

**City of Morro Bay and
Cayucos Sanitary District**

**OFFSHORE MONITORING
AND REPORTING PROGRAM**

SEMI-ANNUAL EFFLUENT SAMPLING

**CHEMICAL AND BIOASSAY
ANALYSIS RESULTS**

JANUARY 2017



Marine Research Specialists

**4744 Telephone Rd., Suite 3-315
Ventura, California 93003**

Report to
City of Morro Bay and
Cayucos Sanitary District

955 Shasta Avenue
Morro Bay, California 93442
(805) 772-6272

MONITORING
AND
REPORTING PROGRAM

SEMI-ANNUAL EFFLUENT REPORT

CHEMICAL AND BIOASSAY
ANALYSIS RESULTS

JANUARY 2017

Prepared by
Douglas A. Coats

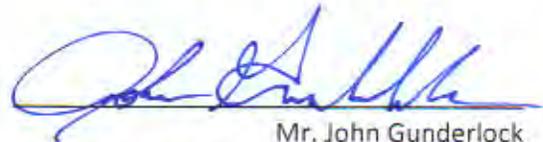
Marine Research Specialists

4744 Telephone Rd., Suite 3-315
Ventura, California 93003

Telephone: (805) 644-1180
E-mail: Marine@Rain.org

February 2017

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.



Mr. John Gunderlock
Wastewater/Collections System Supervisor
City of Morro Bay/Cayucos CSD Wastewater Treatment Plant

Date: 2/9/17

marine research specialists

4744 Telephone Rd., Suite 3-315 · Ventura, CA 93003 · 805-644-1180

John Gunderlock
Wastewater & Collection Systems Supervisor
City of Morro Bay/Cayucos Sanitary District
955 Shasta Avenue
Morro Bay, CA 93442

9 February 2017

Reference: Semiannual Effluent Self-Monitoring Report for January through June 2017

Dear Mr. Gunderlock:

This self-monitoring report documents the chemical and bioassay analysis results for effluent samples collected in January 2017 as required by NPDES discharge permit CA0047881.¹ Analyses of effluent samples collected on 17 and 18 January were conducted in accordance with the monitoring requirements specified in the permit, including:

- Chemical analyses conducted on a composite sample collected on 18 January;
- Nutrient compounds measured in a grab sample collected on 18 January; and
- Chronic bioassays conducted on a composite sample collected on 17 January.

Three attachments to this report demonstrate that all chemical concentrations and toxicological endpoints were within the limitations specified in the discharge permit. Attachment A compares the results of the analyses with the limitations established for each of the effluent parameters specified in the permit. The comparisons are consistent with the minimum-level (ML) reporting requirements of the permit, and all units have been converted to those used in the discharge monitoring report (DMR) that was submitted electronically within the California Integrated Water Quality System (Attachment B). Attachment C collates the original laboratory reports, including raw data and results, pertinent QA/QC analyses, and chains of custody.

The chemical and bioassay analyses of effluent samples collected in January 2017 augment a comprehensive dataset spanning nearly two-and-a-half decades. Together, these measurements demonstrate the consistently benign character of the discharge from the MBSCD² treatment plant. The general lack of toxicity and chemical contaminants within the effluent samples reflects the absence of heavy industry within the collection area and the high performance of the treatment process. The concentrations of the few chemical compounds detected in the January 2017 samples were typical of wastewater derived from domestic sources, and all concentrations were considerably below the limits specified in the NPDES discharge permit.

Six of the eleven chemicals that are monitored on a semiannual basis were detected in the January 2017 composite sample. Of those, four had concentrations high enough to be quantified above their respective MLs: copper, lead, selenium, and zinc. Copper, lead, and zinc are commonly occurring metals that enter the wastewater collection system through erosion of natural mineral deposits along the central California coast. They may also enter the system through corrosion of household plumbing systems. Nevertheless, the concentrations of these compounds that were detected in the January 2017 effluent were well below the levels deemed deleterious to marine organisms.

¹ Regional Water Quality Control Board (RWQCB) - Central Coast Region and the Environmental Protection Agency (EPA) – Region IX. 2009. Waste Discharge Requirements (Order No. R3-2008-0065) and National Pollutant Discharge Elimination System (Permit No. CA0047881) for the Morro Bay and Cayucos Wastewater Treatment Plant Discharges to the Pacific Ocean, Morro Bay, San Luis Obispo County. Effective 1 March 2009.

² City of Morro Bay and the Cayucos Sanitary District, joint owners of the wastewater treatment and disposal facility

Mr. J. Gunderlock
9 February 2017

Page 2

Small but quantifiable concentrations of the metalloid selenium were also detected within the January 2017 effluent sample. The occurrence of selenium within effluent is similar to that of the commonly occurring metals because it too occurs naturally in the mineralogy of the central California coast. As in past effluent samples, its concentration in the January effluent sample was two orders of magnitude below levels deemed deleterious to marine organisms.

The low overall toxicity found in the chronic bioassay affirmed the effluent's low contaminant load. The chronic toxicity test conducted on a January 2017 composite effluent sample measured the effluent's potential to impact the development of larval red abalone (*Haliotis rufescens*) by exposing those organisms to a range of effluent dilutions in the laboratory. Although the larval abalone are highly sensitive to contaminants, adverse effects were not observed in effluent that was seven times more concentrated than that allowed by the discharge permit.

Please contact the undersigned if you have questions regarding these results.

Sincerely,

 **MARINE RESEARCH SPECIALISTS**
Vice President

2017.02.09 18:02:40 -08'00'

Douglas A. Coats
Program Manager

ATTACHMENT A
MINIMUM LEVEL REPORTING

ATTACHMENT A
Analytical Results for Effluent Samples Collected during January 2017

Chemical Compound or Parameter	Units	Method	Detection Limit ^a	Practical ^b Quantification Limit	Minimum Level ^c	Permit ^d Limit	Reported Value
Nutrients							
Nