L	500	0	115	50 - 150%	PASS	1	25	PASS	
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS	0	25	PASS	Q

CHAIN OF CUSTODY

Chain c `ustody 1212004-008

From:	Aquatic Bioassay and Consulting Labs. 29 N. Olive St. Ventura, CA 93001	**Phone:** **Fax:** **Project ID:**	(805) 643-5621 (805) 643-2930 **City of Malibu ASBS**
To:	**Company:** **Address:** **Phone:**	PHYSIS Laboratories 1904 East Wright Circle Anaheim, CA 92806 **(714) 335-5918**	

Sample I.D. No.	Sample Date	Time	Matrix	No.	Reps	Ammonia	Nitrate & Orthophosphate	Oil & Grease	TSS	+ Dissolved Total Metals Metals including Hg by EPA 1640	PAHs, OP Pesticides & Pyrethroid Pesticides			
~~24-BB-01Z~~			~~FW~~	~~2~~	~~1~~			~~1~~	~~1~~					
24-BB-02Z	1-31-16	1058	FW	2	1			1	1					
24-BB-03Z	1-31-16	1032	FW	7	1	1	1	1	1	1	2			
24-BB-03R	1-30-16	1050	SW	7	1	1	1	1	1	1	2			
24-BB-03R	1-31-16	1050	SW	7	1	1	1	1	1	1	2			

Special Instructions: Please email results to Karin Patrick at karin @aquabio.org

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	1-31-16	1300	[signature]	2/1/16	755						

Rich Hanken

From:	Karin Patrick
Sent:	Wednesday, February 03, 2016 12:43 PM
To:	Rich Hanken
Cc:	Project Managers
Subject:	RE: ABC City of Malibu ASBS 1212004-008 COC and SRS
Follow Up Flag:	Follow up
Flag Status:	Flagged
Categories:	Important

Hi Rich,

Please analyze both total and dissolved metals. Right before sampling began, the City decided they wanted both analyzed, even though the dissolved fraction wasn't required by ASBS. Sorry about the discrepancy and thank you for checking.

Karin

aquatic bioassay & consulting laboratories, inc
Karin Wisenbaker
Senior Biologist, Data Quality Manager
karin@aquabio.org · (805) 643-5621 x17
29 north olive · ventura · ca 93001
www.aquabio.org

From: Rich Hanken [mailto:richhanken@physislabs.com]
Sent: Wednesday, February 03, 2016 11:32 AM
To: Karin Patrick
Cc: Project Managers
Subject: ABC City of Malibu ASBS 1212004-008 COC and SRS

Hello Karin,

I'm sorry but I forgot to check with you first but we have already filtered the 3 metals samples but we did notice that there is a discrepancy between the COC and the bottles.

- COC is asking for Total & Dissolved Metals & Hg by EPA 1640.
- The Bottles have had the Dissolved part of the metals scratched out with a blank sharpie.

So please look at the COC and our SRS and please let us know if you still want us to analyze the Dissolved Metals part of the samples.

Thank you,

Rich

Richard G. Hanken
Business Manager - Project Integrator
(714) 602-5320 ext. 212

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Physis Project ID: 1212004-008

Sample Receipt Summary

Client: Aquatic Bioassay & Consulting Laboratories, Inc. | Date Received: 2/1/2016 | Received By: RGH | Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☐ Client	☑ Cooler ☐ Box Total #: 2	☐ BLUE ☑ WET ☐ DRY
Start ___ End ___ ☑ Other: Area Fast	☐ Other :	☐ None 0.6 °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)....................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)....................No

Notes:

Each of the Metals bottles had Dissolved scratched out but the COC specifically asked for Dissolved Metals.

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May 12, 2016

Karin Patrick
Aquatic Bioassay & Consulting Laboratories, Inc.
29 N. Olive Street
Ventura, CA 93001

Project Name: City of Malibu ASBS
Physis Project ID: 1212004-009

Dear Karin,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 3/12/2016. A total of 3 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

PROJECT SAMPLE LIST

Aquatic Bioassay & Consulting Laboratories, Inc. PHYSIS Project ID: 1212004-009

City of Malibu ASBS Total Samples: 3

PHYSIS ID	Sample ID	Description	Date	Time	Matrix
39567	24-BB-03R		3/10/2016	13:30	Seawater
39568	24-BB-03Z		3/11/2016	14:26	Freshwater
39569	24-BB-03R		3/11/2016	14:31	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 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: 39567-R1	**24-BB-03R**	**Matrix: Seawater**		**Sampled: 10-Mar-16 13:30**		**Received: 12-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18128		Prepared: 07-Apr-16		Analyzed: 07-Apr-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28033		Prepared: 12-Mar-16		Analyzed: 12-Mar-16
Total Orthophosphate as P	NA	0.03	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28045		Prepared: 12-Mar-16		Analyzed: 05-Apr-16
Nitrate as N	NA	0.1	0.01	0.02	mg/L	
	Method: SM 2540 D	Batch ID: C-29018		Prepared: 17-Mar-16		Analyzed: 17-Mar-16
Total Suspended Solids	NA	4.4	0.5	0.5	mg/L	
Sample ID: 39568-R1	**24-BB-03Z**	**Matrix: Freshwater**		**Sampled: 11-Mar-16 14:26**		**Received: 12-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18128		Prepared: 07-Apr-16		Analyzed: 07-Apr-16
Ammonia as N	NA	0.78	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28033		Prepared: 12-Mar-16		Analyzed: 12-Mar-16
Total Orthophosphate as P	NA	0.19	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28045		Prepared: 12-Mar-16		Analyzed: 05-Apr-16
Nitrate as N	NA	0.94	0.01	0.02	mg/L	
	Method: SM 2540 D	Batch ID: C-29018		Prepared: 17-Mar-16		Analyzed: 17-Mar-16
Total Suspended Solids	NA	211.4	0.5	0.5	mg/L	
Sample ID: 39569-R1	**24-BB-03R**	**Matrix: Seawater**		**Sampled: 11-Mar-16 14:31**		**Received: 12-Mar-16**
	Method: SM 4500-NH3 D	Batch ID: C-18128		Prepared: 07-Apr-16		Analyzed: 07-Apr-16
Ammonia as N	NA	ND	0.02	0.05	mg/L	
	Method: SM 4500-P E	Batch ID: C-28033		Prepared: 12-Mar-16		Analyzed: 12-Mar-16
Total Orthophosphate as P	NA	0.04	0.01	0.02	mg/L	
	Method: SM 4500-NO3 E	Batch ID: C-28045		Prepared: 12-Mar-16		Analyzed: 05-Apr-16
Nitrate as N	NA	0.05	0.01	0.02	mg/L	
	Method: SM 2540 D	Batch ID: C-29018		Prepared: 17-Mar-16		Analyzed: 17-Mar-16
Total Suspended Solids	NA	12.3	0.5	0.5	mg/L	

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Elements — ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39567-R1	**24-BB-03R** Method: EPA 1640	**Matrix: Seawater** Batch ID: E-10140		**Sampled: 10-Mar-16 13:30** Prepared: 02-May-16		**Received: 12-Mar-16** Analyzed: 05-May-16
Arsenic (As)	Total	1.575	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0294	0.0025	0.005	µg/L	
Chromium (Cr)	Total	0.2519	0.0125	0.025	µg/L	
Copper (Cu)	Total	0.239	0.005	0.01	µg/L	
Lead (Pb)	Total	0.0575	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.397	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.01	0.005	0.015	µg/L	J
Silver (Ag)	Total	0.1	0.01	0.02	µg/L	
Zinc (Zn)	Total	2.1802	0.0025	0.005	µg/L	
Sample ID: 39568-R1	**24-BB-03Z** Method: EPA 1640	**Matrix: Freshwater** Batch ID: E-10140		**Sampled: 11-Mar-16 14:26** Prepared: 02-May-16		**Received: 12-Mar-16** Analyzed: 05-May-16
Arsenic (As)	Total	6.203	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.4005	0.0025	0.005	µg/L	
Chromium (Cr)	Total	13.9122	0.0125	0.025	µg/L	
Copper (Cu)	Total	28.952	0.005	0.01	µg/L	
Lead (Pb)	Total	11.2257	0.0025	0.005	µg/L	
Mercury (Hg)	Total	0.0224	0.0012	0.005	µg/L	
Nickel (Ni)	Total	10.8771	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.198	0.005	0.015	µg/L	
Silver (Ag)	Total	ND	0.01	0.02	µg/L	
Zinc (Zn)	Total	112.326	0.0025	0.005	µg/L	
Sample ID: 39569-R1	**24-BB-03R** Method: EPA 1640	**Matrix: Seawater** Batch ID: E-10140		**Sampled: 11-Mar-16 14:31** Prepared: 02-May-16		**Received: 12-Mar-16** Analyzed: 05-May-16
Arsenic (As)	Total	2.607	0.005	0.015	µg/L	
Cadmium (Cd)	Total	0.0393	0.0025	0.005	µg/L	
Chromium (Cr)	Total	1.092	0.0125	0.025	µg/L	
Copper (Cu)	Total	1.011	0.005	0.01	µg/L	

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Elements

ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Lead (Pb)	Total	0.6868	0.0025	0.005	µg/L	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L	
Nickel (Ni)	Total	0.715	0.0025	0.005	µg/L	
Selenium (Se)	Total	0.021	0.005	0.015	µg/L	
Silver (Ag)	Total	0.09	0.01	0.02	µg/L	
Zinc (Zn)	Total	6.4486	0.0025	0.005	µg/L	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Sample ID: 39567-R1	**24-BB-03R** Method: EPA 625	**Matrix: Seawater** Batch ID: O-10002	**Sampled: 10-Mar-16 13:30** Prepared: 14-Mar-16		**Received: 12-Mar-16** Analyzed: 02-Apr-16	
(PCB030)	Total	59			% Recovery	
(PCB112)	Total	85			% Recovery	
(PCB198)	Total	82			% Recovery	
(TCMX)	Total	36			% 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: 39568-R1	**24-BB-03Z** Method: EPA 625	**Matrix: Freshwater** Batch ID: O-10002	**Sampled: 11-Mar-16 14:26** Prepared: 14-Mar-16		**Received: 12-Mar-16** Analyzed: 02-Apr-16	
(PCB030)	Total	57			% Recovery	
(PCB112)	Total	66			% Recovery	
(PCB198)	Total	69			% Recovery	

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Organophosphorus Pesticides ANALYTICAL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(TCMX)	Total	51			% 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: 39569-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 11-Mar-16 14:31** **Received: 12-Mar-16**
Method: EPA 625 Batch ID: O-10002 Prepared: 14-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(PCB030)	Total	61			% Recovery	
(PCB112)	Total	76			% Recovery	
(PCB198)	Total	74			% Recovery	
(TCMX)	Total	36			% 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	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 39567-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 10-Mar-16 13:30** **Received: 12-Mar-16**

Method: EPA 625 Batch ID: O-10002 Prepared: 14-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	71			% Recovery	
(d10-Phenanthrene)	Total	98			% Recovery	
(d12-Chrysene)	Total	121			% Recovery	
(d8-Naphthalene)	Total	49			% 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	1.5	1	5	ng/L	J
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	22.5	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	1.7	1	5	ng/L	J
Pyrene	Total	ND	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 39568-R1 **24-BB-03Z** **Matrix: Freshwater** **Sampled: 11-Mar-16 14:26** **Received: 12-Mar-16**
Method: EPA 625 Batch ID: O-10002 Prepared: 14-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	59			% Recovery	
(d10-Phenanthrene)	Total	80			% Recovery	
(d12-Chrysene)	Total	99			% Recovery	
(d8-Naphthalene)	Total	42			% Recovery	
1-Methylnaphthalene	Total	ND	1	5	ng/L	
1-Methylphenanthrene	Total	30.2	1	5	ng/L	
2,3,5-Trimethylnaphthalene	Total	ND	1	5	ng/L	
2,6-Dimethylnaphthalene	Total	1.1	1	5	ng/L	J
2-Methylnaphthalene	Total	1.7	1	5	ng/L	J
Acenaphthene	Total	ND	1	5	ng/L	
Acenaphthylene	Total	1.4	1	5	ng/L	J
Anthracene	Total	7.3	1	5	ng/L	
Benz[a]anthracene	Total	4.8	1	5	ng/L	J
Benzo[a]pyrene	Total	5.1	1	5	ng/L	
Benzo[b]fluoranthene	Total	16.1	1	5	ng/L	
Benzo[e]pyrene	Total	16.8	1	5	ng/L	
Benzo[g,h,i]perylene	Total	15.5	1	5	ng/L	
Benzo[k]fluoranthene	Total	3.7	1	5	ng/L	J
Biphenyl	Total	2.8	1	5	ng/L	J
Chrysene	Total	29.7	1	5	ng/L	
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	7.5	1	5	ng/L	
Fluoranthene	Total	23.9	1	5	ng/L	
Fluorene	Total	1.2	1	5	ng/L	J
Indeno[1,2,3-c,d]pyrene	Total	5.7	1	5	ng/L	
Naphthalene	Total	3.1	1	5	ng/L	J
Perylene	Total	11.1	1	5	ng/L	
Phenanthrene	Total	14.8	1	5	ng/L	
Pyrene	Total	27.3	1	5	ng/L	

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Polynuclear Aromatic Hydrocarbons ANALYTICAL REPORT

Sample ID: 39569-R1 **24-BB-03R** Method: EPA 625
Matrix: Seawater Batch ID: O-10002
Sampled: 11-Mar-16 14:31 Prepared: 14-Mar-16
Received: 12-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
(d10-Acenaphthene)	Total	65			% Recovery	
(d10-Phenanthrene)	Total	87			% Recovery	
(d12-Chrysene)	Total	110			% Recovery	
(d8-Naphthalene)	Total	45			% 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	1.5	1	5	ng/L	J
Benzo[a]pyrene	Total	ND	1	5	ng/L	
Benzo[b]fluoranthene	Total	5.5	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	1.6	1	5	ng/L	J
Dibenz[a,h]anthracene	Total	ND	1	5	ng/L	
Dibenzothiophene	Total	1.6	1	5	ng/L	J
Fluoranthene	Total	1.2	1	5	ng/L	J
Fluorene	Total	ND	1	5	ng/L	
Indeno[1,2,3-c,d]pyrene	Total	ND	1	5	ng/L	
Naphthalene	Total	1.5	1	5	ng/L	J
Perylene	Total	ND	1	5	ng/L	
Phenanthrene	Total	1.9	1	5	ng/L	J
Pyrene	Total	1.3	1	5	ng/L	J

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Pyrethroids ANALYTICAL REPORT

Sample ID: 39567-R1 **24-BB-03R** Method: EPA 625-NCI **Matrix: Seawater** Batch ID: O-10002 **Sampled: 10-Mar-16 13:30** Prepared: 14-Mar-16 **Received: 12-Mar-16** Analyzed: 07-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
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: 39568-R1 **24-BB-03Z** Method: EPA 625-NCI **Matrix: Freshwater** Batch ID: O-10002 **Sampled: 11-Mar-16 14:26** Prepared: 14-Mar-16 **Received: 12-Mar-16** Analyzed: 07-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	92.5	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: 39569-R1 **24-BB-03R** **Matrix: Seawater** **Sampled: 11-Mar-16 14:31** **Received: 12-Mar-16**

Method: EPA 625-NCI Batch ID: O-10002 Prepared: 14-Mar-16 Analyzed: 07-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	QA CODE
Allethrin	Total	ND	0.5	2	ng/L	
Bifenthrin	Total	1	0.5	2	ng/L	J
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: 39567-R1 — **24-BB-03R** — Method: EPA 1664B — **Matrix: Seawater** — Batch ID: C-19057 — **Sampled: 10-Mar-16 13:30** — Prepared: 06-Apr-16 — **Received: 12-Mar-16** — Analyzed: 06-Apr-16						
Oil & Grease	NA	ND	1	1	mg/L	
Sample ID: 39568-R1 — **24-BB-03Z** — Method: EPA 1664B — **Matrix: Freshwater** — Batch ID: C-19057 — **Sampled: 11-Mar-16 14:26** — Prepared: 06-Apr-16 — **Received: 12-Mar-16** — Analyzed: 06-Apr-16						
Oil & Grease	NA	1.7	1	1	mg/L	
Sample ID: 39569-R1 — **24-BB-03R** — Method: EPA 1664B — **Matrix: Seawater** — Batch ID: C-19057 — **Sampled: 11-Mar-16 14:31** — Prepared: 06-Apr-16 — **Received: 12-Mar-16** — Analyzed: 06-Apr-16						
Oil & Grease	NA	ND	1	1	mg/L	

QUALITY CONTROL REPORT

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Conventionals QUALITY CONTROL REPORT

Ammonia as N Method: SM 4500-NH3 D Fraction: NA Prepared: 07-Apr-16 Analyzed: 07-Apr-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
39565-B1	QAQC Procedural Blank	C-18128	ND	0.02	0.05	mg/L							
39565-BS1	QAQC Procedural Blank	C-18128	0.24	0.02	0.05	mg/L	0.25	0	96	80 - 120% PASS			
39565-BS2	QAQC Procedural Blank	C-18128	0.26	0.02	0.05	mg/L	0.25	0	104	80 - 120% PASS	8	25 PASS	
39567-MS1	24-BB-03R	C-18128	0.29	0.02	0.05	mg/L	0.25	0.01	112	80 - 120% PASS			
39567-MS2	24-BB-03R	C-18128	0.25	0.02	0.05	mg/L	0.25	0.01	96	80 - 120% PASS	15	25 PASS	
39567-R2	24-BB-03R	C-18128	0.02	0.02	0.05	mg/L					0	25 PASS	J

Nitrate as N Method: SM 4500-NO3 E Fraction: NA Prepared: 12-Mar-16 Analyzed: 05-Apr-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
39565-B1	QAQC Procedural Blank	C-28045	ND	0.01	0.02	mg/L							
39565-BS1	QAQC Procedural Blank	C-28045	0.56	0.01	0.02	mg/L	0.5	0	112	80 - 120% PASS			
39565-BS2	QAQC Procedural Blank	C-28045	0.56	0.01	0.02	mg/L	0.5	0	112	80 - 120% PASS	0	25 PASS	
39567-MS1	24-BB-03R	C-28045	0.67	0.01	0.02	mg/L	0.5	0.1	114	80 - 120% PASS			
39567-MS2	24-BB-03R	C-28045	0.67	0.01	0.02	mg/L	0.5	0.1	114	80 - 120% PASS	0	25 PASS	
39567-R2	24-BB-03R	C-28045	0.1	0.01	0.02	mg/L					0	25 PASS	

Total Orthophosphate as P Method: SM 4500-P E Fraction: NA Prepared: 12-Mar-16 Analyzed: 12-Mar-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
39565-B1	QAQC Procedural Blank	C-28033	ND	0.01	0.02	mg/L							
39565-BS1	QAQC Procedural Blank	C-28033	0.22	0.01	0.02	mg/L	0.2	0	110	80 - 120% PASS			
39565-BS2	QAQC Procedural Blank	C-28033	0.21	0.01	0.02	mg/L	0.2	0	105	80 - 120% PASS	5	25 PASS	
39567-MS1	24-BB-03R	C-28033	0.24	0.01	0.02	mg/L	0.2	0.03	105	80 - 120% PASS			
39567-MS2	24-BB-03R	C-28033	0.25	0.01	0.02	mg/L	0.2	0.03	110	80 - 120% PASS	5	25 PASS	
39567-R2	24-BB-03R	C-28033	0.03	0.01	0.02	mg/L					0	25 PASS	

Total Suspended Solids Method: SM 2540 D Fraction: NA Prepared: 17-Mar-16 Analyzed: 17-Mar-16

SAMPLE ID		BATCH ID	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
39565-B1	QAQC Procedural Blank	C-29018	ND	0.5	0.5	mg/L							
39568-R2	24-BB-03Z	C-29018	203.2	0.5	0.5	mg/L					4	25 PASS	

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Elements QUALITY CONTROL REPORT

Sample ID: 39565-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10140 Prepared: 02-May-16 Analyzed: 05-May-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
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: 39566-LCM1 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10140 Prepared: 02-May-16 Analyzed: 05-May-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Arsenic (As)	Total	1.659	0.005	0.015	µg/L							
Cadmium (Cd)	Total	0.0921	0.0025	0.005	µg/L							
Chromium (Cr)	Total	0.019	0.0125	0.025	µg/L							
Copper (Cu)	Total	0.108	0.005	0.01	µg/L							
Lead (Pb)	Total	0.0029	0.0025	0.005	µg/L							
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L							
Nickel (Ni)	Total	0.3422	0.0025	0.005	µg/L							
Selenium (Se)	Total	0.028	0.005	0.015	µg/L							
Silver (Ag)	Total	0.08	0.01	0.02	µg/L							
Zinc (Zn)	Total	ND	0.0025	0.005	µg/L							

Sample ID: 39566-LCS1 **QAQC LCM - Physis Seawater** **Matrix: Seawater** **Sampled:** **Received:**
Method: EPA 1640 Batch ID: E-10140 Prepared: 02-May-16 Analyzed: 05-May-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
Arsenic (As)	Total	22.404	0.005	0.015	µg/L	20	1.659	104	75 - 125% PASS			
Cadmium (Cd)	Total	18.0335	0.0025	0.005	µg/L	20	0.0921	90	75 - 125% PASS			
Chromium (Cr)	Total	20.0541	0.0125	0.025	µg/L	20	0.019	100	75 - 125% PASS			
Copper (Cu)	Total	19.05	0.005	0.01	µg/L	20	0.108	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	18.6986	0.0025	0.005	µg/L	20	0.0029	93	75 - 125%	PASS				
Mercury (Hg)	Total	8.0247	0.0012	0.005	µg/L	10	0	80	75 - 125%	PASS				
Nickel (Ni)	Total	18.3229	0.0025	0.005	µg/L	20	0.3422	90	75 - 125%	PASS				
Selenium (Se)	Total	19.067	0.005	0.015	µg/L	20	0.028	95	75 - 125%	PASS				
Silver (Ag)	Total	7.51	0.01	0.02	µg/L	10	0.08	74	75 - 125%	PASS			PASS	Q
Zinc (Zn)	Total	19.2456	0.0025	0.005	µg/L	20	0	96	75 - 125%	PASS				
Sample ID: 39566-LCS2	**QAQC LCM - Physis Seawater** Method: EPA 1640				**Matrix: Seawater** Batch ID: E-10140			**Sampled:** Prepared: 02-May-16			**Received:** Analyzed: 05-May-16			
Arsenic (As)	Total	22.421	0.005	0.015	µg/L	20	1.659	104	75 - 125%	PASS	0	25	PASS	
Cadmium (Cd)	Total	18.1639	0.0025	0.005	µg/L	20	0.0921	90	75 - 125%	PASS	0	25	PASS	
Chromium (Cr)	Total	20.3097	0.0125	0.025	µg/L	20	0.019	101	75 - 125%	PASS	1	25	PASS	
Copper (Cu)	Total	19.044	0.005	0.01	µg/L	20	0.108	95	75 - 125%	PASS	0	25	PASS	
Lead (Pb)	Total	18.0551	0.0025	0.005	µg/L	20	0.0029	90	75 - 125%	PASS	3	25	PASS	
Mercury (Hg)	Total	7.8574	0.0012	0.005	µg/L	10	0	79	75 - 125%	PASS	1	25	PASS	
Nickel (Ni)	Total	18.2737	0.0025	0.005	µg/L	20	0.3422	90	75 - 125%	PASS	0	25	PASS	
Selenium (Se)	Total	18.863	0.005	0.015	µg/L	20	0.028	94	75 - 125%	PASS	1	25	PASS	
Silver (Ag)	Total	7.53	0.01	0.02	µg/L	10	0.08	75	75 - 125%	PASS	0	25	PASS	
Zinc (Zn)	Total	20.0188	0.0025	0.005	µg/L	20	0	100	75 - 125%	PASS	4	25	PASS	
Sample ID: 39567-R2	**24-BB-03R** Method: EPA 1640				**Matrix: Seawater** Batch ID: E-10140			**Sampled: 10-Mar-16 13:30** Prepared: 02-May-16			**Received: 12-Mar-16** Analyzed: 05-May-16			
Arsenic (As)	Total	1.572	0.005	0.015	µg/L						0	25	PASS	
Cadmium (Cd)	Total	0.0257	0.0025	0.005	µg/L						13	25	PASS	
Chromium (Cr)	Total	0.2929	0.0125	0.025	µg/L						15	25	PASS	
Copper (Cu)	Total	0.253	0.005	0.01	µg/L						6	25	PASS	
Lead (Pb)	Total	0.0655	0.0025	0.005	µg/L						13	25	PASS	
Mercury (Hg)	Total	ND	0.0012	0.005	µg/L						0	25	PASS	
Nickel (Ni)	Total	0.3771	0.0025	0.005	µg/L						5	25	PASS	
Selenium (Se)	Total	0.012	0.005	0.015	µg/L						18	25	PASS	J
Silver (Ag)	Total	0.09	0.01	0.02	µg/L						11	25	PASS	
Zinc (Zn)	Total	3.3321	0.0025	0.005	µg/L						42	25	FAIL	R

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Elements QUALITY CONTROL REPORT

Sample ID: 39568-R2 **24-BB-03Z** Method: EPA 1640
Matrix: Freshwater Batch ID: E-10140
Sampled: 11-Mar-16 14:26 Prepared: 02-May-16
Received: 12-Mar-16 Analyzed: 05-May-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS		QA CODE
Arsenic (As)	Total	5.361	0.005	0.015	µg/L					15	25	PASS	
Cadmium (Cd)	Total	0.5092	0.0025	0.005	µg/L					24	25	PASS	
Chromium (Cr)	Total	14.0812	0.0125	0.025	µg/L					1	25	PASS	
Copper (Cu)	Total	29.222	0.005	0.01	µg/L					1	25	PASS	
Lead (Pb)	Total	11.2382	0.0025	0.005	µg/L					0	25	PASS	
Mercury (Hg)	Total	0.0308	0.0012	0.005	µg/L					32	25	FAIL	SL
Nickel (Ni)	Total	10.923	0.0025	0.005	µg/L					0	25	PASS	
Selenium (Se)	Total	0.179	0.005	0.015	µg/L					10	25	PASS	
Silver (Ag)	Total	0.01	0.01	0.02	µg/L					0	25	PASS	J
Zinc (Zn)	Total	111.5703	0.0025	0.005	µg/L					1	25	PASS	

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Organophosphorus Pesticides QUALITY CONTROL REPORT

Sample ID: 39565-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-10002 Prepared: 11-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
(PCB030)	Total	74			% Recovery	100		74	57 - 133% PASS			
(PCB112)	Total	97			% Recovery	100		97	65 - 133% PASS			
(PCB198)	Total	106			% Recovery	100		106	69 - 133% PASS			
(TCMX)	Total	67			% Recovery	100		67	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: 39565-BS1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-10002 Prepared: 11-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS	PRECISION %	PRECISION LIMITS	QA CODE
(PCB030)	Total	79			% Recovery	100	0	79	57 - 133% PASS			
(PCB112)	Total	110			% Recovery	100	0	110	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	114			% Recovery	100	0	114	69 - 133%	PASS				
(TCMX)	Total	82			% Recovery	100	0	82	39 - 135%	PASS				
Bolstar (Sulprofos)	Total	479.7	2	4	ng/L	500	0	96	50 - 150%	PASS				
Chlorpyrifos	Total	463.6	0.5	1	ng/L	500	0	93	50 - 150%	PASS				
Demeton	Total	333.6	1	2	ng/L	500	0	67	50 - 150%	PASS				
Diazinon	Total	404.6	0.5	1	ng/L	500	0	81	50 - 150%	PASS				
Dichlorvos	Total	340.4	3	6	ng/L	500	0	68	50 - 150%	PASS				
Dimethoate	Total	380.4	5	10	ng/L	500	0	76	50 - 150%	PASS				
Disulfoton	Total	280.2	1	2	ng/L	500	0	56	50 - 150%	PASS				
Ethoprop (Ethoprofos)	Total	403.2	1	2	ng/L	500	0	81	50 - 150%	PASS				
Fenchlorphos (Ronnel)	Total	454.5	2	4	ng/L	500	0	91	50 - 150%	PASS				
Fensulfothion	Total	612	1	2	ng/L	500	0	122	50 - 150%	PASS				
Fenthion	Total	450.7	2	4	ng/L	500	0	90	50 - 150%	PASS				
Malathion	Total	421.1	3	6	ng/L	500	0	84	50 - 150%	PASS				
Methidathion	Total	455.9	5	10	ng/L	500	0	91	50 - 150%	PASS				
Methyl parathion	Total	580.4	1	2	ng/L	500	0	116	50 - 150%	PASS				
Mevinphos (Phosdrin)	Total	322.9	5	10	ng/L	500	0	65	50 - 150%	PASS				
Phorate	Total	439.8	5	10	ng/L	500	0	88	50 - 150%	PASS				
Phosmet	Total	421.5	5	10	ng/L	500	0	84	50 - 150%	PASS				
Tetrachlorvinphos (Stirofos)	Total	474.6	2	4	ng/L	500	0	95	50 - 150%	PASS				
Tokuthion	Total	472.2	3	6	ng/L	500	0	94	50 - 150%	PASS				
Trichloronate	Total	445.4	1	2	ng/L	500	0	89	50 - 150%	PASS				

Sample ID: 39565-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625 Batch ID: O-10002 Prepared: 11-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
(PCB030)	Total	77			% Recovery	100	0	77	57 - 133%	PASS	3	30	PASS	
(PCB112)	Total	89			% Recovery	100	0	89	65 - 133%	PASS	21	30	PASS	
(PCB198)	Total	89			% Recovery	100	0	89	69 - 133%	PASS	25	30	PASS	
(TCMX)	Total	79			% Recovery	100	0	79	39 - 135%	PASS	4	30	PASS	
Bolstar (Sulprofos)	Total	473.7	2	4	ng/L	500	0	95	50 - 150%	PASS	1	25	PASS	
Chlorpyrifos	Total	469.8	0.5	1	ng/L	500	0	94	50 - 150%	PASS	1	25	PASS	
Demeton	Total	331.6	1	2	ng/L	500	0	66	50 - 150%	PASS	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
Diazinon	Total	397.3	0.5	1	ng/L	500	0	79	50 - 150%	PASS	2	25	PASS	
Dichlorvos	Total	330.5	3	6	ng/L	500	0	66	50 - 150%	PASS	3	25	PASS	
Dimethoate	Total	393.8	5	10	ng/L	500	0	79	50 - 150%	PASS	4	25	PASS	
Disulfoton	Total	248.8	1	2	ng/L	500	0	50	50 - 150%	PASS	11	25	PASS	
Ethoprop (Ethoprofos)	Total	400.1	1	2	ng/L	500	0	80	50 - 150%	PASS	1	25	PASS	
Fenchlorphos (Ronnel)	Total	448	2	4	ng/L	500	0	90	50 - 150%	PASS	1	25	PASS	
Fensulfothion	Total	642.3	1	2	ng/L	500	0	128	50 - 150%	PASS	5	25	PASS	
Fenthion	Total	445.8	2	4	ng/L	500	0	89	50 - 150%	PASS	1	25	PASS	
Malathion	Total	427.3	3	6	ng/L	500	0	85	50 - 150%	PASS	1	25	PASS	
Methidathion	Total	446.8	5	10	ng/L	500	0	89	50 - 150%	PASS	2	25	PASS	
Methyl parathion	Total	581.7	1	2	ng/L	500	0	116	50 - 150%	PASS	0	25	PASS	
Mevinphos (Phosdrin)	Total	332.7	5	10	ng/L	500	0	67	50 - 150%	PASS	3	25	PASS	
Phorate	Total	438.8	5	10	ng/L	500	0	88	50 - 150%	PASS	0	25	PASS	
Phosmet	Total	410.9	5	10	ng/L	500	0	82	50 - 150%	PASS	2	25	PASS	
Tetrachlorvinphos (Stirofos)	Total	475.5	2	4	ng/L	500	0	95	50 - 150%	PASS	0	25	PASS	
Tokuthion	Total	465.1	3	6	ng/L	500	0	93	50 - 150%	PASS	1	25	PASS	
Trichloronate	Total	449.8	1	2	ng/L	500	0	90	50 - 150%	PASS	1	25	PASS	

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 39565-B1 **QAQC Procedural Blank** Method: EPA 625 **Matrix: DI Water** Batch ID: O-10002 **Sampled:** Prepared: 11-Mar-16 **Received:** Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(d10-Acenaphthene)	Total	63			% Recovery	100		63	65 - 113%	FAIL			R
(d10-Phenanthrene)	Total	86			% Recovery	100		86	80 - 111%	PASS			
(d12-Chrysene)	Total	97			% Recovery	100		97	60 - 139%	PASS			
(d8-Naphthalene)	Total	44			% Recovery	100		44	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: 39565-BS1 **QAQC Procedural Blank** Method: EPA 625 **Matrix: DI Water** Batch ID: O-10002 **Sampled:** Prepared: 11-Mar-16 **Received:** Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(d10-Acenaphthene)	Total	77			% Recovery	100	0	77	65 - 113%	PASS			
(d10-Phenanthrene)	Total	97			% Recovery	100	0	97	80 - 111%	PASS			
(d12-Chrysene)	Total	117			% Recovery	100	0	117	60 - 139%	PASS			
(d8-Naphthalene)	Total	58			% Recovery	100	0	58	44 - 119%	PASS			
1-Methylnaphthalene	Total	307.2	1	5	ng/L	500	0	61	50 - 150%	PASS			
1-Methylphenanthrene	Total	545.2	1	5	ng/L	500	0	109	50 - 150%	PASS			
2,3,5-Trimethylnaphthalene	Total	404.1	1	5	ng/L	500	0	81	50 - 150%	PASS			
2,6-Dimethylnaphthalene	Total	354.1	1	5	ng/L	500	0	71	50 - 150%	PASS			
2-Methylnaphthalene	Total	871.6	1	5	ng/L	1500	0	58	50 - 150%	PASS			
Acenaphthene	Total	1076.6	1	5	ng/L	1500	0	72	50 - 150%	PASS			
Acenaphthylene	Total	1097.2	1	5	ng/L	1500	0	73	50 - 150%	PASS			
Anthracene	Total	1707.5	1	5	ng/L	1500	0	114	50 - 150%	PASS			
Benz[a]anthracene	Total	1883.1	1	5	ng/L	1500	0	126	50 - 150%	PASS			
Benzo[a]pyrene	Total	1993.4	1	5	ng/L	1500	0	133	50 - 150%	PASS			
Benzo[b]fluoranthene	Total	1912.3	1	5	ng/L	1500	0	127	50 - 150%	PASS			
Benzo[e]pyrene	Total	702	1	5	ng/L	500	0	140	50 - 150%	PASS			
Benzo[g,h,i]perylene	Total	1744.1	1	5	ng/L	1500	0	116	50 - 150%	PASS			
Benzo[k]fluoranthene	Total	1982.9	1	5	ng/L	1500	0	132	50 - 150%	PASS			
Biphenyl	Total	349.6	1	5	ng/L	500	0	70	50 - 150%	PASS			
Chrysene	Total	1887.5	1	5	ng/L	1500	0	126	50 - 150%	PASS			
Dibenz[a,h]anthracene	Total	1814.3	1	5	ng/L	1500	0	121	50 - 150%	PASS			
Dibenzothiophene	Total	523.3	1	5	ng/L	500	0	105	50 - 150%	PASS			
Fluoranthene	Total	1703.7	1	5	ng/L	1500	0	114	50 - 150%	PASS			
Fluorene	Total	1306.1	1	5	ng/L	1500	0	87	50 - 150%	PASS			
Indeno[1,2,3-c,d]pyrene	Total	1734.4	1	5	ng/L	1500	0	116	50 - 150%	PASS			
Naphthalene	Total	743.1	1	5	ng/L	1500	0	50	50 - 150%	PASS			
Perylene	Total	706.2	1	5	ng/L	500	0	141	50 - 150%	PASS			
Phenanthrene	Total	1478.9	1	5	ng/L	1500	0	99	50 - 150%	PASS			
Pyrene	Total	1704.6	1	5	ng/L	1500	0	114	50 - 150%	PASS			

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Polynuclear Aromatic Hydrocarbons QUALITY CONTROL REPORT

Sample ID: 39565-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625 Batch ID: O-10002 Prepared: 11-Mar-16 Analyzed: 02-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
(d10-Acenaphthene)	Total	75			% Recovery	100	0	75	65 - 113%	PASS	3	30	PASS	
(d10-Phenanthrene)	Total	96			% Recovery	100	0	96	80 - 111%	PASS	1	30	PASS	
(d12-Chrysene)	Total	116			% Recovery	100	0	116	60 - 139%	PASS	1	30	PASS	
(d8-Naphthalene)	Total	56			% Recovery	100	0	56	44 - 119%	PASS	4	30	PASS	
1-Methylnaphthalene	Total	295.6	1	5	ng/L	500	0	59	50 - 150%	PASS	3	25	PASS	
1-Methylphenanthrene	Total	536.3	1	5	ng/L	500	0	107	50 - 150%	PASS	2	25	PASS	
2,3,5-Trimethylnaphthalene	Total	386.9	1	5	ng/L	500	0	77	50 - 150%	PASS	5	25	PASS	
2,6-Dimethylnaphthalene	Total	339.3	1	5	ng/L	500	0	68	50 - 150%	PASS	4	25	PASS	
2-Methylnaphthalene	Total	843.1	1	5	ng/L	1500	0	56	50 - 150%	PASS	4	25	PASS	
Acenaphthene	Total	1052.1	1	5	ng/L	1500	0	70	50 - 150%	PASS	3	25	PASS	
Acenaphthylene	Total	1074.5	1	5	ng/L	1500	0	72	50 - 150%	PASS	1	25	PASS	
Anthracene	Total	1688.6	1	5	ng/L	1500	0	113	50 - 150%	PASS	1	25	PASS	
Benz[a]anthracene	Total	1840.7	1	5	ng/L	1500	0	123	50 - 150%	PASS	2	25	PASS	
Benzo[a]pyrene	Total	1946.2	1	5	ng/L	1500	0	130	50 - 150%	PASS	2	25	PASS	
Benzo[b]fluoranthene	Total	1887.1	1	5	ng/L	1500	0	126	50 - 150%	PASS	1	25	PASS	
Benzo[e]pyrene	Total	678	1	5	ng/L	500	0	136	50 - 150%	PASS	3	25	PASS	
Benzo[g,h,i]perylene	Total	1685.2	1	5	ng/L	1500	0	112	50 - 150%	PASS	4	25	PASS	
Benzo[k]fluoranthene	Total	1969	1	5	ng/L	1500	0	131	50 - 150%	PASS	1	25	PASS	
Biphenyl	Total	335	1	5	ng/L	500	0	67	50 - 150%	PASS	4	25	PASS	
Chrysene	Total	1860.3	1	5	ng/L	1500	0	124	50 - 150%	PASS	2	25	PASS	
Dibenz[a,h]anthracene	Total	1750.8	1	5	ng/L	1500	0	117	50 - 150%	PASS	3	25	PASS	
Dibenzothiophene	Total	506.4	1	5	ng/L	500	0	101	50 - 150%	PASS	4	25	PASS	
Fluoranthene	Total	1687.1	1	5	ng/L	1500	0	112	50 - 150%	PASS	2	25	PASS	
Fluorene	Total	1275.8	1	5	ng/L	1500	0	85	50 - 150%	PASS	2	25	PASS	
Indeno[1,2,3-c,d]pyrene	Total	1694.9	1	5	ng/L	1500	0	113	50 - 150%	PASS	3	25	PASS	
Naphthalene	Total	716.6	1	5	ng/L	1500	0	48	50 - 150%	PASS	4	25	PASS	Q
Perylene	Total	680.6	1	5	ng/L	500	0	136	50 - 150%	PASS	4	25	PASS	
Phenanthrene	Total	1447.8	1	5	ng/L	1500	0	97	50 - 150%	PASS	2	25	PASS	
Pyrene	Total	1701.9	1	5	ng/L	1500	0	113	50 - 150%	PASS	1	25	PASS	

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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature
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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: 39565-B1	**QAQC Procedural Blank** Method: EPA 625-NCI				**Matrix: DI Water** Batch ID: O-10002		**Sampled:** Prepared: 11-Mar-16			**Received:** Analyzed: 06-Apr-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: 39565-BS1	**QAQC Procedural Blank** Method: EPA 625-NCI				**Matrix: DI Water** Batch ID: O-10002		**Sampled:** Prepared: 11-Mar-16			**Received:** Analyzed: 06-Apr-16		
Allethrin	Total	500.5	0.5	2	ng/L	500	0	100	50 - 150%	PASS		
Bifenthrin	Total	428	0.5	2	ng/L	500	0	86	50 - 150%	PASS		
Cyfluthrin	Total	596.5	0.5	2	ng/L	500	0	119	50 - 150%	PASS		
Cyhalothrin, Total Lambda	Total	572.4	0.5	2	ng/L	500	0	114	50 - 150%	PASS		
Cypermethrin	Total	579.1	0.5	2	ng/L	500	0	116	50 - 150%	PASS		
Danitol (Fenpropathrin)	Total	598.9	0.3	2	ng/L	500	0	120	50 - 150%	PASS		
Deltamethrin/Tralomethrin	Total	519.3	0.5	2	ng/L	500	0	104	50 - 150%	PASS		
Esfenvalerate	Total	590	0.5	2	ng/L	500	0	118	50 - 150%	PASS		
Fenvalerate	Total	578	0.5	2	ng/L	500	0	116	50 - 150%	PASS		
Fluvalinate	Total	553.1	0.5	2	ng/L	500	0	111	50 - 150%	PASS		
Permethrin, cis-	Total	183.8	2	4	ng/L	133.5	0	138	50 - 150%	PASS		
Permethrin, trans-	Total	402.4	1	2	ng/L	358	0	112	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	496.6	0.5	2	ng/L	500	0	99	50 - 150%	PASS				
Resmethrin	Total	0	5	10	ng/L	500	0	0	50 - 150%	PASS			PASS	Q

Sample ID: 39565-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**

Method: EPA 625-NCI Batch ID: O-10002 Prepared: 11-Mar-16 Analyzed: 06-Apr-16

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS		QA CODE
Allethrin	Total	463.8	0.5	2	ng/L	500	0	93	50 - 150%	PASS	7	25	PASS	
Bifenthrin	Total	401.9	0.5	2	ng/L	500	0	80	50 - 150%	PASS	7	25	PASS	
Cyfluthrin	Total	521.6	0.5	2	ng/L	500	0	104	50 - 150%	PASS	13	25	PASS	
Cyhalothrin, Total Lambda	Total	553.6	0.5	2	ng/L	500	0	111	50 - 150%	PASS	3	25	PASS	
Cypermethrin	Total	527.6	0.5	2	ng/L	500	0	106	50 - 150%	PASS	9	25	PASS	
Danitol (Fenpropathrin)	Total	575.2	0.3	2	ng/L	500	0	115	50 - 150%	PASS	4	25	PASS	
Deltamethrin/Tralomethrin	Total	451.2	0.5	2	ng/L	500	0	90	50 - 150%	PASS	14	25	PASS	
Esfenvalerate	Total	525.2	0.5	2	ng/L	500	0	105	50 - 150%	PASS	12	25	PASS	
Fenvalerate	Total	498.4	0.5	2	ng/L	500	0	100	50 - 150%	PASS	15	25	PASS	
Fluvalinate	Total	468.9	0.5	2	ng/L	500	0	94	50 - 150%	PASS	17	25	PASS	
Permethrin, cis-	Total	139.8	2	4	ng/L	133.5	0	105	50 - 150%	PASS	27	25	PASS	Q
Permethrin, trans-	Total	385.7	1	2	ng/L	358	0	108	50 - 150%	PASS	4	25	PASS	
Prallethrin	Total	458.5	0.5	2	ng/L	500	0	92	50 - 150%	PASS	7	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: 39565-B1	**QAQC Procedural Blank** Method: EPA 1664B				**Matrix: DI Water** Batch ID: C-19057			**Sampled:** Prepared: 06-Apr-16			**Received:** Analyzed: 06-Apr-16			
Oil & Grease	NA	ND	1	1	mg/L									
Sample ID: 39565-BS1	**QAQC Procedural Blank** Method: EPA 1664B				**Matrix: DI Water** Batch ID: C-19057			**Sampled:** Prepared: 06-Apr-16			**Received:** Analyzed: 06-Apr-16			
Oil & Grease	NA	35.1	1	1	mg/L	40	0	88	80 - 120%	PASS				
Sample ID: 39565-BS2	**QAQC Procedural Blank** Method: EPA 1664B				**Matrix: DI Water** Batch ID: C-19057			**Sampled:** Prepared: 06-Apr-16			**Received:** Analyzed: 06-Apr-16			
Oil & Grease	NA	36.2	1	1	mg/L	40	0	91	80 - 120%	PASS	2	25	PASS	

CHAIN OF CUSTODY

Chain of (stody 1212004-009

From:	Aquatic Bioassay and Consulting Labs. 29 N. Olive St. Ventura, CA 93001	Phone: (805) 643-5621 Fax: (805) 643-2930 Project ID: City of Malibu ASBS	To:	Company: PHYSIS Laboratories Address: 1904 East Wright Circle Anaheim, CA 92806 Phone: (714) 335-5918

Sample I.D. No.	Sample Date	Time	Matrix	No.	Reps	ANALYSIS: Ammonia	Nitrate & Orthophosphate	Oil & Grease	TSS	Total Metals Metals including Hg by EPA 1640	PAHs, OP Pesticides & Pyrethroid Pesticides			
24-BB-03R	03/10/16	1330	sw	7	1	1	1	1	1	1	2			

Special Instructions: Please email results to Karin Patrick at karin @aquabio.org

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	3-11-16	1605	Kelly [signature]	3.12.16	9:30 AM						

Chai f Custody

From: Aquatic Bioassay and Consulting Labs. 29 N. Olive St. Ventura, CA 93001	**Phone:** (805) 643-5621 **Fax:** (805) 643-2930 **Project ID:** **City of Malibu ASBS**	**To:**	**Company:** PHYSIS Laboratories **Address:** 1904 East Wright Circle Anaheim, CA 92806 **Phone:** **(714) 335-5918**

Sample I.D. No.	Sample Date	Time	Matrix	No.	Reps	ANALYSIS: Ammonia	Nitrate & Orthophosphate	Oil & Grease	TSS	Total Metals Metals including Hg by EPA 1640	PAHs, OP Pesticides & Pyrethroid Pesticides			
~~24-BB-01Z~~			~~FW~~	~~2~~	~~1~~			~~1~~	~~1~~					
~~24-BB-02Z~~			~~FW~~	~~2~~	~~1~~			~~1~~	~~1~~					
24-BB-03Z	03.11.16	1426	FW	7	1	1	1	1	1	1	2			
24-BB-03R	03.11.16	1431	SW	7	1	1	1	1	1	1	2			

Special Instructions: Please email results to Karin Patrick at karin @aquabio.org

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[illegible signature]	03.11.16	1700	[illegible signature]	03.11.16	1700				[illegible signature]	3.12.16	9:30 AM

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ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

Physis Project ID: 1212004-009

Sample Receipt Summary

Client: Aquatic Bioassay & Consulting Laboratories, Inc. Date Received: 3/12/2016 Received By: KC Inspected By: RGH

Courier:	Cooler:	Temperature:
☐ Physis ☐ FEDEX ☐ UPS ☐ Client	☑ Cooler ☐ Box Total #: 2	☐ BLUE ☑ WET ☐ DRY
Start End ☑ Other: Area Fast	☐ Other :	☐ None 0.4 °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).........No

Notes:

APPENDIX B

2016 Toxicity Reports

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/30/2016
ABC LAB. NO.:	COM0116.219

CHRONIC MYTILUS 48 HOUR DEVELOPMENT BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	06-8899-9690	Test Type:	Development-Survival	Analyst:	
Start Date:	30 Jan-16 12:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	01 Feb-16 12:01	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	00-5377-5397	Code:	COM0116.219m	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	91m	Station:	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-9880-1606	Combined Proportion Norm	100	>100	NA	1.77%	1	Wilcoxon Rank Sum Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
01-1828-9773	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
02-9880-1606	Combined Proportion Norm	PMSD	0.01772	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	10	0.9609	0.9431	0.9787	0.9318	0.9955	0.007879	0.02491	2.59%	0.0%
100		10	0.9564	0.9423	0.9704	0.9318	0.9955	0.006218	0.01966	2.06%	0.47%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.9909	0.9591	0.9364	0.9955	0.9318	0.9591	0.9455	0.9955	0.9364	0.9591
100		0.9455	0.9591	0.9818	0.9591	0.95	0.9318	0.9455	0.9955	0.9591	0.9364

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	218/220	211/220	206/220	219/220	205/220	211/220	208/220	219/220	206/220	211/220
100		208/220	211/220	216/220	211/220	209/220	205/220	208/220	219/220	211/220	206/220

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-9880-1606	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	06-8899-9690	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	30 Jan-16 12:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	01 Feb-16 12:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	00-5377-5397	**Code:**	COM0116.219m	**Client:**	City of Malibu
Sample Date:	30 Jan-16 10:30	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	30 Jan-16 12:15	**Source:**	Bioassay Report		
Sample Age:	91m	**Station:**	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.77%	Passes combined proportion normal

Wilcoxon Rank Sum Two-Sample Test

Control vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	101	NA	6	18	0.3897	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.01772	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001593326	0.001593326	1	0.3282	0.5738	Non-Significant Effect
Error	0.087387	0.004854833	18			
Total	0.08898033		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.726	6.541	0.4286	Equal Variances
Variances	Mod Levene Equality of Variance	0.6321	8.285	0.4369	Equal Variances
Variances	Levene Equality of Variance	1.864	8.285	0.1890	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8582	0.866	0.0073	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.254	0.2235	0.0015	Non-normal Distribution
Distribution	D'Agostino Skewness	1.823	2.576	0.0683	Normal Distribution
Distribution	D'Agostino Kurtosis	0.2344	2.576	0.8147	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	3.379	9.21	0.1846	Normal Distribution
Distribution	Anderson-Darling A2 Normality	1.315	3.878	0.0016	Non-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	10	0.9609	0.9431	0.9787	0.9591	0.9318	0.9955	0.007879	2.59%	0.0%
100		10	0.9564	0.9423	0.9704	0.9545	0.9318	0.9955	0.006218	2.06%	0.47%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.386	1.33	1.442	1.367	1.307	1.503	0.02479	5.66%	0.0%
100		10	1.368	1.325	1.411	1.356	1.307	1.503	0.01887	4.36%	1.29%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.9909	0.9591	0.9364	0.9955	0.9318	0.9591	0.9455	0.9955	0.9364	0.9591
100		0.9455	0.9591	0.9818	0.9591	0.95	0.9318	0.9455	0.9955	0.9591	0.9364

Mussel Shell Development Test | Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-9880-1606	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.475	1.367	1.316	1.503	1.307	1.367	1.335	1.503	1.316	1.367
100		1.335	1.367	1.436	1.367	1.345	1.307	1.335	1.503	1.367	1.316

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	218/220	211/220	206/220	219/220	205/220	211/220	208/220	219/220	206/220	211/220
100		208/220	211/220	216/220	211/220	209/220	205/220	208/220	219/220	211/220	206/220

Analyst: BM QA: P

CETIS Analytical Report

Report Date: 03 Mar-16 10:23 (p 1 of 1)
Test Code: COM0116.219myt | 12-4500-3651

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-1828-9773	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	06-8899-9690	Test Type:	Development-Survival	Analyst:	
Start Date:	30 Jan-16 12:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	01 Feb-16 12:01	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	00-5377-5397	Code:	COM0116.219m	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	91m	Station:	24-BB-03R		

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	10	0.9609	0.9318	0.9955	0.007879	0.02492	2.59%	0.0%	2114	2200
100		10	0.9564	0.9318	0.9955	0.006218	0.01966	2.06%	0.47%	2104	2200

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.9909	0.9591	0.9364	0.9955	0.9318	0.9591	0.9455	0.9955	0.9364	0.9591
100		0.9455	0.9591	0.9818	0.9591	0.95	0.9318	0.9455	0.9955	0.9591	0.9364

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	218/220	211/220	206/220	219/220	205/220	211/220	208/220	219/220	206/220	211/220
100		208/220	211/220	216/220	211/220	209/220	205/220	208/220	219/220	211/220	206/220

CETIS Measurement Report

Report Date: 03 Mar-16 10:23 (p 1 of 2)
Test Code: COM0116.219myt | 12-4500-3651

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	06-8899-9690	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	30 Jan-16 12:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	01 Feb-16 12:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	00-5377-5397	**Code:**	COM0116.219m	**Client:**	City of Malibu
Sample Date:	30 Jan-16 10:30	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	30 Jan-16 12:15	**Source:**	Bioassay Report		
Sample Age:	91m	**Station:**	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
100		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
Overall		4	6.45			6.1	6.6				0 (0%)

Total Ammonia (N)-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
100		1	0			0	0	0	0		0
Overall		2	0			0	0				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.2	6.929	9.471	8.1	8.3	0.1	0.1414	1.73%	0
Overall		4	8.05			7.9	8.3				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.1
100		6.5	6.6

Total Ammonia (N)-mg/L

C-%	Control Type	1	2
0	Negative Contr	0	
100		0	

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.3	8.1

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

CHRONIC MYTILUS DEVELOPMENT BIOASSAY

DATE: January 30, 2016

STANDARD TOXICANT: Unionized Ammonia

NOEC = 0.05 mg/l

EC25 = 0.07992 mg/l
EC50 = 0.09689 mg/l

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 03 Mar-16 13:08 (p 1 of 1)
Test Code: MYT013016 | 04-7534-0938

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-2069-8179	Test Type:	Development-Survival	Analyst:	
Start Date:	30 Jan-16 12:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 12:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-0576-7469	Code:	MYT013016m	Client:	Internal Lab
Sample Date:	30 Jan-16 12:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-4254-6458	Combined Proportion Norm	0.05	0.075	0.06124	3.71%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
17-5392-8572	Combined Proportion Norm	EC5	0.05473	0.04952	0.05878		Linear Interpolation (ICPIN)
		EC10	0.06267	0.05781	0.06785		
		EC15	0.07062	0.06456	0.07743		
		EC20	0.07652	0.07179	0.07933		
		EC25	0.07992	0.07679	0.08252		
		EC40	0.0901	0.08731	0.09268		
		EC50	0.09689	0.09311	0.1005		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-4254-6458	Combined Proportion Norm	PMSD	0.03709	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.9582	0.9301	0.9862	0.9364	0.9955	0.0101	0.02259	2.36%	0.0%
0.028		5	0.9718	0.9416	1	0.9364	0.9955	0.01089	0.02435	2.51%	-1.42%
0.05		5	0.9455	0.9243	0.9666	0.9182	0.9591	0.007606	0.01701	1.8%	1.33%
0.075		5	0.7936	0.748	0.8392	0.75	0.8455	0.01643	0.03673	4.63%	17.17%
0.097		5	0.4809	0.4246	0.5373	0.4045	0.5227	0.0203	0.04539	9.44%	49.81%
0.119		5	0.2327	0.1736	0.2918	0.1727	0.2818	0.02129	0.04761	20.46%	75.71%

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9591	0.9455	0.9955	0.9364	0.9545
0.028		0.9773	0.9955	0.9591	0.9364	0.9909
0.05		0.9409	0.95	0.9591	0.9182	0.9591
0.075		0.8455	0.8045	0.7682	0.8	0.75
0.097		0.4909	0.5045	0.4818	0.5227	0.4045
0.119		0.2818	0.2318	0.2	0.2773	0.1727

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/220	208/220	219/220	206/220	210/220
0.028		215/220	219/220	211/220	206/220	218/220
0.05		207/220	209/220	211/220	202/220	211/220
0.075		186/220	177/220	169/220	176/220	165/220
0.097		108/220	111/220	106/220	115/220	89/220
0.119		62/220	51/220	44/220	61/220	38/220

CETIS Analytical Report

Report Date:	03 Mar-16 13:08 (p 1 of 2)
Test Code:	MYT013016 | 04-7534-0938

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-4254-6458	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	17-2069-8179	Test Type:	Development-Survival	Analyst:	
Start Date:	30 Jan-16 12:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 12:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-0576-7469	Code:	MYT013016m	Client:	Internal Lab
Sample Date:	30 Jan-16 12:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.71%	0.05	0.075	0.06124	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	0.028	-1.113	2.362	0.087	8	0.9879	CDF	Non-Significant Effect
	0.05	1.047	2.362	0.087	8	0.3992	CDF	Non-Significant Effect
	0.075*	7.507	2.362	0.087	8	<0.0001	CDF	Significant Effect
	0.097*	16.63	2.362	0.087	8	<0.0001	CDF	Significant Effect
	0.119*	23.85	2.362	0.087	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.03709	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.498189	0.6996378	5	208.6	<0.0001	Significant Effect
Error	0.08049809	0.003354087	24			
Total	3.578687		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.154	15.09	0.6762	Equal Variances
Variances	Mod Levene Equality of Variance	0.8286	4.248	0.5458	Equal Variances
Variances	Levene Equality of Variance	0.765	3.895	0.5840	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9869	0.9031	0.9651	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.07386	0.1853	1.0000	Normal Distribution
Distribution	D'Agostino Skewness	0.6561	2.576	0.5118	Normal Distribution
Distribution	D'Agostino Kurtosis	0.1005	2.576	0.9199	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.4406	9.21	0.8023	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.1774	3.878	0.9764	Normal Distribution

Combined Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.9582	0.9301	0.9862	0.9545	0.9364	0.9955	0.0101	2.36%	0.0%
0.028		5	0.9718	0.9416	1	0.9773	0.9364	0.9955	0.01089	2.51%	-1.42%
0.05		5	0.9455	0.9243	0.9666	0.95	0.9182	0.9591	0.007606	1.8%	1.33%
0.075		5	0.7936	0.748	0.8392	0.8	0.75	0.8455	0.01643	4.63%	17.17%
0.097		5	0.4809	0.4246	0.5373	0.4909	0.4045	0.5227	0.0203	9.44%	49.81%
0.119		5	0.2327	0.1736	0.2918	0.2318	0.1727	0.2818	0.02129	20.46%	75.71%

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-4254-6458	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.375	1.283	1.468	1.356	1.316	1.503	0.03316	5.39%	0.0%
0.028		5	1.416	1.321	1.512	1.419	1.316	1.503	0.03434	5.42%	-2.96%
0.05		5	1.337	1.292	1.382	1.345	1.281	1.367	0.01611	2.69%	2.79%
0.075		5	1.1	1.043	1.158	1.107	1.047	1.167	0.02056	4.18%	19.99%
0.097		5	0.7662	0.7095	0.8229	0.7763	0.6894	0.8081	0.02041	5.96%	44.3%
0.119		5	0.5018	0.4311	0.5724	0.5023	0.4286	0.5596	0.02544	11.34%	63.52%

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9591	0.9455	0.9955	0.9364	0.9545
0.028		0.9773	0.9955	0.9591	0.9364	0.9909
0.05		0.9409	0.95	0.9591	0.9182	0.9591
0.075		0.8455	0.8045	0.7682	0.8	0.75
0.097		0.4909	0.5045	0.4818	0.5227	0.4045
0.119		0.2818	0.2318	0.2	0.2773	0.1727

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.367	1.335	1.503	1.316	1.356
0.028		1.419	1.503	1.367	1.316	1.475
0.05		1.325	1.345	1.367	1.281	1.367
0.075		1.167	1.113	1.068	1.107	1.047
0.097		0.7763	0.7899	0.7672	0.8081	0.6894
0.119		0.5596	0.5023	0.4636	0.5546	0.4286

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/220	208/220	219/220	206/220	210/220
0.028		215/220	219/220	211/220	206/220	218/220
0.05		207/220	209/220	211/220	202/220	211/220
0.075		186/220	177/220	169/220	176/220	165/220
0.097		108/220	111/220	106/220	115/220	89/220
0.119		62/220	51/220	44/220	61/220	38/220

CETIS Analytical Report

Report Date:	03 Mar-16 13:08 (p 1 of 2)
Test Code:	MYT013016 | 04-7534-0938

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-5392-8572	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	17-2069-8179	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	30 Jan-16 12:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	01 Feb-16 12:00	**Species:**	Mytilis galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	03-0576-7469	**Code:**	MYT013016m	**Client:**	Internal Lab
Sample Date:	30 Jan-16 12:00	**Material:**	Copper chloride	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	0.05473	0.04952	0.05878
EC10	0.06267	0.05781	0.06785
EC15	0.07062	0.06456	0.07743
EC20	0.07652	0.07179	0.07933
EC25	0.07992	0.07679	0.08252
EC40	0.0901	0.08731	0.09268
EC50	0.09689	0.09311	0.1005

Combined Proportion Normal Summary — Calculated Variate(A/B)

C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.9582	0.9364	0.9955	0.0101	0.02259	2.36%	0.0%	1054	1100
0.028		5	0.9718	0.9364	0.9955	0.01089	0.02435	2.51%	-1.42%	1069	1100
0.05		5	0.9455	0.9182	0.9591	0.007606	0.01701	1.8%	1.33%	1040	1100
0.075		5	0.7936	0.75	0.8455	0.01643	0.03673	4.63%	17.17%	873	1100
0.097		5	0.4809	0.4045	0.5227	0.0203	0.04539	9.44%	49.81%	528	1100
0.119		5	0.2327	0.1727	0.2818	0.02129	0.04761	20.46%	75.71%	256	1100

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9591	0.9455	0.9955	0.9364	0.9545
0.028		0.9773	0.9955	0.9591	0.9364	0.9909
0.05		0.9409	0.95	0.9591	0.9182	0.9591
0.075		0.8455	0.8045	0.7682	0.8	0.75
0.097		0.4909	0.5045	0.4818	0.5227	0.4045
0.119		0.2818	0.2318	0.2	0.2773	0.1727

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/220	208/220	219/220	206/220	210/220
0.028		215/220	219/220	211/220	206/220	218/220
0.05		207/220	209/220	211/220	202/220	211/220
0.075		186/220	177/220	169/220	176/220	165/220
0.097		108/220	111/220	106/220	115/220	89/220
0.119		62/220	51/220	44/220	61/220	38/220

Analysis ID:	17-5392-8572	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Test Code: MYT013016 | 04-7534-0938

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	17-2069-8179	Test Type:	Development-Survival	Analyst:	
Start Date:	30 Jan-16 12:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 12:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-0576-7469	Code:	MYT013016m	Client:	Internal Lab
Sample Date:	30 Jan-16 12:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
0.028		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
0.05		2	6.3	6.298	6.302	6.3	6.3	0	0	0.0%	0
0.075		2	6.2	6.187	6.213	6.2	6.2	0	0	0.0%	0
0.097		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
0.119		2	6.3	6.298	6.302	6.3	6.3	0	0	0.0%	0
Overall		12	6.275			6.1	6.6				0 (0%)

Total Ammonia (N)-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
0.028		1	1.58			1.58	1.58	0	0	0.0%	0
0.05		1	2.88			2.88	2.88	0	0	0.0%	0
0.075		1	4.27			4.27	4.27	0	0	0.0%	0
0.097		1	5.56			5.56	5.56	0	0	0.0%	0
0.119		1	6.79			6.79	6.79	0	0	0.0%	0
Overall		6	3.513			0	6.79				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.028		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.05		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.075		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.097		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.119		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		12	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.028		2	34	34	34	34	34	0	0	0.0%	0
0.05		2	34	34	34	34	34	0	0	0.0%	0
0.075		2	34	34	34	34	34	0	0	0.0%	0
0.097		2	34	34	34	34	34	0	0	0.0%	0
0.119		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.028		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.05		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.075		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.097		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.119		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

Mussel Shell Development Test | Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.6	6.1
0.028		6.5	6.1
0.05		6.3	6.3
0.075		6.2	6.2
0.097		6.3	6.1
0.119		6.3	6.3

Total Ammonia (N)-mg/L

C-µg/L	Control Type	1
0	Negative Contr	0
0.028		1.58
0.05		2.88
0.075		4.27
0.097		5.56
0.119		6.79

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
0.028		7.9	7.9
0.05		7.9	7.9
0.075		7.9	7.9
0.097		7.9	7.9
0.119		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
0.028		34	34
0.05		34	34
0.075		34	34
0.097		34	34
0.119		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.8	14.7
0.028		14.8	14.7
0.05		14.8	14.7
0.075		14.8	14.7
0.097		14.8	14.7
0.119		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/30/2016
ABC LAB. NO.:	COM0116.219

CHRONIC SEA URCHIN FERTILIZATION 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: 03 Mar-16 10:24 (p 1 of 1)
Test Code: COM0116.219urc | 19-8391-2816

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	19-0666-4603	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:15	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:55	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-2142-5786	Code:	COM0116.219u	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	5h	Station:	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-2624-8228	Fertilization Rate	100	>100	NA	1.62%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
20-5841-5407	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
02-2624-8228	Fertilization Rate	Control Resp	0.9363	0.7 - NL	Yes	Passes Acceptability Criteria
20-5841-5407	Fertilization Rate	Control Resp	0.9363	0.7 - NL	Yes	Passes Acceptability Criteria
02-2624-8228	Fertilization Rate	PMSD	0.01615	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	8	0.9363	0.9222	0.9503	0.91	0.96	0.005957	0.01685	1.8%	0.0%
100		8	0.93	0.9152	0.9448	0.91	0.96	0.006268	0.01773	1.91%	0.67%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	0.92	0.95	0.93	0.91	0.96	0.95	0.93	0.94
100		0.93	0.91	0.92	0.96	0.93	0.95	0.91	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	92/100	95/100	93/100	91/100	96/100	95/100	93/100	94/100
100		93/100	91/100	92/100	96/100	93/100	95/100	91/100	93/100

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-2624-8228	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Parametric-Two Sample	Official Results:	Yes
Batch ID:	19-0666-4603	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:15	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:55	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	
Sample ID:	21-2142-5786	Code:	COM0116.219u	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	5h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.62%	Passes fertilization rate

Equal Variance t Two-Sample Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	0.6993	1.761	0.031	14	0.2479	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9363	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01615	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006184599	0.0006184599	1	0.489	0.4958	Non-Significant Effect
Error	0.01770687	0.001264776	14			
Total	0.01832533		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.094	8.885	0.9085	Equal Variances
Variances	Mod Levene Equality of Variance	0.09029	8.862	0.7682	Equal Variances
Variances	Levene Equality of Variance	0.04753	8.862	0.8306	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9561	0.8408	0.5918	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1479	0.2471	0.4796	Normal Distribution
Distribution	D'Agostino Skewness	0.7371	2.576	0.4610	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3335	3.878	0.5183	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	0.9363	0.9222	0.9503	0.935	0.91	0.96	0.005957	1.8%	0.0%
100		8	0.93	0.9152	0.9448	0.93	0.91	0.96	0.006268	1.91%	0.67%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	8	1.317	1.288	1.346	1.313	1.266	1.369	0.01229	2.64%	0.0%
100		8	1.305	1.275	1.335	1.303	1.266	1.369	0.01285	2.79%	0.94%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	0.92	0.95	0.93	0.91	0.96	0.95	0.93	0.94
100		0.93	0.91	0.92	0.96	0.93	0.95	0.91	0.93

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1.284	1.345	1.303	1.266	1.369	1.345	1.303	1.323
100		1.303	1.266	1.284	1.369	1.303	1.345	1.266	1.303

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-2624-8228	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Parametric-Two Sample	Official Results:	Yes

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	92/100	95/100	93/100	91/100	96/100	95/100	93/100	94/100
100		93/100	91/100	92/100	96/100	93/100	95/100	91/100	93/100

CETIS Analytical Report

Report Date: 03 Mar-16 10:24 (p 1 of 2)
Test Code: COM0116.219urc | 19-8391-2816

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-5841-5407	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	19-0666-4603	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:15	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:55	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-2142-5786	Code:	COM0116.219u	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	5h	Station:	24-BB-03R		

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	0.9363	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	8	0.9363	0.91	0.96	0.005957	0.01685	1.8%	0.0%	749	800
100		8	0.93	0.91	0.96	0.006268	0.01773	1.91%	0.67%	744	800

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	0.92	0.95	0.93	0.91	0.96	0.95	0.93	0.94
100		0.93	0.91	0.92	0.96	0.93	0.95	0.91	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	92/100	95/100	93/100	91/100	96/100	95/100	93/100	94/100
100		93/100	91/100	92/100	96/100	93/100	95/100	91/100	93/100

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-5841-5407	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 03 Mar-16 10:24 (p 1 of 1)
Test Code: COM0116.219urc | 19-8391-2816

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	19-0666-4603	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:15	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:55	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-2142-5786	Code:	COM0116.219u	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	5h	Station:	24-BB-03R		

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 Contr	2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
100		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
Overall		4	6.425			6.2	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	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		4	14.85			14.8	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.2
100		6.6	6.3

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.9	14.8
100		14.9	14.8

Analyst: M QA: P

aquatic bioassay & consulting laboratories, inc

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: January 30, 2016

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35.63 ug/l
EC50 = 46.44 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 03 Mar-16 13:08 (p 1 of 1)
Test Code: URC013016 | 19-1929-7816

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	03-7479-0296	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:10	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:50	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	08-6019-1671	Code:	URC013016u	Client:	Internal Lab
Sample Date:	30 Jan-16 15:10	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-5665-8892	Fertilization Rate	18	32	24	4.51%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
06-9720-2779	Fertilization Rate	EC5	22.22	21.59	22.8		Linear Interpolation (ICPIN)
		EC10	26.43	25.24	27.6		
		EC15	30.65	28.96	32.4		
		EC20	33.47	32.45	34.39		
		EC25	35.63	34.62	36.57		
		EC40	42.12	41.09	43.17		
		EC50	46.44	45.22	47.82		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-5665-8892	Fertilization Rate	Control Resp	0.93	0.7 - NL	Yes	Passes Acceptability Criteria
06-9720-2779	Fertilization Rate	Control Resp	0.93	0.7 - NL	Yes	Passes Acceptability Criteria
02-5665-8892	Fertilization Rate	PMSD	0.04509	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.93	0.904	0.956	0.91	0.95	0.008165	0.01633	1.76%	0.0%
18		4	0.9525	0.9127	0.9923	0.92	0.98	0.0125	0.025	2.63%	-2.42%
32		4	0.785	0.7691	0.8009	0.77	0.79	0.005	0.01	1.27%	15.59%
56		4	0.2625	0.2024	0.3226	0.21	0.29	0.01887	0.03775	14.38%	71.77%
100		4	0.065	0.0229	0.1071	0.03	0.09	0.01323	0.02646	40.7%	93.01%
180		4	0	0	0	0	0	0	0		100.0%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.93	0.95	0.93
18		0.96	0.98	0.95	0.92
32		0.77	0.79	0.79	0.79
56		0.26	0.29	0.29	0.21
100		0.06	0.08	0.09	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	93/100	95/100	93/100
18		96/100	98/100	95/100	92/100
32		77/100	79/100	79/100	79/100
56		26/100	29/100	29/100	21/100
100		6/100	8/100	9/100	3/100
180		0/100	0/100	0/100	0/100

Analyst: my QA: P

CETIS Analytical Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-5665-8892	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	03-7479-0296	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Jan-16 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Jan-16 15:50	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	
Sample ID:	08-6019-1671	**Code:**	URC013016u	**Client:**	Internal Lab
Sample Date:	30 Jan-16 15:10	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.51%	18	32	24	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		18	-1.657	2.356	0.075	6	0.9956	CDF	Non-Significant Effect
		32*	6.801	2.356	0.075	6	<0.0001	CDF	Significant Effect
		56*	24.2	2.356	0.075	6	<0.0001	CDF	Significant Effect
		100*	33.15	2.356	0.075	6	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.93	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04509	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.830179	0.9575447	4	476.2	<0.0001	Significant Effect
Error	0.03016081	0.00201072	15			
Total	3.86034		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.916	13.28	0.2055	Equal Variances
Variances	Mod Levene Equality of Variance	1.228	4.893	0.3405	Equal Variances
Variances	Levene Equality of Variance	1.275	4.893	0.3232	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9534	0.866	0.4210	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1423	0.2235	0.3605	Normal Distribution
Distribution	D'Agostino Skewness	0.9319	2.576	0.3514	Normal Distribution
Distribution	D'Agostino Kurtosis	0.2377	2.576	0.8121	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.925	9.21	0.6297	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4915	3.878	0.2229	Normal Distribution

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.93	0.904	0.956	0.93	0.91	0.95	0.008165	1.76%	0.0%
18		4	0.9525	0.9127	0.9923	0.955	0.92	0.98	0.0125	2.63%	-2.42%
32		4	0.785	0.7691	0.8009	0.79	0.77	0.79	0.005	1.27%	15.59%
56		4	0.2625	0.2024	0.3226	0.275	0.21	0.29	0.01887	14.38%	71.77%
100		4	0.065	0.0229	0.1071	0.07	0.03	0.09	0.01323	40.7%	93.01%
180		4	0	0	0	0	0	0	0		100.0%

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-5665-8892	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.304	1.253	1.356	1.303	1.266	1.345	0.01618	2.48%	0.0%
18		4	1.357	1.262	1.452	1.357	1.284	1.429	0.02998	4.42%	-4.03%
32		4	1.089	1.07	1.108	1.095	1.071	1.095	0.006036	1.11%	16.53%
56		4	0.5371	0.4676	0.6066	0.5519	0.476	0.5687	0.02185	8.14%	58.82%
100		4	0.2532	0.1611	0.3454	0.2671	0.1741	0.3047	0.02897	22.88%	80.58%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.17%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.93	0.95	0.93
18		0.96	0.98	0.95	0.92
32		0.77	0.79	0.79	0.79
56		0.26	0.29	0.29	0.21
100		0.06	0.08	0.09	0.03
180		0	0	0	0

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.266	1.303	1.345	1.303
18		1.369	1.429	1.345	1.284
32		1.071	1.095	1.095	1.095
56		0.5351	0.5687	0.5687	0.476
100		0.2475	0.2868	0.3047	0.1741
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	93/100	95/100	93/100
18		96/100	98/100	95/100	92/100
32		77/100	79/100	79/100	79/100
56		26/100	29/100	29/100	21/100
100		6/100	8/100	9/100	3/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 03 Mar-16 13:08 (p 1 of 2)
Test Code: URC013016 | 19-1929-7816

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	06-9720-2779	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	03-7479-0296	Test Type:	Fertilization	Analyst:	
Start Date:	30 Jan-16 15:10	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	30 Jan-16 15:50	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	08-6019-1671	Code:	URC013016u	Client:	Internal Lab
Sample Date:	30 Jan-16 15:10	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

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	0.93	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	22.22	21.59	22.8
EC10	26.43	25.24	27.6
EC15	30.65	28.96	32.4
EC20	33.47	32.45	34.39
EC25	35.63	34.62	36.57
EC40	42.12	41.09	43.17
EC50	46.44	45.22	47.82

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.93	0.91	0.95	0.008165	0.01633	1.76%	0.0%	372	400
18		4	0.9525	0.92	0.98	0.0125	0.025	2.63%	-2.42%	381	400
32		4	0.785	0.77	0.79	0.005	0.01	1.27%	15.59%	314	400
56		4	0.2625	0.21	0.29	0.01887	0.03775	14.38%	71.77%	105	400
100		4	0.065	0.03	0.09	0.01323	0.02646	40.7%	93.01%	26	400
180		4	0	0	0	0	0		100.0%	0	400

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.93	0.95	0.93
18		0.96	0.98	0.95	0.92
32		0.77	0.79	0.79	0.79
56		0.26	0.29	0.29	0.21
100		0.06	0.08	0.09	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	93/100	95/100	93/100
18		96/100	98/100	95/100	92/100
32		77/100	79/100	79/100	79/100
56		26/100	29/100	29/100	21/100
100		6/100	8/100	9/100	3/100
180		0/100	0/100	0/100	0/100

Analysis ID:	06-9720-2779	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 03 Mar-16 13:08 (p 1 of 2)
Test Code: URC013016 | 19-1929-7816

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	03-7479-0296	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Jan-16 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Jan-16 15:50	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	08-6019-1671	**Code:**	URC013016u	**Client:**	Internal Lab
Sample Date:	30 Jan-16 15:10	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

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-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
18		2	6.6	4.059	9.141	6.4	6.8	0.2	0.2828	4.29%	0
32		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
56		2	6.45	3.273	9.627	6.2	6.7	0.25	0.3536	5.48%	0
100		2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
180		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
Overall		12	6.475			6.1	6.8				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
56		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		12	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
56		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
18		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
32		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
56		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
180		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		12	14.85			14.8	14.9				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.6	6.2
18		6.8	6.4
32		6.6	6.3
56		6.7	6.2
100		6.8	6.1
180		6.7	6.3

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
18		7.9	7.9
32		7.9	7.9
56		7.9	7.9
100		7.9	7.9
180		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
18		34	34
32		34	34
56		34	34
100		34	34
180		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.9	14.8
18		14.9	14.8
32		14.9	14.8
56		14.9	14.8
100		14.9	14.8
180		14.9	14.8

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/30/2016
ABC LAB. NO.:	COM0116.219

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
GROWTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 03 Mar-16 10:23 (p 1 of 2)
Test Code: COM0116.219klp | 05-6869-6179

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	11-9831-0006	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	30 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	19-7888-4798	**Code:**	COM0116.219k	**Client:**	City of Malibu
Sample Date:	30 Jan-16 10:30	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	30 Jan-16 12:15	**Source:**	Bioassay Report		
Sample Age:	2h	**Station:**	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-3233-4902	Germination Rate	100	>100	NA	1.29%	1	Equal Variance t Two-Sample Test
17-6217-6370	Mean Length	100	>100	NA	1.06%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
11-1856-9860	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	
04-0833-9360	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
11-1856-9860	Germination Rate	Control Resp	0.911	0.7 - NL	Yes	Passes Acceptability Criteria
19-3233-4902	Germination Rate	Control Resp	0.911	0.7 - NL	Yes	Passes Acceptability Criteria
04-0833-9360	Mean Length	Control Resp	14.42	10 - NL	Yes	Passes Acceptability Criteria
17-6217-6370	Mean Length	Control Resp	14.42	10 - NL	Yes	Passes Acceptability Criteria
19-3233-4902	Germination Rate	PMSD	0.01293	NL - 0.2	No	Passes Acceptability Criteria
17-6217-6370	Mean Length	PMSD	0.01061	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	10	0.911	0.9018	0.9202	0.89	0.93	0.004069	0.01287	1.41%	0.0%
100		10	0.919	0.9076	0.9304	0.9	0.95	0.005044	0.01595	1.74%	-0.88%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	14.42	14.26	14.58	14	14.7	0.07272	0.23	1.6%	0.0%
100		10	14.55	14.44	14.66	14.4	14.9	0.05	0.1581	1.09%	-0.9%

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	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.91	0.9	0.89	0.93	0.91	0.9	0.92	0.91	0.93	0.91
100		0.9	0.93	0.91	0.95	0.93	0.92	0.91	0.93	0.91	0.9

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	14.7	14.3	14.4	14.6	14.4	14.6	14.5	14.6	14.1
100		14.4	14.4	14.5	14.5	14.9	14.6	14.5	14.4	14.6	14.7

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	91/100	90/100	89/100	93/100	91/100	90/100	92/100	91/100	93/100	91/100
100		90/100	93/100	91/100	95/100	93/100	92/100	91/100	93/100	91/100	90/100

CETIS Analytical Report

Report Date: 03 Mar-16 10:23 (p 1 of 3)
Test Code: COM0116.219klp | 05-6869-6179

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	19-3233-4902	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	11-9831-0006	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-7888-4798	Code:	COM0116.219k	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	2h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.29%	Passes germination rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	-1.247	1.734	0.021	18	0.8858	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.911	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01293	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001117231	0.001117231	1	1.555	0.2283	Non-Significant Effect
Error	0.01292996	0.0007183314	18			
Total	0.0140472		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.759	6.541	0.4128	Equal Variances
Variances	Mod Levene Equality of Variance	1.162	8.285	0.2953	Equal Variances
Variances	Levene Equality of Variance	1.138	8.285	0.3002	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9404	0.866	0.2442	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1474	0.2235	0.3067	Normal Distribution
Distribution	D'Agostino Skewness	1.235	2.576	0.2169	Normal Distribution
Distribution	D'Agostino Kurtosis	0.2746	2.576	0.7836	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.6	9.21	0.4494	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.5033	3.878	0.2088	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	0.911	0.9018	0.9202	0.91	0.89	0.93	0.004069	1.41%	0.0%
100		10	0.919	0.9076	0.9304	0.915	0.9	0.95	0.005044	1.74%	-0.88%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.269	1.252	1.285	1.266	1.233	1.303	0.007216	1.8%	0.0%
100		10	1.283	1.262	1.305	1.275	1.249	1.345	0.009571	2.36%	-1.18%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.91	0.9	0.89	0.93	0.91	0.9	0.92	0.91	0.93	0.91
100		0.9	0.93	0.91	0.95	0.93	0.92	0.91	0.93	0.91	0.9

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	19-3233-4902	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.266	1.249	1.233	1.303	1.266	1.249	1.284	1.266	1.303	1.266
100		1.249	1.303	1.266	1.345	1.303	1.284	1.266	1.303	1.266	1.249

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	91/100	90/100	89/100	93/100	91/100	90/100	92/100	91/100	93/100	91/100
100		90/100	93/100	91/100	95/100	93/100	92/100	91/100	93/100	91/100	90/100

CETIS Analytical Report

Report Date: 03 Mar-16 10:23 (p 3 of 3)
Test Code: COM0116.219klp | 05-6869-6179

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	17-6217-6370	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	11-9831-0006	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-7888-4798	Code:	COM0116.219k	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	2h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	1.06%	Passes mean length

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	-1.473	1.734	0.153	18	0.9210	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.42	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01061	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08449978	0.08449978	1	2.17	0.1580	Non-Significant Effect
Error	0.7010002	0.03894445	18			
Total	0.7854999		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.116	6.541	0.2796	Equal Variances
Variances	Mod Levene Equality of Variance	1.521	8.285	0.2334	Equal Variances
Variances	Levene Equality of Variance	1.391	8.285	0.2537	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9755	0.866	0.8631	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1174	0.2235	0.7091	Normal Distribution
Distribution	D'Agostino Skewness	0.5556	2.576	0.5785	Normal Distribution
Distribution	D'Agostino Kurtosis	0.3198	2.576	0.7491	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.411	9.21	0.8142	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2755	3.878	0.6875	Normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	14.42	14.26	14.58	14.45	14	14.7	0.07272	1.6%	0.0%
100		10	14.55	14.44	14.66	14.5	14.4	14.9	0.05	1.09%	-0.9%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	14.7	14.3	14.4	14.6	14.4	14.6	14.5	14.6	14.1
100		14.4	14.4	14.5	14.5	14.9	14.6	14.5	14.4	14.6	14.7

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	11-1856-9860	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	11-9831-0006	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	30 Jan-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	19-7888-4798	**Code:**	COM0116.219k	**Client:**	City of Malibu
Sample Date:	30 Jan-16 10:30	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	30 Jan-16 12:15	**Source:**	Bioassay Report		
Sample Age:	2h	**Station:**	24-BB-03R		

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	0.911	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	10	0.911	0.89	0.93	0.004069	0.01287	1.41%	0.0%	911	1000
100		10	0.919	0.9	0.95	0.005044	0.01595	1.74%	-0.88%	919	1000

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.91	0.9	0.89	0.93	0.91	0.9	0.92	0.91	0.93	0.91
100		0.9	0.93	0.91	0.95	0.93	0.92	0.91	0.93	0.91	0.9

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	91/100	90/100	89/100	93/100	91/100	90/100	92/100	91/100	93/100	91/100
100		90/100	93/100	91/100	95/100	93/100	92/100	91/100	93/100	91/100	90/100

Analysis ID:	11-1856-9860	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	04-0833-9360	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:19	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	11-9831-0006	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-7888-4798	Code:	COM0116.219k	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	2h	Station:	24-BB-03R		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	2007649	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.42	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	10	14.42	14	14.7	0.07272	0.23	1.6%	0.0%
100		10	14.55	14.4	14.9	0.05	0.1581	1.09%	-0.9%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	14.7	14.3	14.4	14.6	14.4	14.6	14.5	14.6	14.1
100		14.4	14.4	14.5	14.5	14.9	14.6	14.5	14.4	14.6	14.7

CETIS Measurement Report

Report Date: 03 Mar-16 10:23 (p 1 of 1)
Test Code: COM0116.219klp | 05-6869-6179

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	11-9831-0006	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:00	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-7888-4798	Code:	COM0116.219k	Client:	City of Malibu
Sample Date:	30 Jan-16 10:30	Material:	Sample Water	Project:	ASBS
Receive Date:	30 Jan-16 12:15	Source:	Bioassay Report		
Sample Age:	2h	Station:	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
100		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
Overall		4	6.425			6.2	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	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		4	14.85			14.8	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.6	6.2
100		6.6	6.3

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.9	14.8
100		14.9	14.8

aquatic bioassay & consulting laboratories, inc

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

DATE: January 30, 2016

STANDARD TOXICANT: Copper Chloride

ENDPOINT: GERMINATION

NOEC = 32.0 ug/l

EC25 = 109.5 ug/l
EC50 = 154.0 ug/l

ENDPOINT: GROWTH-LENGTH

NOEC = 32.0 ug/l

IC25 = 92.37 ug/l
IC50 = 212.9 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-8846-5278	Germination Rate	32	100	56.57	4.98%		Dunnett Multiple Comparison Test
15-2841-7232	Mean Length	32	100	56.57	2.75%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
20-5784-4435	Germination Rate	EC5	48.62	39.42	54.29		Linear Interpolation (ICPIN)
		EC10	66.11	55.03	76.59		
		EC15	83.61	69.05	102.2		
		EC20	100.6	83.31	109.7		
		EC25	109.5	99.11	118.8		
		EC40	136.2	127.2	148.6		
		EC50	154	142.5	169.6		
02-6683-0227	Mean Length	IC5	44.07	39.66	44.72		Linear Interpolation (ICPIN)
		IC10	56.15	52.01	57.44		
		IC15	68.22	63.84	70.23		
		IC20	80.3	75.8	82.98		
		IC25	92.37	87.56	95.72		
		IC40	191.5	184.1	198.6		
		IC50	212.9	206.8	218.9		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-8846-5278	Germination Rate	Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
20-5784-4435	Germination Rate	Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
02-6683-0227	Mean Length	Control Resp	14.5	10 - NL	Yes	Passes Acceptability Criteria
15-2841-7232	Mean Length	Control Resp	14.5	10 - NL	Yes	Passes Acceptability Criteria
15-2841-7232	Mean Length	NOEL	32	NL - 35	No	Passes Acceptability Criteria
19-8846-5278	Germination Rate	PMSD	0.04976	NL - 0.2	No	Passes Acceptability Criteria
15-2841-7232	Mean Length	PMSD	0.0275	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.92	0.9076	0.9324	0.91	0.93	0.004472	0.01	1.09%	0.0%
5.6		5	0.934	0.9083	0.9597	0.91	0.96	0.009274	0.02074	2.22%	-1.52%
10		5	0.94	0.9109	0.9691	0.91	0.96	0.01049	0.02345	2.5%	-2.17%
18		5	0.928	0.8997	0.9563	0.9	0.95	0.0102	0.0228	2.46%	-0.87%
32		5	0.93	0.9037	0.9563	0.9	0.95	0.009487	0.02121	2.28%	-1.09%
100		5	0.748	0.6958	0.8002	0.7	0.8	0.01881	0.04207	5.63%	18.7%
180		5	0.33	0.2322	0.4278	0.26	0.44	0.03521	0.07874	23.86%	64.13%
320		5	0	0	0	0	0	0	0		100.0%

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.5	14.16	14.84	14.1	14.8	0.1225	0.2739	1.89%	0.0%
5.6		5	14.46	14.22	14.7	14.2	14.7	0.08718	0.1949	1.35%	0.28%
10		5	14.58	14.3	14.86	14.3	14.9	0.102	0.228	1.56%	-0.55%
18		5	14.52	14.25	14.79	14.2	14.7	0.09695	0.2168	1.49%	-0.14%
32		5	14.6	14.4	14.8	14.4	14.8	0.07071	0.1581	1.08%	-0.69%
100		5	10.44	10.2	10.68	10.2	10.7	0.08718	0.1949	1.87%	28.0%
180		5	9.5	8.938	10.06	9	10.1	0.2025	0.4528	4.77%	34.48%
320		5	0	0	0	0	0	0	0		100.0%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.92	0.93	0.93	0.91
5.6		0.96	0.95	0.93	0.92	0.91
10		0.96	0.92	0.95	0.96	0.91
18		0.93	0.95	0.9	0.91	0.95
32		0.95	0.9	0.92	0.95	0.93
100		0.77	0.8	0.76	0.7	0.71
180		0.26	0.31	0.38	0.44	0.26
320		0	0	0	0	0

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.5	14.8	14.4	14.1
5.6		14.2	14.7	14.4	14.4	14.6
10		14.5	14.3	14.9	14.5	14.7
18		14.7	14.2	14.6	14.7	14.4
32		14.4	14.8	14.7	14.6	14.5
100		10.5	10.5	10.3	10.7	10.2
180		9.1	9.6	9	10.1	9.7
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	92/100	93/100	93/100	91/100
5.6		96/100	95/100	93/100	92/100	91/100
10		96/100	92/100	95/100	96/100	91/100
18		93/100	95/100	90/100	91/100	95/100
32		95/100	90/100	92/100	95/100	93/100
100		77/100	80/100	76/100	70/100	71/100
180		26/100	31/100	38/100	44/100	26/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	19-8846-5278	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.98%	32	100	56.57	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	-0.9198	2.407	0.076	8	0.9844	CDF	Non-Significant Effect
	10	-1.339	2.407	0.076	8	0.9957	CDF	Non-Significant Effect
	18	-0.5461	2.407	0.076	8	0.9572	CDF	Non-Significant Effect
	32	-0.6594	2.407	0.076	8	0.9680	CDF	Non-Significant Effect
	100*	7.534	2.407	0.076	8	<0.0001	CDF	Significant Effect
	180*	21.3	2.407	0.076	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.92	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04976	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.114767	0.3524612	6	140.7	<0.0001	Significant Effect
Error	0.07015084	0.002505387	28			
Total	2.184918		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.398	16.81	0.2856	Equal Variances
Variances	Mod Levene Equality of Variance	2.696	3.812	0.0423	Equal Variances
Variances	Levene Equality of Variance	2.84	3.528	0.0275	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.964	0.9146	0.3001	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.09613	0.1723	0.5558	Normal Distribution
Distribution	D'Agostino Skewness	0.5984	2.576	0.5496	Normal Distribution
Distribution	D'Agostino Kurtosis	0.4408	2.576	0.6594	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.5524	9.21	0.7587	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4528	3.878	0.2762	Normal Distribution

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.92	0.9076	0.9324	0.92	0.91	0.93	0.004472	1.09%	0.0%
5.6		5	0.934	0.9083	0.9597	0.93	0.91	0.96	0.009274	2.22%	-1.52%
10		5	0.94	0.9109	0.9691	0.95	0.91	0.96	0.01049	2.5%	-2.17%
18		5	0.928	0.8997	0.9563	0.93	0.9	0.95	0.0102	2.46%	-0.87%
32		5	0.93	0.9037	0.9563	0.93	0.9	0.95	0.009487	2.28%	-1.09%
100		5	0.748	0.6958	0.8002	0.76	0.7	0.8	0.01881	5.63%	18.7%
180		5	0.33	0.2322	0.4278	0.31	0.26	0.44	0.03521	23.86%	64.13%
320		5	0	0	0	0	0	0	0		100.0%

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	19-8846-5278	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.284	1.262	1.307	1.284	1.266	1.303	0.008258	1.44%	0.0%
5.6		5	1.314	1.26	1.367	1.303	1.266	1.369	0.01919	3.27%	-2.27%
10		5	1.327	1.266	1.387	1.345	1.266	1.369	0.02178	3.67%	-3.3%
18		5	1.302	1.247	1.357	1.303	1.249	1.345	0.0198	3.4%	-1.35%
32		5	1.305	1.254	1.357	1.303	1.249	1.345	0.01846	3.16%	-1.63%
100		5	1.046	0.9856	1.106	1.059	0.9912	1.107	0.02173	4.65%	18.57%
180		5	0.61	0.5064	0.7136	0.5905	0.5351	0.7253	0.0373	13.67%	52.51%
320		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.11%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.92	0.93	0.93	0.91
5.6		0.96	0.95	0.93	0.92	0.91
10		0.96	0.92	0.95	0.96	0.91
18		0.93	0.95	0.9	0.91	0.95
32		0.95	0.9	0.92	0.95	0.93
100		0.77	0.8	0.76	0.7	0.71
180		0.26	0.31	0.38	0.44	0.26
320		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.266	1.284	1.303	1.303	1.266
5.6		1.369	1.345	1.303	1.284	1.266
10		1.369	1.284	1.345	1.369	1.266
18		1.303	1.345	1.249	1.266	1.345
32		1.345	1.249	1.284	1.345	1.303
100		1.071	1.107	1.059	0.9912	1.002
180		0.5351	0.5905	0.6642	0.7253	0.5351
320		0.05002	0.05002	0.05002	0.05002	0.05002

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	92/100	93/100	93/100	91/100
5.6		96/100	95/100	93/100	92/100	91/100
10		96/100	92/100	95/100	96/100	91/100
18		93/100	95/100	90/100	91/100	95/100
32		95/100	90/100	92/100	95/100	93/100
100		77/100	80/100	76/100	70/100	71/100
180		26/100	31/100	38/100	44/100	26/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-2841-7232	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	2.75%	32	100	56.57	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	0.2415	2.407	0.399	8	0.7816	CDF	Non-Significant Effect
	10	-0.483	2.407	0.399	8	0.9499	CDF	Non-Significant Effect
	18	-0.1208	2.407	0.399	8	0.8873	CDF	Non-Significant Effect
	32	-0.6038	2.407	0.399	8	0.9630	CDF	Non-Significant Effect
	100*	24.51	2.407	0.399	8	<0.0001	CDF	Significant Effect
	180*	30.19	2.407	0.399	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.5	10 - NL	Yes	Passes Acceptability Criteria
NOEL	32	NL - 35	No	Passes Acceptability Criteria
PMSD	0.0275	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	150.9314	25.15524	6	366.8	<0.0001	Significant Effect
Error	1.92	0.06857143	28			
Total	152.8514		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.06	16.81	0.4165	Equal Variances
Variances	Mod Levene Equality of Variance	1.661	3.812	0.1802	Equal Variances
Variances	Levene Equality of Variance	1.889	3.528	0.1180	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.983	0.9146	0.8507	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.08538	0.1723	0.7645	Normal Distribution
Distribution	D'Agostino Skewness	0.0297	2.576	0.9763	Normal Distribution
Distribution	D'Agostino Kurtosis	0.3216	2.576	0.7478	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.1043	9.21	0.9492	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2639	3.878	0.7253	Normal Distribution

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.5	14.16	14.84	14.5	14.1	14.8	0.1225	1.89%	0.0%
5.6		5	14.46	14.22	14.7	14.4	14.2	14.7	0.08718	1.35%	0.28%
10		5	14.58	14.3	14.86	14.5	14.3	14.9	0.102	1.56%	-0.55%
18		5	14.52	14.25	14.79	14.6	14.2	14.7	0.09695	1.49%	-0.14%
32		5	14.6	14.4	14.8	14.6	14.4	14.8	0.07071	1.08%	-0.69%
100		5	10.44	10.2	10.68	10.5	10.2	10.7	0.08718	1.87%	28.0%
180		5	9.5	8.938	10.06	9.6	9	10.1	0.2025	4.77%	34.48%
320		5	0	0	0	0	0	0	0		100.0%

Analyst: my QA: P

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-2841-7232	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.5	14.8	14.4	14.1
5.6		14.2	14.7	14.4	14.4	14.6
10		14.5	14.3	14.9	14.5	14.7
18		14.7	14.2	14.6	14.7	14.4
32		14.4	14.8	14.7	14.6	14.5
100		10.5	10.5	10.3	10.7	10.2
180		9.1	9.6	9	10.1	9.7
320		0	0	0	0	0

CETIS Analytical Report

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-5784-4435	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

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	µg/L	95% LCL	95% UCL
EC5	48.62	39.42	54.29
EC10	66.11	55.03	76.59
EC15	83.61	69.05	102.2
EC20	100.6	83.31	109.7
EC25	109.5	99.11	118.8
EC40	136.2	127.2	148.6
EC50	154	142.5	169.6

Germination Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.92	0.91	0.93	0.004472	0.009999	1.09%	0.0%	460	500
5.6		5	0.934	0.91	0.96	0.009274	0.02074	2.22%	-1.52%	467	500
10		5	0.94	0.91	0.96	0.01049	0.02345	2.5%	-2.17%	470	500
18		5	0.928	0.9	0.95	0.0102	0.0228	2.46%	-0.87%	464	500
32		5	0.93	0.9	0.95	0.009487	0.02121	2.28%	-1.09%	465	500
100		5	0.748	0.7	0.8	0.01881	0.04207	5.63%	18.7%	374	500
180		5	0.33	0.26	0.44	0.03521	0.07874	23.86%	64.13%	165	500
320		5	0	0	0	0	0		100.0%	0	500

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.92	0.93	0.93	0.91
5.6		0.96	0.95	0.93	0.92	0.91
10		0.96	0.92	0.95	0.96	0.91
18		0.93	0.95	0.9	0.91	0.95
32		0.95	0.9	0.92	0.95	0.93
100		0.77	0.8	0.76	0.7	0.71
180		0.26	0.31	0.38	0.44	0.26
320		0	0	0	0	0

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-5784-4435	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	92/100	93/100	93/100	91/100
5.6		96/100	95/100	93/100	92/100	91/100
10		96/100	92/100	95/100	96/100	91/100
18		93/100	95/100	90/100	91/100	95/100
32		95/100	90/100	92/100	95/100	93/100
100		77/100	80/100	76/100	70/100	71/100
180		26/100	31/100	38/100	44/100	26/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-6683-0227	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1306663	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.5	10 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	44.07	39.66	44.72
IC10	56.15	52.01	57.44
IC15	68.22	63.84	70.23
IC20	80.3	75.8	82.98
IC25	92.37	87.56	95.72
IC40	191.5	184.1	198.6
IC50	212.9	206.8	218.9

Mean Length Summary

			Calculated Variate						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.5	14.1	14.8	0.1225	0.2739	1.89%	0.0%
5.6		5	14.46	14.2	14.7	0.08718	0.1949	1.35%	0.28%
10		5	14.58	14.3	14.9	0.102	0.228	1.56%	-0.55%
18		5	14.52	14.2	14.7	0.09695	0.2168	1.49%	-0.14%
32		5	14.6	14.4	14.8	0.07071	0.1581	1.08%	-0.69%
100		5	10.44	10.2	10.7	0.08718	0.1949	1.87%	28.0%
180		5	9.5	9	10.1	0.2025	0.4528	4.77%	34.48%
320		5	0	0	0	0	0		100.0%

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.5	14.8	14.4	14.1
5.6		14.2	14.7	14.4	14.4	14.6
10		14.5	14.3	14.9	14.5	14.7
18		14.7	14.2	14.6	14.7	14.4
32		14.4	14.8	14.7	14.6	14.5
100		10.5	10.5	10.3	10.7	10.2
180		9.1	9.6	9	10.1	9.7
320		0	0	0	0	0

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-6683-0227	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	12-6412-6186	Test Type:	Growth-Germination	Analyst:	
Start Date:	30 Jan-16 00:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 00:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	01-4313-1739	Code:	KLP013016k	Client:	Internal Lab
Sample Date:	30 Jan-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	1m	Station:	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
5.6		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
10		2	6.6	2.788	10.41	6.3	6.9	0.3	0.4243	6.43%	0
18		2	6.6	4.059	9.141	6.4	6.8	0.2	0.2828	4.29%	0
32		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
100		2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
180		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
320		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		16	6.456			6.1	6.9				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
5.6		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
10		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
320		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		16	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
5.6		2	34	34	34	34	34	0	0	0.0%	0
10		2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
320		2	34	34	34	34	34	0	0	0.0%	0
Overall		16	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
5.6		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
10		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
18		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
32		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
180		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
320		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		16	14.85			14.8	14.9				0 (0%)

Macrocystis Germination and Germ Tube Growth Test | Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.6	6.2
5.6		6.5	6.1
10		6.9	6.3
18		6.8	6.4
32		6.6	6.3
100		6.8	6.1
180		6.7	6.3
320		6.6	6.1

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
5.6		7.9	7.9
10		7.9	7.9
18		7.9	7.9
32		7.9	7.9
100		7.9	7.9
180		7.9	7.9
320		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
5.6		34	34
10		34	34
18		34	34
32		34	34
100		34	34
180		34	34
320		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.9	14.8
5.6		14.9	14.8
10		14.9	14.8
18		14.9	14.8
32		14.9	14.8
100		14.9	14.8
180		14.9	14.8
320		14.9	14.8

 Analyst: MJ QA: P

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03Z
DATE RECEIVED:	01/31/2016
ABC LAB. NO.:	COM0116.224

CHRONIC MYTILUS 48 HOUR 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: 03 Mar-16 10:25 (p 1 of 1)
Test Code: COM0116.224myt | 06-2367-2583

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	19-5816-0492	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:01	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	09-9984-3885	Code:	COM0116.224m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03Z		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-3248-2028	Combined Proportion Norm	100	>100	NA	1.61%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-4479-5443	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
09-3248-2028	Combined Proportion Norm	PMSD	0.0161	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	10	0.9321	0.9197	0.9445	0.9018	0.9643	0.00548	0.01733	1.86%	0.0%
100		10	0.9344	0.9211	0.9477	0.9107	0.9777	0.005879	0.01859	1.99%	-0.24%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9286	0.9777	0.942	0.9196	0.942	0.9107	0.9286	0.942	0.933	0.9196

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		208/224	219/224	211/224	206/224	211/224	204/224	208/224	211/224	209/224	206/224

CETIS Analytical Report

Report Date: 03 Mar-16 10:25 (p 1 of 2)
Test Code: COM0116.224myt | 06-2367-2583

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	09-3248-2028	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	19-5816-0492	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:01	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	09-9984-3885	Code:	COM0116.224m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03Z		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.61%	Passes combined proportion normal

Equal Variance t Two-Sample Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	-0.3124	1.734	0.030	18	0.6208	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.0161	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001501193	0.0001501193	1	0.0976	0.7583	Non-Significant Effect
Error	0.02768644	0.001538136	18			
Total	0.02783656		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.455	6.541	0.5854	Equal Variances
Variances	Mod Levene Equality of Variance	0.04011	8.285	0.8435	Equal Variances
Variances	Levene Equality of Variance	0.09251	8.285	0.7645	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9005	0.866	0.0421	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.216	0.2235	0.0152	Normal Distribution
Distribution	D'Agostino Skewness	2.297	2.576	0.0216	Normal Distribution
Distribution	D'Agostino Kurtosis	1.893	2.576	0.0583	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	8.862	9.21	0.0119	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.7683	3.878	0.0455	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	10	0.9321	0.9197	0.9445	0.933	0.9018	0.9643	0.00548	1.86%	0.0%
100		10	0.9344	0.9211	0.9477	0.9308	0.9107	0.9777	0.005879	1.99%	-0.24%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.309	1.284	1.335	1.309	1.252	1.381	0.01119	2.7%	0.0%
100		10	1.315	1.284	1.345	1.305	1.267	1.421	0.0135	3.25%	-0.42%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9286	0.9777	0.942	0.9196	0.942	0.9107	0.9286	0.942	0.933	0.9196

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3248-2028	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.327	1.3	1.381	1.309	1.252	1.327	1.283	1.309	1.275	1.327
100		1.3	1.421	1.327	1.283	1.327	1.267	1.3	1.327	1.309	1.283

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		208/224	219/224	211/224	206/224	211/224	204/224	208/224	211/224	209/224	206/224

CETIS Analytical Report

Report Date: 03 Mar-16 10:25 (p 1 of 1)
Test Code: COM0116.224myt | 06-2367-2583

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	12-4479-5443	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	19-5816-0492	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	01 Feb-16 10:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	03 Feb-16 10:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	09-9984-3885	**Code:**	COM0116.224m	**Client:**	City of Malibu
Sample Date:	31 Jan-16 10:32	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	31 Jan-16 12:40	**Source:**	Bioassay Report		
Sample Age:	23h	**Station:**	24-BB-03Z		

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	10	0.9321	0.9018	0.9643	0.00548	0.01733	1.86%	0.0%	2088	2240
100		10	0.9344	0.9107	0.9777	0.005879	0.01859	1.99%	-0.24%	2093	2240

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9286	0.9777	0.942	0.9196	0.942	0.9107	0.9286	0.942	0.933	0.9196

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		208/224	219/224	211/224	206/224	211/224	204/224	208/224	211/224	209/224	206/224

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	19-5816-0492	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:01	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	09-9984-3885	Code:	COM0116.224m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03Z		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
100		2	6.25	3.073	9.427	6	6.5	0.25	0.3536	5.66%	0
Overall		4	6.375			6	6.9				0 (0%)

Total Ammonia (N)-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
100		1	0			0	0	0	0		0
Overall		2	0			0	0				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.9	6.1
100		6.5	6

Total Ammonia (N)-mg/L

C-%	Control Type	1
0	Negative Contr	0
100		0

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

Analyst: My QA: [illegible]

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/31/2016
ABC LAB. NO.:	COM0116.225

CHRONIC MYTILUS 48 HOUR 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: 03 Mar-16 10:27 (p 1 of 1)
Test Code: COM0116.225myt | 03-3436-3037

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	16-5281-0763	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:02	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:02	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-2165-9156	Code:	COM0116.225m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-7352-3969	Combined Proportion Norm	100	>100	NA	1.77%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
06-3689-1034	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
03-7352-3969	Combined Proportion Norm	PMSD	0.01766	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	10	0.9321	0.9197	0.9445	0.9018	0.9643	0.00548	0.01733	1.86%	0.0%
100		10	0.9304	0.9145	0.9462	0.9063	0.9777	0.007018	0.02219	2.39%	0.19%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9375	0.942	0.9152	0.9777	0.9063	0.942	0.9196	0.9152	0.9063	0.942

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		210/224	211/224	205/224	219/224	203/224	211/224	206/224	205/224	203/224	211/224

CETIS Analytical Report

Report Date:	03 Mar-16 10:27 (p 1 of 2)		
Test Code:	COM0116.225myt | 03-3436-3037		

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-7352-3969	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	16-5281-0763	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:02	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:02	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-2165-9156	Code:	COM0116.225m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.77%	Passes combined proportion normal

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	0.09233	1.734	0.033	18	0.4637	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.01766	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.547618E-05	1.547618E-05	1	0.008524	0.9275	Non-Significant Effect
Error	0.03267996	0.001815553	18			
Total	0.03269543		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.898	6.541	0.3539	Equal Variances
Variances	Mod Levene Equality of Variance	0.9181	8.285	0.3507	Equal Variances
Variances	Levene Equality of Variance	0.9461	8.285	0.3436	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.901	0.866	0.0431	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2145	0.2235	0.0165	Normal Distribution
Distribution	D'Agostino Skewness	2.068	2.576	0.0386	Normal Distribution
Distribution	D'Agostino Kurtosis	1.602	2.576	0.1091	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	6.845	9.21	0.0326	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.754	3.878	0.0495	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	10	0.9321	0.9197	0.9445	0.933	0.9018	0.9643	0.00548	1.86%	0.0%
100		10	0.9304	0.9145	0.9462	0.9286	0.9063	0.9777	0.007018	2.39%	0.19%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.309	1.284	1.335	1.309	1.252	1.381	0.01119	2.7%	0.0%
100		10	1.307	1.273	1.342	1.301	1.26	1.421	0.01542	3.73%	0.13%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9375	0.942	0.9152	0.9777	0.9063	0.942	0.9196	0.9152	0.9063	0.942

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	03-7352-3969	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.327	1.3	1.381	1.309	1.252	1.327	1.283	1.309	1.275	1.327
100		1.318	1.327	1.275	1.421	1.26	1.327	1.283	1.275	1.26	1.327

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		210/224	211/224	205/224	219/224	203/224	211/224	206/224	205/224	203/224	211/224

CETIS Analytical Report

Report Date: 03 Mar-16 10:27 (p 1 of 1)
Test Code: COM0116.225myt | 03-3436-3037

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	06-3689-1034	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:22	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	16-5281-0763	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:02	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	03 Feb-16 10:02	Species:	Mytilis galloprovincialis	Brine:	
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	03-2165-9156	Code:	COM0116.225m	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	23h	Station:	24-BB-03R		

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	10	0.9321	0.9018	0.9643	0.00548	0.01733	1.86%	0.0%	2088	2240
100		10	0.9304	0.9063	0.9777	0.007018	0.02219	2.39%	0.19%	2084	2240

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.942	0.9286	0.9643	0.933	0.9018	0.942	0.9196	0.933	0.9152	0.942
100		0.9375	0.942	0.9152	0.9777	0.9063	0.942	0.9196	0.9152	0.9063	0.942

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	211/224	208/224	216/224	209/224	202/224	211/224	206/224	209/224	205/224	211/224
100		210/224	211/224	205/224	219/224	203/224	211/224	206/224	205/224	203/224	211/224

CETIS Measurement Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	16-5281-0763	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	01 Feb-16 10:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	03 Feb-16 10:02	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	03-2165-9156	**Code:**	COM0116.225m	**Client:**	City of Malibu
Sample Date:	31 Jan-16 10:50	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	31 Jan-16 12:40	**Source:**	Bioassay Report		
Sample Age:	23h	**Station:**	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
100		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
Overall		4	6.45			6.1	6.9				0 (0%)

Total Ammonia (N)-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
100		1	0			0	0	0	0		0
Overall		2	0			0	0				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.25	6.344	10.16	8.1	8.4	0.15	0.2121	2.57%	0
Overall		4	8.075			7.9	8.4				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.9	6.1
100		6.6	6.2

Total Ammonia (N)-mg/L

C-%	Control Type	1
0	Negative Contr	0
100		0

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8.4

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

CHRONIC MYTILUS DEVELOPMENT BIOASSAY

DATE: February 1, 2016

STANDARD TOXICANT: Unionized Ammonia

NOEC = 0.051 mg/l

EC25 = 0.08264 mg/l
EC50 = 0.1005 mg/l

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 03 Mar-16 13:09 (p 1 of 1)
Test Code: MYT020116 | 03-9971-1783

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-4694-9349	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 10:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	15-9110-5695	Code:	MYT020116m	Client:	Internal Lab
Sample Date:	01 Feb-16 10:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-7317-4648	Combined Proportion Norm	0.051	0.077	0.06267	4.24%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
20-9709-5571	Combined Proportion Norm	EC5	0.05717	0.05314	0.06092		Linear Interpolation (ICPIN)
		EC10	0.06548	0.06137	0.07106		
		EC15	0.07379	0.06836	0.07992		
		EC20	0.07915	0.07637	0.08201		
		EC25	0.08264	0.08031	0.08499		
		EC40	0.09313	0.09154	0.09527		
		EC50	0.1005	0.09822	0.1032		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-7317-4648	Combined Proportion Norm	PMSD	0.04236	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.9304	0.9176	0.9431	0.9196	0.942	0.004596	0.01028	1.11%	0.0%
0.026		5	0.942	0.905	0.9789	0.8973	0.9732	0.01332	0.02978	3.16%	-1.25%
0.051		5	0.9241	0.9023	0.9459	0.9018	0.942	0.00786	0.01758	1.9%	0.67%
0.077		5	0.7777	0.7359	0.8194	0.7455	0.8304	0.01503	0.03362	4.32%	16.41%
0.098		5	0.4964	0.4642	0.5286	0.4732	0.5402	0.01159	0.02592	5.22%	46.64%
0.121		5	0.2357	0.1615	0.3099	0.1518	0.2946	0.02673	0.05976	25.35%	74.66%

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.942	0.9196	0.933	0.9196	0.9375
0.026		0.942	0.9643	0.933	0.8973	0.9732
0.051		0.942	0.9196	0.9152	0.942	0.9018
0.077		0.8304	0.7902	0.7455	0.7634	0.7589
0.098		0.5402	0.4955	0.4821	0.4911	0.4732
0.121		0.2768	0.2589	0.1964	0.2946	0.1518

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/224	206/224	209/224	206/224	210/224
0.026		211/224	216/224	209/224	201/224	218/224
0.051		211/224	206/224	205/224	211/224	202/224
0.077		186/224	177/224	167/224	171/224	170/224
0.098		121/224	111/224	108/224	110/224	106/224
0.121		62/224	58/224	44/224	66/224	34/224

Analyst: BV QA: P

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-7317-4648	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	15-4694-9349	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 10:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	15-9110-5695	Code:	MYT020116m	Client:	Internal Lab
Sample Date:	01 Feb-16 10:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.24%	0.051	0.077	0.06267	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.026	-0.9901	2.362	0.070	8	0.9829	CDF	Non-Significant Effect
		0.051	0.3759	2.362	0.070	8	0.6995	CDF	Non-Significant Effect
		0.077*	7.539	2.362	0.070	8	<0.0001	CDF	Significant Effect
		0.098*	17.62	2.362	0.070	8	<0.0001	CDF	Significant Effect
		0.121*	26.98	2.362	0.070	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.04236	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.87492	0.5749839	5	261.6	<0.0001	Significant Effect
Error	0.05275744	0.002198227	24			
Total	2.927677		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.466	15.09	0.1324	Equal Variances
Variances	Mod Levene Equality of Variance	1.785	4.248	0.1669	Equal Variances
Variances	Levene Equality of Variance	3.004	3.895	0.0303	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9632	0.9031	0.3724	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1154	0.1853	0.3792	Normal Distribution
Distribution	D'Agostino Skewness	0.7984	2.576	0.4246	Normal Distribution
Distribution	D'Agostino Kurtosis	0.5266	2.576	0.5985	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.9148	9.21	0.6329	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4087	3.878	0.3506	Normal Distribution

Combined Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.9304	0.9176	0.9431	0.933	0.9196	0.942	0.004596	1.11%	0.0%
0.026		5	0.942	0.905	0.9789	0.942	0.8973	0.9732	0.01332	3.16%	-1.25%
0.051		5	0.9241	0.9023	0.9459	0.9196	0.9018	0.942	0.00786	1.9%	0.67%
0.077		5	0.7777	0.7359	0.8194	0.7634	0.7455	0.8304	0.01503	4.32%	16.41%
0.098		5	0.4964	0.4642	0.5286	0.4911	0.4732	0.5402	0.01159	5.22%	46.64%
0.121		5	0.2357	0.1615	0.3099	0.2589	0.1518	0.2946	0.02673	25.35%	74.66%

Analysis ID:	15-7317-4648	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.304	1.279	1.329	1.309	1.283	1.327	0.009018	1.55%	0.0%
0.026		5	1.334	1.255	1.412	1.327	1.245	1.406	0.02835	4.75%	-2.25%
0.051		5	1.293	1.252	1.335	1.283	1.252	1.327	0.01494	2.58%	0.85%
0.077		5	1.081	1.029	1.132	1.063	1.042	1.146	0.01851	3.83%	17.14%
0.098		5	0.7818	0.7496	0.814	0.7765	0.7586	0.8256	0.0116	3.32%	40.06%
0.121		5	0.5042	0.4141	0.5943	0.5338	0.4002	0.5738	0.03244	14.39%	61.34%

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.942	0.9196	0.933	0.9196	0.9375
0.026		0.942	0.9643	0.933	0.8973	0.9732
0.051		0.942	0.9196	0.9152	0.942	0.9018
0.077		0.8304	0.7902	0.7455	0.7634	0.7589
0.098		0.5402	0.4955	0.4821	0.4911	0.4732
0.121		0.2768	0.2589	0.1964	0.2946	0.1518

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.327	1.283	1.309	1.283	1.318
0.026		1.327	1.381	1.309	1.245	1.406
0.051		1.327	1.283	1.275	1.327	1.252
0.077		1.146	1.095	1.042	1.063	1.058
0.098		0.8256	0.7809	0.7675	0.7765	0.7586
0.121		0.554	0.5338	0.4592	0.5738	0.4002

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/224	206/224	209/224	206/224	210/224
0.026		211/224	216/224	209/224	201/224	218/224
0.051		211/224	206/224	205/224	211/224	202/224
0.077		186/224	177/224	167/224	171/224	170/224
0.098		121/224	111/224	108/224	110/224	106/224
0.121		62/224	58/224	44/224	66/224	34/224

CETIS Analytical Report

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-9709-5571	Endpoint:	Combined Proportion Normal	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	15-4694-9349	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 10:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	15-9110-5695	Code:	MYT020116m	Client:	Internal Lab
Sample Date:	01 Feb-16 10:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	0.05717	0.05314	0.06092
EC10	0.06548	0.06137	0.07106
EC15	0.07379	0.06836	0.07992
EC20	0.07915	0.07637	0.08201
EC25	0.08264	0.08031	0.08499
EC40	0.09313	0.09154	0.09527
EC50	0.1005	0.09822	0.1032

Combined Proportion Normal Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.9304	0.9196	0.942	0.004596	0.01028	1.11%	0.0%	1042	1120
0.026		5	0.942	0.8973	0.9732	0.01332	0.02978	3.16%	-1.25%	1055	1120
0.051		5	0.9241	0.9018	0.942	0.00786	0.01758	1.9%	0.67%	1035	1120
0.077		5	0.7777	0.7455	0.8304	0.01503	0.03362	4.32%	16.41%	871	1120
0.098		5	0.4964	0.4732	0.5402	0.01159	0.02592	5.22%	46.64%	556	1120
0.121		5	0.2357	0.1518	0.2946	0.02673	0.05976	25.35%	74.66%	263	1120

Combined Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.942	0.9196	0.933	0.9196	0.9375
0.026		0.942	0.9643	0.933	0.8973	0.9732
0.051		0.942	0.9196	0.9152	0.942	0.9018
0.077		0.8304	0.7902	0.7455	0.7634	0.7589
0.098		0.5402	0.4955	0.4821	0.4911	0.4732
0.121		0.2768	0.2589	0.1964	0.2946	0.1518

Combined Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/224	206/224	209/224	206/224	210/224
0.026		211/224	216/224	209/224	201/224	218/224
0.051		211/224	206/224	205/224	211/224	202/224
0.077		186/224	177/224	167/224	171/224	170/224
0.098		121/224	111/224	108/224	110/224	106/224
0.121		62/224	58/224	44/224	66/224	34/224

Analyst: Bg QA: P

Analysis ID:	20-9709-5571	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date:	03 Mar-16 13:09 (p 1 of 2)
Test Code:	MYT020116 | 03-9971-1783

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-4694-9349	Test Type:	Development-Survival	Analyst:	
Start Date:	01 Feb-16 10:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 10:00	Species:	Mytilis galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Carlsbad Aquafarms CA	Age:	

Sample ID:	15-9110-5695	Code:	MYT020116m	Client:	Internal Lab
Sample Date:	01 Feb-16 10:00	Material:	Copper chloride	Project:	REF TOX
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
0.026		2	6.5	5.229	7.771	6.4	6.6	0.1	0.1414	2.18%	0
0.051		2	6.4	5.129	7.671	6.3	6.5	0.1	0.1414	2.21%	0
0.077		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
0.098		2	6.25	5.615	6.885	6.2	6.3	0.05001	0.07072	1.13%	0
0.121		2	6.25	5.615	6.885	6.2	6.3	0.05001	0.07072	1.13%	0
Overall		12	6.35			6.1	6.9				0 (0%)

Total Ammonia (N)-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
0.026		1	1.55			1.55	1.55	0	0	0.0%	0
0.051		1	2.86			2.86	2.86	0	0	0.0%	0
0.077		1	4.33			4.33	4.33	0	0	0.0%	0
0.098		1	5.51			5.51	5.51	0	0	0.0%	0
0.121		1	6.79			6.79	6.79	0	0	0.0%	0
Overall		6	3.507			0	6.79				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.026		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.051		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.077		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.098		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.121		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		12	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.026		2	34	34	34	34	34	0	0	0.0%	0
0.051		2	34	34	34	34	34	0	0	0.0%	0
0.077		2	34	34	34	34	34	0	0	0.0%	0
0.098		2	34	34	34	34	34	0	0	0.0%	0
0.121		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.026		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.051		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.077		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.098		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.121		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

Mussel Shell Development Test | Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.9	6.1
0.026		6.6	6.4
0.051		6.5	6.3
0.077		6.3	6.1
0.098		6.2	6.3
0.121		6.3	6.2

Total Ammonia (N)-mg/L

C-µg/L	Control Type	1
0	Negative Contr	0
0.026		1.55
0.051		2.86
0.077		4.33
0.098		5.51
0.121		6.79

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
0.026		7.9	7.9
0.051		7.9	7.9
0.077		7.9	7.9
0.098		7.9	7.9
0.121		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
0.026		34	34
0.051		34	34
0.077		34	34
0.098		34	34
0.121		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.8	14.7
0.026		14.8	14.7
0.051		14.8	14.7
0.077		14.8	14.7
0.098		14.8	14.7
0.121		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03Z
DATE RECEIVED:	01/31/2016
ABC LAB. NO.:	COM0116.224

CHRONIC SEA URCHIN FERTILIZATION 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: 03 Mar-16 10:26 (p 1 of 1)
Test Code: COM0116.224urc | 06-2062-7839

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	06-9724-3860	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:40	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	19-8486-0480	Code:	COM0116.224u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03Z		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-0221-3411	Fertilization Rate	100	>100	NA	NA	1	Wilcoxon Rank Sum Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
01-2697-4760	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
01-2697-4760	Fertilization Rate	Control Resp	1	0.7 - NL	Yes	Passes Acceptability Criteria
14-0221-3411	Fertilization Rate	Control Resp	1	0.7 - NL	Yes	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	8	1	1	1	1	1	0	0	0.0%	0.0%
100		8	1	1	1	1	1	0	0	0.0%	0.0%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

Analyst: My QA: P

CETIS Analytical Report

Report Date: 03 Mar-16 10:26 (p 1 of 1)
Test Code: COM0116.224urc | 06-2062-7839

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	14-0221-3411	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Nonparametric-Two Sample	Official Results:	Yes
Batch ID:	06-9724-3860	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:40	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	
Sample ID:	19-8486-0480	Code:	COM0116.224u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03Z		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Angular (Corrected)	NA	C > T	NA	NA	Passes fertilization rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	68	NA	1	14	1.0000	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.7 - NL	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	65540	<0.0001	Significant Effect
Error	0	0	14			
Total	0		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Distribution	D'Agostino Skewness	1.937	2.576	0.0527	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	1	1	1	1	1	1	0	0.0%	0.0%
100		8	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	8	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
100		8	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1.521	1.521	1.521	1.521	1.521	1.521	1.521	1.521
100		1.521	1.521	1.521	1.521	1.521	1.521	1.521	1.521

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

CETIS Analytical Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-2697-4760	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	06-9724-3860	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	01 Feb-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	01 Feb-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	19-8486-0480	**Code:**	COM0116.224u	**Client:**	City of Malibu
Sample Date:	31 Jan-16 10:32	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	31 Jan-16 12:40	**Source:**	Bioassay Report		
Sample Age:	26h	**Station:**	24-BB-03Z		

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	1	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	8	1	1	1	0	0	0.0%	0.0%	800	800
100		8	1	1	1	0	0	0.0%	0.0%	800	800

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

Analysis ID:	01-2697-4760	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date:	03 Mar-16 10:26 (p 1 of 1)
Test Code:	COM0116.224urc | 06-2062-7839

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	06-9724-3860	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:40	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	19-8486-0480	Code:	COM0116.224u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03Z		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	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 Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
100		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
Overall		4	6.325			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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.1
100		6.1	6.3

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/31/2016
ABC LAB. NO.:	COM0116.225

CHRONIC SEA URCHIN FERTILIZATION 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: 03 Mar-16 10:27 (p 1 of 1)
Test Code: COM0116.225urc | 14-1010-1755

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	12-1551-4559	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	13-6295-5562	Code:	COM0116.225u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-0461-9744	Fertilization Rate	100	>100	NA	NA	1	Wilcoxon Rank Sum Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
08-8749-7689	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
08-8749-7689	Fertilization Rate	Control Resp	1	0.7 - NL	Yes	Passes Acceptability Criteria
09-0461-9744	Fertilization Rate	Control Resp	1	0.7 - NL	Yes	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	8	1	1	1	1	1	0	0	0.0%	0.0%
100		8	1	1	1	1	1	0	0	0.0%	0.0%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

CETIS Analytical Report

Report Date: 03 Mar-16 10:26 (p 1 of 1)
Test Code: COM0116.225urc | 14-1010-1755

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	09-0461-9744	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Nonparametric-Two Sample	Official Results:	Yes

Batch ID:	12-1551-4559	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	13-6295-5562	Code:	COM0116.225u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Angular (Corrected)	NA	C > T	NA	NA	Passes fertilization rate

Wilcoxon Rank Sum Two-Sample Test

Control vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	68	NA	1	14	1.0000	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.7 - NL	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	65540	<0.0001	Significant Effect
Error	0	0	14			
Total	0		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Distribution	D'Agostino Skewness	1.937	2.576	0.0527	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	1	1	1	1	1	1	0	0.0%	0.0%
100		8	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	8	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
100		8	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1.521	1.521	1.521	1.521	1.521	1.521	1.521	1.521
100		1.521	1.521	1.521	1.521	1.521	1.521	1.521	1.521

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

Analyst: my QA: P

CETIS Analytical Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-8749-7689	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	12-1551-4559	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	01 Feb-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	01 Feb-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	13-6295-5562	**Code:**	COM0116.225u	**Client:**	City of Malibu
Sample Date:	31 Jan-16 10:50	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	31 Jan-16 12:40	**Source:**	Bioassay Report		
Sample Age:	26h	**Station:**	24-BB-03R		

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	1	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	8	1	1	1	0	0	0.0%	0.0%	800	800
100		8	1	1	1	0	0	0.0%	0.0%	800	800

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
100		100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	08-8749-7689	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 03 Mar-16 10:27 (p 1 of 1)
Test Code: COM0116.225urc | 14-1010-1755

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	12-1551-4559	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 13:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	13-6295-5562	Code:	COM0116.225u	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	26h	Station:	24-BB-03R		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	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 Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
100		2	6.25	3.073	9.427	6	6.5	0.25	0.3536	5.66%	0
Overall		4	6.35			6	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.15	6.244	10.06	8	8.3	0.15	0.2121	2.6%	0
Overall		4	8.025			7.9	8.3				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.1
100		6.5	6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.3	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: February 1, 2016

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35.03 ug/l
EC50 = 45.21 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	05-0550-0141	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:45	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 14:25	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	16-4985-3189	Code:	URC020116u	Client:	Internal Lab
Sample Date:	01 Feb-16 13:45	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-3320-3622	Fertilization Rate	18	32	24	2.8%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
14-5036-8769	Fertilization Rate	EC5	21.98	20.5	22.45		Linear Interpolation (ICPIN)
		EC10	25.97	24.58	26.9		
		EC15	29.95	28.46	31.34		
		EC20	32.99	32.15	33.76		
		EC25	35.03	34.22	35.78		
		EC40	41.14	40.35	41.96		
		EC50	45.21	44.38	46.2		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-3320-3622	Fertilization Rate	Control Resp	0.945	0.7 - NL	Yes	Passes Acceptability Criteria
14-5036-8769	Fertilization Rate	Control Resp	0.945	0.7 - NL	Yes	Passes Acceptability Criteria
13-3320-3622	Fertilization Rate	PMSD	0.02797	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.945	0.9174	0.9726	0.92	0.96	0.00866	0.01732	1.83%	0.0%
18		4	0.9475	0.9275	0.9675	0.93	0.96	0.006292	0.01258	1.33%	-0.26%
32		4	0.78	0.7616	0.7984	0.77	0.79	0.005774	0.01155	1.48%	17.46%
56		4	0.2225	0.1827	0.2623	0.21	0.26	0.0125	0.025	11.24%	76.46%
100		4	0.0575	0.0247	0.0903	0.03	0.08	0.01031	0.02062	35.85%	93.92%
180		4	0	0	0	0	0	0	0		100.0%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.95	0.95	0.96
18		0.95	0.93	0.96	0.95
32		0.77	0.79	0.79	0.77
56		0.21	0.26	0.21	0.21
100		0.06	0.03	0.08	0.06
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	95/100	95/100	96/100
18		95/100	93/100	96/100	95/100
32		77/100	79/100	79/100	77/100
56		21/100	26/100	21/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date:	03 Mar-16 13:09 (p 1 of 2)
Test Code:	URC020116 | 18-6344-9599

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	13-3320-3622	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	05-0550-0141	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:45	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 14:25	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	16-4985-3189	Code:	URC020116u	Client:	Internal Lab
Sample Date:	01 Feb-16 13:45	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.8%	18	32	24	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		18	-0.2049	2.356	0.055	6	0.8594	CDF	Non-Significant Effect
		32*	10.93	2.356	0.055	6	<0.0001	CDF	Significant Effect
		56*	36.47	2.356	0.055	6	<0.0001	CDF	Significant Effect
		100*	47.34	2.356	0.055	6	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.945	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.02797	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.08869	1.022173	4	951.6	<0.0001	Significant Effect
Error	0.01611234	0.001074156	15			
Total	4.104803		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.509	13.28	0.4765	Equal Variances
Variances	Mod Levene Equality of Variance	0.2372	4.893	0.9129	Equal Variances
Variances	Levene Equality of Variance	0.6662	4.893	0.6252	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9476	0.866	0.3324	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1617	0.2235	0.1853	Normal Distribution
Distribution	D'Agostino Skewness	1.042	2.576	0.2976	Normal Distribution
Distribution	D'Agostino Kurtosis	0.5439	2.576	0.5865	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.381	9.21	0.5014	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.5498	3.878	0.1605	Normal Distribution

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.945	0.9174	0.9726	0.95	0.92	0.96	0.00866	1.83%	0.0%
18		4	0.9475	0.9275	0.9675	0.95	0.93	0.96	0.006292	1.33%	-0.26%
32		4	0.78	0.7616	0.7984	0.78	0.77	0.79	0.005774	1.48%	17.46%
56		4	0.2225	0.1827	0.2623	0.21	0.21	0.26	0.0125	11.24%	76.46%
100		4	0.0575	0.0247	0.0903	0.06	0.03	0.08	0.01031	35.85%	93.92%
180		4	0	0	0	0	0	0	0		100.0%

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	13-3320-3622	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.336	1.278	1.394	1.345	1.284	1.369	0.01824	2.73%	0.0%
18		4	1.341	1.297	1.385	1.345	1.303	1.369	0.0138	2.06%	-0.36%
32		4	1.083	1.061	1.105	1.083	1.071	1.095	0.00697	1.29%	18.96%
56		4	0.4908	0.4438	0.5378	0.476	0.476	0.5351	0.01476	6.01%	63.26%
100		4	0.2389	0.1641	0.3138	0.2475	0.1741	0.2868	0.02352	19.69%	82.12%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.26%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.95	0.95	0.96
18		0.95	0.93	0.96	0.95
32		0.77	0.79	0.79	0.77
56		0.21	0.26	0.21	0.21
100		0.06	0.03	0.08	0.06
180		0	0	0	0

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.284	1.345	1.345	1.369
18		1.345	1.303	1.369	1.345
32		1.071	1.095	1.095	1.071
56		0.476	0.5351	0.476	0.476
100		0.2475	0.1741	0.2868	0.2475
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	95/100	95/100	96/100
18		95/100	93/100	96/100	95/100
32		77/100	79/100	79/100	77/100
56		21/100	26/100	21/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

Analyst: MY QA: P

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	14-5036-8769	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	05-0550-0141	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:45	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 14:25	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	16-4985-3189	Code:	URC020116u	Client:	Internal Lab
Sample Date:	01 Feb-16 13:45	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

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	0.945	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	21.98	20.5	22.45
EC10	25.97	24.58	26.9
EC15	29.95	28.46	31.34
EC20	32.99	32.15	33.76
EC25	35.03	34.22	35.78
EC40	41.14	40.35	41.96
EC50	45.21	44.38	46.2

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.945	0.92	0.96	0.00866	0.01732	1.83%	0.0%	378	400
18		4	0.9475	0.93	0.96	0.006292	0.01258	1.33%	-0.26%	379	400
32		4	0.78	0.77	0.79	0.005774	0.01155	1.48%	17.46%	312	400
56		4	0.2225	0.21	0.26	0.0125	0.025	11.24%	76.46%	89	400
100		4	0.0575	0.03	0.08	0.01031	0.02062	35.85%	93.92%	23	400
180		4	0	0	0	0	0		100.0%	0	400

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.95	0.95	0.96
18		0.95	0.93	0.96	0.95
32		0.77	0.79	0.79	0.77
56		0.21	0.26	0.21	0.21
100		0.06	0.03	0.08	0.06
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	95/100	95/100	96/100
18		95/100	93/100	96/100	95/100
32		77/100	79/100	79/100	77/100
56		21/100	26/100	21/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

Analysis ID:	14-5036-8769	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 03 Mar-16 13:09 (p 1 of 2)
Test Code: URC020116 | 18-6344-9599

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	05-0550-0141	Test Type:	Fertilization	Analyst:	
Start Date:	01 Feb-16 13:45	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	01 Feb-16 14:25	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	16-4985-3189	Code:	URC020116u	Client:	Internal Lab
Sample Date:	01 Feb-16 13:45	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
18		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
32		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
56		2	6.3	6.298	6.302	6.3	6.3	0	0	0.0%	0
100		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
180		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
Overall		12	6.3			6.1	6.8				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
56		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		12	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
56		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
18		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
32		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
56		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
180		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.8	6.1
18		6.6	6.3
32		6.5	6.1
56		6.3	6.3
100		6.2	6.1
180		6.1	6.2

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
18		7.9	7.9
32		7.9	7.9
56		7.9	7.9
100		7.9	7.9
180		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
18		34	34
32		34	34
56		34	34
100		34	34
180		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.8	14.7
18		14.8	14.7
32		14.8	14.7
56		14.8	14.7
100		14.8	14.7
180		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03Z
DATE RECEIVED:	1/31/2016
ABC LAB. NO.:	COM0116.224

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
GROWTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-1839-6747	Germination Rate	100	>100	NA	1.79%	1	Equal Variance t Two-Sample Test
16-1432-4135	Mean Length	100	>100	NA	1.8%	1	Wilcoxon Rank Sum Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-0716-6617	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	
10-7022-2653	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
04-1839-6747	Germination Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
12-0716-6617	Germination Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
10-7022-2653	Mean Length	Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
16-1432-4135	Mean Length	Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
04-1839-6747	Germination Rate	PMSD	0.01795	NL - 0.2	No	Passes Acceptability Criteria
16-1432-4135	Mean Length	PMSD	0.01799	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	10	0.935	0.9202	0.9498	0.9	0.96	0.00654	0.02068	2.21%	0.0%
100		10	0.943	0.9279	0.9581	0.91	0.98	0.006675	0.02111	2.24%	-0.86%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	14.78	14.45	15.11	14.3	15.7	0.1459	0.4614	3.12%	0.0%
100		10	14.5	14.39	14.61	14.3	14.8	0.04714	0.1491	1.03%	1.89%

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	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.96	0.98	0.95	0.93	0.92	0.96	0.93	0.95	0.94

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.4	14.4	14.6	14.4	14.5	14.3	14.8	14.6	14.6

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	96/100	98/100	95/100	93/100	92/100	96/100	93/100	95/100	94/100

CETIS Analytical Report

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	04-1839-6747	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.79%	Passes germination rate

Equal Variance t Two-Sample Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	-0.8904	1.734	0.035	18	0.8075	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01795	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001617364	0.001617364	1	0.7928	0.3850	Non-Significant Effect
Error	0.03671939	0.002039966	18			
Total	0.03833676		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.323	6.541	0.6838	Equal Variances
Variances	Mod Levene Equality of Variance	0.085	8.285	0.7740	Equal Variances
Variances	Levene Equality of Variance	0.08558	8.285	0.7732	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9681	0.866	0.7148	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1079	0.2235	0.8716	Normal Distribution
Distribution	D'Agostino Skewness	0.5192	2.576	0.6037	Normal Distribution
Distribution	D'Agostino Kurtosis	0.3414	2.576	0.7328	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.3861	9.21	0.8245	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.2666	3.878	0.7165	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	0.935	0.9202	0.9498	0.935	0.9	0.96	0.00654	2.21%	0.0%
100		10	0.943	0.9279	0.9581	0.945	0.91	0.98	0.006675	2.24%	-0.86%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.316	1.286	1.346	1.313	1.249	1.369	0.01325	3.19%	0.0%
100		10	1.334	1.299	1.368	1.334	1.266	1.429	0.01524	3.61%	-1.37%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.96	0.98	0.95	0.93	0.92	0.96	0.93	0.95	0.94

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	04-1839-6747	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Parametric-Two Sample	Official Results:	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.284	1.303	1.369	1.345	1.323	1.303	1.369	1.266	1.249	1.345
100		1.266	1.369	1.429	1.345	1.303	1.284	1.369	1.303	1.345	1.323

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	96/100	98/100	95/100	93/100	92/100	96/100	93/100	95/100	94/100

Macrocystis Germination and Germ Tube Growth Test	Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	16-1432-4135	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Nonparametric-Two Sample	Official Results:	Yes
Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	
Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	1.8%	Passes mean length

Wilcoxon Rank Sum Two-Sample Test

Control vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	84	NA	3	18	0.0578	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01799	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.392	0.392	1	3.335	0.0845	Non-Significant Effect
Error	2.116	0.1175555	18			
Total	2.508		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	9.58	6.541	0.0025	Unequal Variances
Variances	Mod Levene Equality of Variance	2.052	8.285	0.1691	Equal Variances
Variances	Levene Equality of Variance	6.609	8.285	0.0192	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8491	0.866	0.0052	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2096	0.2235	0.0215	Normal Distribution
Distribution	D'Agostino Skewness	2.768	2.576	0.0056	Non-normal Distribution
Distribution	D'Agostino Kurtosis	2.05	2.576	0.0404	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	11.86	9.21	0.0027	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	1.296	3.878	0.0019	Non-normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	14.78	14.45	15.11	14.6	14.3	15.7	0.1459	3.12%	0.0%
100		10	14.5	14.39	14.61	14.45	14.3	14.8	0.04714	1.03%	1.89%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.4	14.4	14.6	14.4	14.5	14.3	14.8	14.6	14.6

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	12-0716-6617	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

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	0.935	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	10	0.935	0.9	0.96	0.00654	0.02068	2.21%	0.0%	935	1000
100		10	0.943	0.91	0.98	0.006675	0.02111	2.24%	-0.86%	943	1000

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.96	0.98	0.95	0.93	0.92	0.96	0.93	0.95	0.94

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	96/100	98/100	95/100	93/100	92/100	96/100	93/100	95/100	94/100

Analysis ID:	12-0716-6617	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	10-7022-2653	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	2072320	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.78	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	10	14.78	14.3	15.7	0.1459	0.4614	3.12%	0.0%
100		10	14.5	14.3	14.8	0.04714	0.1491	1.03%	1.89%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.4	14.4	14.6	14.4	14.5	14.3	14.8	14.6	14.6

CETIS Measurement Report

Test Code: COM0116.224klp | 01-7835-9845

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	11-1062-0494	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:30	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:30	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	19-8289-9156	Code:	COM0116.224k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:32	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03Z		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
100		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
Overall		4	6.325			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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.1
100		6.1	6.3

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 3rd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	01/31/2016
ABC LAB. NO.:	COM0116.225

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
GROWTH	NOEC	=	<100.00 %
	TUc	=	>1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	09-6814-6080	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:31	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	17-1967-2320	Code:	COM0116.225k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-7408-6006	Germination Rate	100	>100	NA	1.61%	1	Equal Variance t Two-Sample Test
03-2103-8363	Mean Length	<100	100	NA	1.97%	>1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
15-3139-2950	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	
00-4078-8832	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
02-7408-6006	Germination Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
15-3139-2950	Germination Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
00-4078-8832	Mean Length	Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
03-2103-8363	Mean Length	Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
02-7408-6006	Germination Rate	PMSD	0.01615	NL - 0.2	No	Passes Acceptability Criteria
03-2103-8363	Mean Length	PMSD	0.0197	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	10	0.935	0.9202	0.9498	0.9	0.96	0.00654	0.02068	2.21%	0.0%
100		10	0.934	0.92	0.948	0.91	0.96	0.006182	0.01955	2.09%	0.11%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	14.78	14.45	15.11	14.3	15.7	0.1459	0.4614	3.12%	0.0%
100		10	14.37	14.18	14.56	13.7	14.6	0.08307	0.2627	1.83%	2.77%

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	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.93	0.96	0.95	0.92	0.91	0.93	0.96	0.95	0.92

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.2	14.5	14.5	14.5	13.7	14.5	14.6	14.3	14.5

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	93/100	96/100	95/100	92/100	91/100	93/100	96/100	95/100	92/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-7408-6006	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	09-6814-6080	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:31	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	17-1967-2320	Code:	COM0116.225k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	1.61%	Passes germination rate

Equal Variance t Two-Sample Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	0.1207	1.734	0.032	18	0.4526	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.01615	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.471218E-05	2.471218E-05	1	0.01457	0.9053	Non-Significant Effect
Error	0.03053609	0.00169645	18			
Total	0.0305608		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.074	6.541	0.9175	Equal Variances
Variances	Mod Levene Equality of Variance	0.03446	8.285	0.8548	Equal Variances
Variances	Levene Equality of Variance	0.001085	8.285	0.9741	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9206	0.866	0.1016	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1689	0.2235	0.1403	Normal Distribution
Distribution	D'Agostino Skewness	0.09078	2.576	0.9277	Normal Distribution
Distribution	D'Agostino Kurtosis	2.098	2.576	0.0359	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	4.411	9.21	0.1102	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.6503	3.878	0.0901	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	0.935	0.9202	0.9498	0.935	0.9	0.96	0.00654	2.21%	0.0%
100		10	0.934	0.92	0.948	0.93	0.91	0.96	0.006182	2.09%	0.11%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	10	1.316	1.286	1.346	1.313	1.249	1.369	0.01325	3.19%	0.0%
100		10	1.314	1.285	1.343	1.303	1.266	1.369	0.01279	3.08%	0.17%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.93	0.96	0.95	0.92	0.91	0.93	0.96	0.95	0.92

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	02-7408-6006	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Parametric-Two Sample	Official Results:	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1.284	1.303	1.369	1.345	1.323	1.303	1.369	1.266	1.249	1.345
100		1.266	1.303	1.369	1.345	1.284	1.266	1.303	1.369	1.345	1.284

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	93/100	96/100	95/100	92/100	91/100	93/100	96/100	95/100	92/100

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-2103-8363	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	09-6814-6080	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	01 Feb-16 13:31	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-1967-2320	**Code:**	COM0116.225k	**Client:**	City of Malibu
Sample Date:	31 Jan-16 10:50	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	31 Jan-16 12:40	**Source:**	Bioassay Report		
Sample Age:	27h	**Station:**	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	1.97%	Fails mean length

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100*	2.442	1.734	0.291	18	0.0126	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.78	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.0197	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.8405002	0.8405002	1	5.963	0.0252	Significant Effect
Error	2.536999	0.1409444	18			
Total	3.3775		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.085	6.541	0.1086	Equal Variances
Variances	Mod Levene Equality of Variance	1.063	8.285	0.3162	Equal Variances
Variances	Levene Equality of Variance	2.691	8.285	0.1183	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9201	0.866	0.0993	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.211	0.2235	0.0199	Normal Distribution
Distribution	D'Agostino Skewness	1.612	2.576	0.1069	Normal Distribution
Distribution	D'Agostino Kurtosis	1.497	2.576	0.1343	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	4.841	9.21	0.0889	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.7796	3.878	0.0427	Normal Distribution

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	14.78	14.45	15.11	14.6	14.3	15.7	0.1459	3.12%	0.0%
100		10	14.37	14.18	14.56	14.5	13.7	14.6	0.08307	1.83%	2.77%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.2	14.5	14.5	14.5	13.7	14.5	14.6	14.3	14.5

CETIS Analytical Report

Report Date: 03 Mar-16 10:26 (p 1 of 3)
Test Code: COM0116.225klp | 21-3758-2869

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-3139-2950	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	09-6814-6080	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:31	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	17-1967-2320	Code:	COM0116.225k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03R		

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	0.935	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	10	0.935	0.9	0.96	0.00654	0.02068	2.21%	0.0%	935	1000
100		10	0.934	0.91	0.96	0.006182	0.01955	2.09%	0.11%	934	1000

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0.92	0.93	0.96	0.95	0.94	0.93	0.96	0.91	0.9	0.95
100		0.91	0.93	0.96	0.95	0.92	0.91	0.93	0.96	0.95	0.92

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	92/100	93/100	96/100	95/100	94/100	93/100	96/100	91/100	90/100	95/100
100		91/100	93/100	96/100	95/100	92/100	91/100	93/100	96/100	95/100	92/100

Analysis ID:	15-3139-2950	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	00-4078-8832	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:21	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	09-6814-6080	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:31	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	
Sample ID:	17-1967-2320	Code:	COM0116.225k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03R		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	140740	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.78	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	10	14.78	14.3	15.7	0.1459	0.4614	3.12%	0.0%
100		10	14.37	13.7	14.6	0.08307	0.2627	1.83%	2.77%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	15.5	14.9	15.7	14.3	14.5	14.6	14.7	14.6	14.5	14.5
100		14.4	14.2	14.5	14.5	14.5	13.7	14.5	14.6	14.3	14.5

CETIS Measurement Report

Report Date: 03 Mar-16 10:26 (p 1 of 1)
Test Code: COM0116.225klp | 21-3758-2869

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	09-6814-6080	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16 13:31	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16 13:31	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	17-1967-2320	Code:	COM0116.225k	Client:	City of Malibu
Sample Date:	31 Jan-16 10:50	Material:	Sample Water	Project:	ASBS
Receive Date:	31 Jan-16 12:40	Source:	Bioassay Report		
Sample Age:	27h	Station:	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
100		2	6.25	3.073	9.427	6	6.5	0.25	0.3536	5.66%	0
Overall		4	6.35			6	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.15	6.244	10.06	8	8.3	0.15	0.2121	2.6%	0
Overall		4	8.025			7.9	8.3				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.1
100		6.5	6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.3	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.7
100		14.8	14.7

aquatic bioassay & consulting laboratories, inc

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

DATE: February 1, 2016

STANDARD TOXICANT: Copper Chloride

ENDPOINT: GERMINATION

NOEC = 32.0 ug/l

EC25 = 108.0 ug/l
EC50 = 138.5 ug/l

ENDPOINT: GROWTH-LENGTH

NOEC = 32.0 ug/l

IC25 = 81.32 ug/l
IC50 = 202.4 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	14-1595-5110	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	04-7914-7466	Code:	KLP020116k	Client:	Internal Lab
Sample Date:	01 Feb-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-4383-8954	Germination Rate	32	100	56.57	4.12%		Dunnett Multiple Comparison Test
16-8410-8911	Mean Length	32	100	56.57	3.27%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
14-0334-7001	Germination Rate	EC5	46.56	33.43	54.81		Linear Interpolation (ICPIN)
		EC10	66.49	51.89	79.55		
		EC15	86.43	68.34	104.6		
		EC20	101.9	86.25	107.6		
		EC25	108	100.8	113.6		
		EC40	126.3	120.4	130.8		
		EC50	138.5	133.1	143.3		
10-8495-5840	Mean Length	IC5	40.52	35.55	42.96		Linear Interpolation (ICPIN)
		IC10	50.72	46.04	53.17		
		IC15	60.92	56.64	63.46		
		IC20	71.12	67.44	73.98		
		IC25	81.32	77.24	84.54		
		IC40	174.1	131.4	189.1		
		IC50	202.4	190.4	208.9		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-0334-7001	Germination Rate	Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
18-4383-8954	Germination Rate	Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
10-8495-5840	Mean Length	Control Resp	14.44	10 - NL	Yes	Passes Acceptability Criteria
16-8410-8911	Mean Length	Control Resp	14.44	10 - NL	Yes	Passes Acceptability Criteria
16-8410-8911	Mean Length	NOEL	32	NL - 35	No	Passes Acceptability Criteria
18-4383-8954	Germination Rate	PMSD	0.04117	NL - 0.2	No	Passes Acceptability Criteria
16-8410-8911	Mean Length	PMSD	0.03267	NL - 0.2	No	Passes Acceptability Criteria

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.926	0.8925	0.9595	0.9	0.96	0.01208	0.02702	2.92%	0.0%
5.6		5	0.924	0.9032	0.9448	0.91	0.95	0.007483	0.01673	1.81%	0.22%
10		5	0.928	0.9058	0.9502	0.9	0.95	0.008	0.01789	1.93%	-0.22%
18		5	0.928	0.8997	0.9563	0.9	0.96	0.0102	0.0228	2.46%	-0.22%
32		5	0.914	0.8952	0.9328	0.9	0.93	0.006782	0.01517	1.66%	1.3%
100		5	0.756	0.7001	0.8119	0.7	0.81	0.02015	0.04506	5.96%	18.36%
180		5	0.148	0.09289	0.2031	0.1	0.21	0.01985	0.04438	29.99%	84.02%
320		5	0	0	0	0	0	0	0		100.0%

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.44	14.27	14.61	14.2	14.5	0.06	0.1342	0.93%	0.0%
5.6		5	14.66	14.52	14.8	14.5	14.8	0.05099	0.114	0.78%	-1.52%
10		5	14.64	14.57	14.71	14.6	14.7	0.02449	0.05477	0.37%	-1.39%
18		5	14.56	14.15	14.97	14.3	15.1	0.147	0.3286	2.26%	-0.83%
32		5	14.46	14.11	14.81	14.2	14.8	0.1249	0.2793	1.93%	-0.14%
100		5	9.6	9.26	9.94	9.2	9.9	0.1225	0.2739	2.85%	33.52%
180		5	8.68	7.918	9.442	7.6	9.1	0.2746	0.614	7.07%	39.89%
320		5	0	0	0	0	0	0	0		100.0%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.96	0.91	0.91	0.95	0.9
5.6		0.91	0.91	0.93	0.95	0.92
10		0.93	0.95	0.9	0.93	0.93
18		0.92	0.94	0.92	0.9	0.96
32		0.9	0.93	0.9	0.93	0.91
100		0.7	0.72	0.81	0.78	0.77
180		0.16	0.11	0.21	0.1	0.16
320		0	0	0	0	0

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.5	14.5	14.5	14.5	14.2
5.6		14.8	14.5	14.6	14.7	14.7
10		14.6	14.6	14.7	14.6	14.7
18		15.1	14.3	14.5	14.6	14.3
32		14.2	14.7	14.8	14.4	14.2
100		9.6	9.9	9.2	9.5	9.8
180		8.9	9.1	7.6	9	8.8
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	96/100	91/100	91/100	95/100	90/100
5.6		91/100	91/100	93/100	95/100	92/100
10		93/100	95/100	90/100	93/100	93/100
18		92/100	94/100	92/100	90/100	96/100
32		90/100	93/100	90/100	93/100	91/100
100		70/100	72/100	81/100	78/100	77/100
180		16/100	11/100	21/100	10/100	16/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	18-4383-8954	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	14-1595-5110	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	01 Feb-16	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	03 Feb-16	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	04-7914-7466	**Code:**	KLP020116k	**Client:**	Internal Lab
Sample Date:	01 Feb-16	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.12%	32	100	56.57	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	0.2165	2.407	0.07	8	0.7904	CDF	Non-Significant Effect
	10	-0.05137	2.407	0.07	8	0.8706	CDF	Non-Significant Effect
	18	-0.09594	2.407	0.07	8	0.8815	CDF	Non-Significant Effect
	32	0.8665	2.407	0.07	8	0.5142	CDF	Non-Significant Effect
	100*	8.4	2.407	0.07	8	<0.0001	CDF	Significant Effect
	180*	31.27	2.407	0.07	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.926	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.04117	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.425762	0.5709603	6	271.3	<0.0001	Significant Effect
Error	0.05893214	0.002104719	28			
Total	3.484694		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.841	16.81	0.6982	Equal Variances
Variances	Mod Levene Equality of Variance	0.6426	3.812	0.6953	Equal Variances
Variances	Levene Equality of Variance	1.578	3.528	0.1904	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9698	0.9146	0.4390	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.09739	0.1723	0.5332	Normal Distribution
Distribution	D'Agostino Skewness	0.6161	2.576	0.5378	Normal Distribution
Distribution	D'Agostino Kurtosis	1.389	2.576	0.1647	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.31	9.21	0.3151	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.325	3.878	0.5410	Normal Distribution

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.926	0.8925	0.9595	0.91	0.9	0.96	0.01208	2.92%	0.0%
5.6		5	0.924	0.9032	0.9448	0.92	0.91	0.95	0.007483	1.81%	0.22%
10		5	0.928	0.9058	0.9502	0.93	0.9	0.95	0.008	1.93%	-0.22%
18		5	0.928	0.8997	0.9563	0.92	0.9	0.96	0.0102	2.46%	-0.22%
32		5	0.914	0.8952	0.9328	0.91	0.9	0.93	0.006782	1.66%	1.3%
100		5	0.756	0.7001	0.8119	0.77	0.7	0.81	0.02015	5.96%	18.36%
180		5	0.148	0.09289	0.2031	0.16	0.1	0.21	0.01985	29.99%	84.02%
320		5	0	0	0	0	0	0	0		100.0%

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 18-4383-8954	Endpoint: Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed: 03 Mar-16 8:20	Analysis: Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.299	1.232	1.367	1.266	1.249	1.369	0.02425	4.17%	0.0%
5.6		5	1.293	1.252	1.334	1.284	1.266	1.345	0.01477	2.55%	0.48%
10		5	1.301	1.258	1.343	1.303	1.249	1.345	0.01528	2.63%	-0.11%
18		5	1.302	1.245	1.359	1.284	1.249	1.369	0.02056	3.53%	-0.21%
32		5	1.274	1.24	1.308	1.266	1.249	1.303	0.01223	2.15%	1.94%
100		5	1.055	0.9903	1.121	1.071	0.9912	1.12	0.02348	4.97%	18.76%
180		5	0.3918	0.3141	0.4695	0.4115	0.3218	0.476	0.02799	15.97%	69.84%
320		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.15%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.96	0.91	0.91	0.95	0.9
5.6		0.91	0.91	0.93	0.95	0.92
10		0.93	0.95	0.9	0.93	0.93
18		0.92	0.94	0.92	0.9	0.96
32		0.9	0.93	0.9	0.93	0.91
100		0.7	0.72	0.81	0.78	0.77
180		0.16	0.11	0.21	0.1	0.16
320		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.369	1.266	1.266	1.345	1.249
5.6		1.266	1.266	1.303	1.345	1.284
10		1.303	1.345	1.249	1.303	1.303
18		1.284	1.323	1.284	1.249	1.369
32		1.249	1.303	1.249	1.303	1.266
100		0.9912	1.013	1.12	1.083	1.071
180		0.4115	0.3381	0.476	0.3218	0.4115
320		0.05002	0.05002	0.05002	0.05002	0.05002

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	96/100	91/100	91/100	95/100	90/100
5.6		91/100	91/100	93/100	95/100	92/100
10		93/100	95/100	90/100	93/100	93/100
18		92/100	94/100	92/100	90/100	96/100
32		90/100	93/100	90/100	93/100	91/100
100		70/100	72/100	81/100	78/100	77/100
180		16/100	11/100	21/100	10/100	16/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	16-8410-8911	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	14-1595-5110	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	01 Feb-16	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	03 Feb-16	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	
Sample ID:	04-7914-7466	**Code:**	KLP020116k	**Client:**	Internal Lab
Sample Date:	01 Feb-16	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	3.27%	32	100	56.57	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		5.6	38	16	1	8	0.9999	Asymp	Non-Significant Effect
		10	40	16	0	8	1.0000	Asymp	Non-Significant Effect
		18	30	16	1	8	0.9557	Asymp	Non-Significant Effect
		32	27	16	1	8	0.8267	Asymp	Non-Significant Effect
		100*	15	16	0	8	0.0222	Asymp	Significant Effect
		180*	15	16	0	8	0.0222	Asymp	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.44	10 - NL	Yes	Passes Acceptability Criteria
NOEL	32	NL - 35	No	Passes Acceptability Criteria
PMSD	0.03267	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	211.5309	35.25514	6	367.2	<0.0001	Significant Effect
Error	2.688001	0.09600003	28			
Total	214.2189		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	22.31	16.81	0.0011	Unequal Variances
Variances	Mod Levene Equality of Variance	1.163	3.812	0.3626	Equal Variances
Variances	Levene Equality of Variance	2.576	3.528	0.0410	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8868	0.9146	0.0018	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1584	0.1723	0.0263	Normal Distribution
Distribution	D'Agostino Skewness	3.234	2.576	0.0012	Non-normal Distribution
Distribution	D'Agostino Kurtosis	3.31	2.576	0.0009	Non-normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	21.41	9.21	<0.0001	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	1.02	3.878	0.0112	Normal Distribution

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.44	14.27	14.61	14.5	14.2	14.5	0.06	0.93%	0.0%
5.6		5	14.66	14.52	14.8	14.7	14.5	14.8	0.05099	0.78%	-1.52%
10		5	14.64	14.57	14.71	14.6	14.6	14.7	0.02448	0.37%	-1.39%
18		5	14.56	14.15	14.97	14.5	14.3	15.1	0.147	2.26%	-0.83%
32		5	14.46	14.11	14.81	14.4	14.2	14.8	0.1249	1.93%	-0.14%
100		5	9.6	9.26	9.94	9.6	9.2	9.9	0.1225	2.85%	33.52%
180		5	8.68	7.918	9.442	8.9	7.6	9.1	0.2746	7.07%	39.89%
320		5	0	0	0	0	0	0	0		100.0%

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 16-8410-8911 **Endpoint:** Mean Length **CETIS Version:** CETISv1.8.7
Analyzed: 03 Mar-16 8:20 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.5	14.5	14.5	14.5	14.2
5.6		14.8	14.5	14.6	14.7	14.7
10		14.6	14.6	14.7	14.6	14.7
18		15.1	14.3	14.5	14.6	14.3
32		14.2	14.7	14.8	14.4	14.2
100		9.6	9.9	9.2	9.5	9.8
180		8.9	9.1	7.6	9	8.8
320		0	0	0	0	0

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	14-0334-7001	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	14-1595-5110	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	04-7914-7466	Code:	KLP020116k	Client:	Internal Lab
Sample Date:	01 Feb-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

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	0.926	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	46.56	33.43	54.81
EC10	66.49	51.89	79.55
EC15	86.43	68.34	104.6
EC20	101.9	86.25	107.6
EC25	108	100.8	113.6
EC40	126.3	120.4	130.8
EC50	138.5	133.1	143.3

Germination Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.926	0.9	0.96	0.01208	0.02702	2.92%	0.0%	463	500
5.6		5	0.924	0.91	0.95	0.007483	0.01673	1.81%	0.22%	462	500
10		5	0.928	0.9	0.95	0.008	0.01789	1.93%	-0.22%	464	500
18		5	0.928	0.9	0.96	0.0102	0.0228	2.46%	-0.22%	464	500
32		5	0.914	0.9	0.93	0.006782	0.01517	1.66%	1.3%	457	500
100		5	0.756	0.7	0.81	0.02015	0.04506	5.96%	18.36%	378	500
180		5	0.148	0.1	0.21	0.01985	0.04438	29.99%	84.02%	74	500
320		5	0	0	0	0	0		100.0%	0	500

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.96	0.91	0.91	0.95	0.9
5.6		0.91	0.91	0.93	0.95	0.92
10		0.93	0.95	0.9	0.93	0.93
18		0.92	0.94	0.92	0.9	0.96
32		0.9	0.93	0.9	0.93	0.91
100		0.7	0.72	0.81	0.78	0.77
180		0.16	0.11	0.21	0.1	0.16
320		0	0	0	0	0

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 14-0334-7001 **Endpoint:** Germination Rate **CETIS Version:** CETISv1.8.7
Analyzed: 03 Mar-16 8:20 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	96/100	91/100	91/100	95/100	90/100
5.6		91/100	91/100	93/100	95/100	92/100
10		93/100	95/100	90/100	93/100	93/100
18		92/100	94/100	92/100	90/100	96/100
32		90/100	93/100	90/100	93/100	91/100
100		70/100	72/100	81/100	78/100	77/100
180		16/100	11/100	21/100	10/100	16/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	10-8495-5840	Endpoint:	Mean Length	CETIS Version:	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	14-1595-5110	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	04-7914-7466	Code:	KLP020116k	Client:	Internal Lab
Sample Date:	01 Feb-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1856968	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.44	10 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	40.52	35.55	42.96
IC10	50.72	46.04	53.17
IC15	60.92	56.64	63.46
IC20	71.12	67.44	73.98
IC25	81.32	77.24	84.54
IC40	174.1	131.4	189.1
IC50	202.4	190.4	208.9

Mean Length Summary

			Calculated Variate						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.44	14.2	14.5	0.06	0.1342	0.93%	0.0%
5.6		5	14.66	14.5	14.8	0.05099	0.114	0.78%	-1.52%
10		5	14.64	14.6	14.7	0.02448	0.05473	0.37%	-1.39%
18		5	14.56	14.3	15.1	0.147	0.3286	2.26%	-0.83%
32		5	14.46	14.2	14.8	0.1249	0.2793	1.93%	-0.14%
100		5	9.6	9.2	9.9	0.1225	0.2739	2.85%	33.52%
180		5	8.68	7.6	9.1	0.2746	0.614	7.07%	39.89%
320		5	0	0	0	0	0		100.0%

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.5	14.5	14.5	14.5	14.2
5.6		14.8	14.5	14.6	14.7	14.7
10		14.6	14.6	14.7	14.6	14.7
18		15.1	14.3	14.5	14.6	14.3
32		14.2	14.7	14.8	14.4	14.2
100		9.6	9.9	9.2	9.5	9.8
180		8.9	9.1	7.6	9	8.8
320		0	0	0	0	0

Analysis ID:	10-8495-5840	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	03 Mar-16 8:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 03 Mar-16 13:09 (p 1 of 2)
Test Code: KLP020116 | 00-8926-1908

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	14-1595-5110	Test Type:	Growth-Germination	Analyst:	
Start Date:	01 Feb-16	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	03 Feb-16	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	David Gutoff	Age:	

Sample ID:	04-7914-7466	Code:	KLP020116k	Client:	Internal Lab
Sample Date:	01 Feb-16	Material:	Copper chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	NA	Station:	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
5.6		2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
10		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
18		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
32		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
100		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
180		2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
320		2	6.1	6.094	6.106	6.1	6.1	0	0	0.0%	0
Overall		16	6.319			6	6.8				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
5.6		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
10		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
320		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		16	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
5.6		2	34	34	34	34	34	0	0	0.0%	0
10		2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
320		2	34	34	34	34	34	0	0	0.0%	0
Overall		16	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
5.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
10		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
18		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
32		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
180		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
320		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		16	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.8	6.1
5.6		6.8	6
10		6.6	6.5
18		6.6	6.3
32		6.5	6.1
100		6.2	6.1
180		6.1	6.2
320		6.1	6.1

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
5.6		7.9	7.9
10		7.9	7.9
18		7.9	7.9
32		7.9	7.9
100		7.9	7.9
180		7.9	7.9
320		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
5.6		34	34
10		34	34
18		34	34
32		34	34
100		34	34
180		34	34
320		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.8	14.7
5.6		14.8	14.7
10		14.8	14.7
18		14.8	14.7
32		14.8	14.7
100		14.8	14.7
180		14.8	14.7
320		14.8	14.7

aquatic bioassay & consulting laboratories, inc

March 22nd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	03/11/2016
ABC LAB. NO.:	COM0316.081

CHRONIC SEA URCHIN FERTILIZATION 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:	22 Mar-16 10:17 (p 1 of 1)
Test Code:	COM0316.081urc | 01-2546-5707

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-8621-4110	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	12 Mar-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	12-6234-7441	**Code:**	COM0316.081u	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-9257-8106	Fertilization Rate	100	>100	NA	3.58%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
20-5401-3847	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
15-9257-8106	Fertilization Rate	Control Resp	0.94	0.7 - NL	Yes	Passes Acceptability Criteria
20-5401-3847	Fertilization Rate	Control Resp	0.94	0.7 - NL	Yes	Passes Acceptability Criteria
15-9257-8106	Fertilization Rate	PMSD	0.03581	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	0.94	0.9109	0.9691	0.92	0.96	0.009129	0.01826	1.94%	0.0%
100		4	0.95	0.9156	0.9844	0.93	0.98	0.0108	0.0216	2.27%	-1.06%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.96	0.95	0.93
100		0.98	0.95	0.93	0.94

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	96/100	95/100	93/100
100		98/100	95/100	93/100	94/100

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-9257-8106	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.8.7
Analyzed:	22 Mar-16 9:18	Analysis:	Parametric-Two Sample	Official Results:	Yes
Batch ID:	15-8621-4110	Test Type:	Fertilization	Analyst:	
Start Date:	12 Mar-16 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	12 Mar-16 13:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	
Sample ID:	12-6234-7441	Code:	COM0316.081u	Client:	City of Malibu
Sample Date:	11 Mar-16 14:31	Material:	Sample Water	Project:	ASBS
Receive Date:	11 Mar-16 17:00	Source:	Bioassay Report		
Sample Age:	22h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	3.58%	Passes fertilization rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	-0.7304	1.943	0.066	6	0.7537	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.94	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.03581	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001218956	0.001218956	1	0.5335	0.4927	Non-Significant Effect
Error	0.01371015	0.002285026	6			
Total	0.01492911		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.016	47.47	0.5793	Equal Variances
Variances	Mod Levene Equality of Variance	0.05888	13.75	0.8164	Equal Variances
Variances	Levene Equality of Variance	0.195	13.75	0.6742	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9203	0.6451	0.4324	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1937	0.3313	0.6068	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3415	3.878	0.4978	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	0.94	0.9109	0.9691	0.94	0.92	0.96	0.009129	1.94%	0.0%
100		4	0.95	0.9156	0.9844	0.945	0.93	0.98	0.0108	2.27%	-1.06%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.325	1.264	1.387	1.324	1.284	1.369	0.01946	2.94%	0.0%
100		4	1.35	1.262	1.438	1.334	1.303	1.429	0.02764	4.09%	-1.86%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.96	0.95	0.93
100		0.98	0.95	0.93	0.94

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.284	1.369	1.345	1.303
100		1.429	1.345	1.303	1.323

Purple Sea Urchin Sperm Cell Fertilization Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	15-9257-8106	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:18	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	96/100	95/100	93/100
100		98/100	95/100	93/100	94/100

CETIS Analytical Report

Report Date: 22 Mar-16 10:17 (p 1 of 2)
Test Code: COM0316.081urc | 01-2546-5707

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-5401-3847	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	15-8621-4110	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	12 Mar-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	12-6234-7441	**Code:**	COM0316.081u	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

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	0.94	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	0.94	0.92	0.96	0.009129	0.01826	1.94%	0.0%	376	400
100		4	0.95	0.93	0.98	0.0108	0.0216	2.27%	-1.06%	380	400

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.92	0.96	0.95	0.93
100		0.98	0.95	0.93	0.94

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	92/100	96/100	95/100	93/100
100		98/100	95/100	93/100	94/100

Analyst: PJ QA: P

Analysis ID:	20-5401-3847	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

CETIS Measurement Report

Report Date: 22 Mar-16 10:17 (p 1 of 1)
Test Code: COM0316.081urc | 01-2546-5707

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-8621-4110	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	12 Mar-16 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	12-6234-7441	**Code:**	COM0316.081u	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

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 Contr	2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		4	6.375			6	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
100		2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
Overall		4	14.8			14.7	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6
100		6.6	6.1

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.9
100		14.7	14.9

Analyst: MY QA: P

aquatic bioassay & consulting laboratories, inc

March 22nd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	03/11/2016
ABC LAB. NO.:	COM0316.081

CHRONIC MYTILUS 48 HOUR DEVELOPMENT BIOASSAY

NOEC = 100.00 %
TUc = 1.00

EC25 = >100.00 %
EC50 = >100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-7549-9189	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Mar-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	10-6503-5043	**Code:**	COM0316.081m	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-8894-8197	Combined Proportion Norm	100	>100	NA	2.37%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
17-7507-3827	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
11-8894-8197	Combined Proportion Norm	PMSD	0.02373	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	0.9638	0.9424	0.9852	0.9457	0.9864	0.007706	0.01723	1.79%	0.0%
100		5	0.9774	0.9587	0.996	0.9548	0.991	0.006711	0.01501	1.54%	-1.41%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9548	0.9864	0.9774	0.9548	0.9457
100		0.991	0.9774	0.9729	0.991	0.9548

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/221	218/221	216/221	211/221	209/221
100		219/221	216/221	215/221	219/221	211/221

CETIS Analytical Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-8894-8197	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	15-7549-9189	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Mar-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	
Sample ID:	10-6503-5043	**Code:**	COM0316.081m	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.37%	Passes combined proportion normal

Equal Variance t Two-Sample Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	100	-1.321	1.86	0.059	8	0.8885	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
PMSD	0.02373	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004420078	0.004420078	1	1.746	0.2229	Non-Significant Effect
Error	0.02025443	0.002531804	8			
Total	0.02467451		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.016	23.15	0.9877	Equal Variances
Variances	Mod Levene Equality of Variance	0.005962	13.75	0.9410	Equal Variances
Variances	Levene Equality of Variance	0.04025	11.26	0.8460	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.929	0.7411	0.4385	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1728	0.3025	0.6237	Normal Distribution
Distribution	D'Agostino Skewness	0.1993	2.576	0.8420	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4289	3.878	0.3145	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	0.9638	0.9424	0.9852	0.9548	0.9457	0.9864	0.007706	1.79%	0.0%
100		5	0.9774	0.9587	0.996	0.9774	0.9548	0.991	0.006712	1.54%	-1.41%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.384	1.322	1.447	1.356	1.336	1.454	0.02241	3.62%	0.0%
100		5	1.427	1.364	1.489	1.42	1.356	1.476	0.02259	3.54%	-3.04%

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9548	0.9864	0.9774	0.9548	0.9457
100		0.991	0.9774	0.9729	0.991	0.9548

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.356	1.454	1.42	1.356	1.336
100		1.476	1.42	1.405	1.476	1.356

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-8894-8197	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/221	218/221	216/221	211/221	209/221
100		219/221	216/221	215/221	219/221	211/221

CETIS Analytical Report

Report Date: 22 Mar-16 10:18 (p 1 of 1)
Test Code: COM0316.081myt | 13-2223-7728

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-7507-3827	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	15-7549-9189	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Mar-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	10-6503-5043	**Code:**	COM0316.081m	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

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	0.9638	0.9457	0.9864	0.007706	0.01723	1.79%	0.0%	1065	1105
100		5	0.9774	0.9548	0.991	0.006712	0.01501	1.54%	-1.41%	1080	1105

Combined Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9548	0.9864	0.9774	0.9548	0.9457
100		0.991	0.9774	0.9729	0.991	0.9548

Combined Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	211/221	218/221	216/221	211/221	209/221
100		219/221	216/221	215/221	219/221	211/221

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-7549-9189	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Mar-16 13:01	**Species:**	Mytilis galloprovincialis	**Brine:**	
Duration:	48h	**Source:**	Carlsbad Aquafarms CA	**Age:**	

Sample ID:	10-6503-5043	**Code:**	COM0316.081m	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		4	6.375			6	6.8				0 (0%)

Total Ammonia (N)-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	1	0			0	0	0	0		0
100		1	0			0	0	0	0		0
Overall		2	0			0	0				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
100		2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
Overall		4	14.8			14.7	14.9				0 (0%)

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6
100		6.6	6.1

Total Ammonia (N)-mg/L

C-%	Control Type	1
0	Negative Contr	0
100		0

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.9
100		14.7	14.9

Analyst: my QA: P

aquatic bioassay & consulting laboratories, inc

March 22nd, 2016

Ms. Jennifer Brown
City of Malibu
23815 Stuart Ranch Rd.
Malibu, CA 90265

Dear Ms. Brown:

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-600/R95/136*. Results were as follows:

CLIENT:	City of Malibu
SAMPLE I.D.:	24-BB-03R
DATE RECEIVED:	03/11/2016
ABC LAB. NO.:	COM0316.081

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

GERMINATION	NOEC	=	100.00 %
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
GROWTH	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date:	22 Mar-16 10:18 (p 1 of 2)
Test Code:	COM0316.081klp | 04-8699-5959

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	06-3694-3055	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-7427-5851	**Code:**	COM0316.081k	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-0233-2432	Germination Rate	100	>100	NA	2.63%	1	Equal Variance t Two-Sample Test
04-0598-1269	Mean Length	100	>100	NA	0.9%	1	Equal Variance t Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
05-2264-8405	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	
18-1679-3204	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
05-2264-8405	Germination Rate	Control Resp	0.91	0.7 - NL	Yes	Passes Acceptability Criteria
11-0233-2432	Germination Rate	Control Resp	0.91	0.7 - NL	Yes	Passes Acceptability Criteria
04-0598-1269	Mean Length	Control Resp	14.38	10 - NL	Yes	Passes Acceptability Criteria
18-1679-3204	Mean Length	Control Resp	14.38	10 - NL	Yes	Passes Acceptability Criteria
11-0233-2432	Germination Rate	PMSD	0.02626	NL - 0.2	No	Passes Acceptability Criteria
04-0598-1269	Mean Length	PMSD	0.008959	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	0.91	0.8948	0.9252	0.9	0.93	0.005477	0.01225	1.35%	0.0%
100		5	0.934	0.9083	0.9597	0.91	0.96	0.009274	0.02074	2.22%	-2.64%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.38	14.32	14.44	14.3	14.4	0.02	0.04472	0.31%	0.0%
100		5	14.48	14.3	14.66	14.3	14.7	0.06633	0.1483	1.02%	-0.7%

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	0.93	0.91	0.9
100		0.93	0.95	0.92	0.96	0.91

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.4	14.4	14.4	14.4	14.3
100		14.3	14.5	14.4	14.5	14.7

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	93/100	91/100	90/100
100		93/100	95/100	92/100	96/100	91/100

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	11-0233-2432	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	Analysis:	Parametric-Two Sample	Official Results:	Yes

Batch ID:	06-3694-3055	Test Type:	Growth-Germination	Analyst:	
Start Date:	12 Mar-16 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	Species:	Macrocystis pyrifera	Brine:	Not Applicable
Duration:	48h	Source:	Aquatic Bioassay Labs Collection	Age:	

Sample ID:	17-7427-5851	Code:	COM0316.081k	Client:	City of Malibu
Sample Date:	11 Mar-16 14:31	Material:	Sample Water	Project:	ASBS
Receive Date:	11 Mar-16 17:00	Source:	Bioassay Report		
Sample Age:	22h	Station:	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	2.63%	Passes germination rate

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	-2.175	1.86	0.040	8	0.9693	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.91	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.02626	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.005502115	0.005502115	1	4.729	0.0614	Non-Significant Effect
Error	0.009307238	0.001163405	8			
Total	0.01480935		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.787	23.15	0.2253	Equal Variances
Variances	Mod Levene Equality of Variance	3.582	13.75	0.1073	Equal Variances
Variances	Levene Equality of Variance	3.965	11.26	0.0816	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.95	0.7411	0.6690	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.207	0.3025	0.2812	Normal Distribution
Distribution	D'Agostino Skewness	0.6854	2.576	0.4931	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3549	3.878	0.4648	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	0.91	0.8948	0.9252	0.91	0.9	0.93	0.005477	1.35%	0.0%
100		5	0.934	0.9083	0.9597	0.93	0.91	0.96	0.009274	2.22%	-2.64%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.267	1.239	1.294	1.266	1.249	1.303	0.009859	1.74%	0.0%
100		5	1.314	1.26	1.367	1.303	1.266	1.369	0.01919	3.27%	-3.7%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.9	0.93	0.91	0.9
100		0.93	0.95	0.92	0.96	0.91

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.266	1.249	1.303	1.266	1.249
100		1.303	1.345	1.284	1.369	1.266

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	11-0233-2432	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	93/100	91/100	90/100
100		93/100	95/100	92/100	96/100	91/100

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-0598-1269	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:18	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	06-3694-3055	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-7427-5851	**Code:**	COM0316.081k	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	0.9%	Passes mean length

Equal Variance t Two-Sample Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		100	-1.443	1.86	0.129	8	0.9065	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.38	10 - NL	Yes	Passes Acceptability Criteria
PMSD	0.008959	NL - 0.2	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0250001	0.0250001	1	2.083	0.1869	Non-Significant Effect
Error	0.09599981	0.01199998	8			
Total	0.1209999		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	11	23.15	0.0394	Equal Variances
Variances	Mod Levene Equality of Variance	3.429	13.75	0.1135	Equal Variances
Variances	Levene Equality of Variance	2.817	11.26	0.1318	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8391	0.7411	0.0430	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.3232	0.3025	0.0039	Non-normal Distribution
Distribution	D'Agostino Skewness	0.7261	2.576	0.4678	Normal Distribution
Distribution	Anderson-Darling A2 Normality	1.077	3.878	0.0081	Non-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	14.38	14.32	14.44	14.4	14.3	14.4	0.01998	0.31%	0.0%
100		5	14.48	14.3	14.66	14.5	14.3	14.7	0.06633	1.02%	-0.7%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.4	14.4	14.4	14.4	14.3
100		14.3	14.5	14.4	14.5	14.7

CETIS Analytical Report

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-2264-8405	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	06-3694-3055	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-7427-5851	**Code:**	COM0316.081k	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

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	0.91	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	0.91	0.9	0.93	0.005477	0.01225	1.35%	0.0%	455	500
100		5	0.934	0.91	0.96	0.009274	0.02074	2.22%	-2.64%	467	500

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.9	0.93	0.91	0.9
100		0.93	0.95	0.92	0.96	0.91

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	90/100	93/100	91/100	90/100
100		93/100	95/100	92/100	96/100	91/100

Analysis ID:	05-2264-8405	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-1679-3204	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Mar-16 9:19	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	06-3694-3055	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-7427-5851	**Code:**	COM0316.081k	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1925769	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	14.38	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	14.38	14.3	14.4	0.01998	0.04468	0.31%	0.0%
100		5	14.48	14.3	14.7	0.06633	0.1483	1.02%	-0.7%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.4	14.4	14.4	14.4	14.3
100		14.3	14.5	14.4	14.5	14.7

CETIS Measurement Report

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	06-3694-3055	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	12 Mar-16 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Mar-16 13:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	17-7427-5851	**Code:**	COM0316.081k	**Client:**	City of Malibu
Sample Date:	11 Mar-16 14:31	**Material:**	Sample Water	**Project:**	ASBS
Receive Date:	11 Mar-16 17:00	**Source:**	Bioassay Report		
Sample Age:	22h	**Station:**	24-BB-03R		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		4	6.375			6	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 Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975			7.9	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	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 Contr	2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
100		2	14.8	13.53	16.07	14.7	14.9	0.1	0.1414	0.96%	0
Overall		4	14.8			14.7	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6
100		6.6	6.1

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
100		8.1	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
100		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.9
100		14.7	14.9

CHAIN OF CUSTODY RECORD

Client: City of Malibu

Address

Phone Number: (805) 405-9388

Project Name/Number: ASBS

Project Mgr. Karin Patrick

P.O. #

Sampled By *(signature)*

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Ammonia	Nitrate & Orthophosphate	Oil & Grease	TSS	Total Metals	PAHs, Organophosphorus & Pyrethroid Pesticides	Urchin Toxicity*	Kelp Toxicity*	Bivalve Toxicity*	Comments
03.11.16	1426		X	FW	24-BB-03Z	7	X	X	X	X	X	X				
03.11.16	1431			SW	24-BB-03R	12	X	X	X	X	X	X	X	X	X	
*				~~FW~~	~~24-BB-02Z~~	~~7~~			X	X			X	X	X	
*				~~FW~~	~~24-BB-01Z~~	~~7~~			X	X			X	X	X	

Special Instructions: * 02Z + 01Z not flowing

Relinquised By: *(signature)* [signature] Date: Time: 03.11.16 1700

Received By: *(signature)* [signature] Date: Time: 03.11.16 1700

Sample Temp _____°C

Relinquised By: *(signature)* Date: Time:

Received By: *(signature)* Date: Time:

Aquatic Bioassay and Consulting Laboratories
29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-5621

APPENDIX C

EPA Recommended Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater

Appendix C

EPA Recommended
Aquatic Life Ambient Water Quality
Criterion for Selenium in Freshwater[1]

	Chronic					Short-term
Criterion version	**Egg-Ovary [1] (mg/kg dw)**	**Whole Body [1] (mg/kg dw)**	**Muscle [1] (mg/kg dw)**	**Water,[1] Lentic[2] (µg/L)**	**Water,[1] Lotic (µg/L)**	**Water (µg/L)**
2016 Final Update	15.1	8.5	11.3	1.5 (30 d)	3.1 (30 d)	Intermittent exposure equation.
1999 Selenium Criteria	N/A	N/A	N/A	5 (4 d)	5 (4 d)	Acute Equation based on water column concentration.

1. A note on hierarchy of table: when fish egg/ovary concentrations are measured, the values supersede any whole-body, muscle, or water column elements except in certain situations. Whole body or muscle measurements supersede any water column element when both fish tissue and water concentrations are measured, except in certain situations (see examples in text above). Water column values are derived from fish tissue concentrations.

The criterion document does not include an acute criterion (based on water-only exposure) because selenium is bioaccumulative and toxicity primarily occurs through dietary exposure. EPA derived an intermittent exposure criterion element from the 30-day average water column criterion element for situations where elevated inputs of selenium could result in bioaccumulation in the ecosystem and potential chronic effects in fish (*e.g.*, new discharges).

2. Lentic, pertaining to organisms or habitats, means inhabiting or situated in still, fresh water.

3. Lotic, pertaining to organisms or habitats, means inhabiting or situated in rapidly moving fresh water.

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[1] EPA, "Recommended Aquatic Life Ambient Water Quality for Selenium in Freshwater," Document No. 2016-16585. July 13, 2016. *Office of the Federal Register* website, Accessed December 7, 2016. https://www.federalregister.gov/d/2016-16585/p-12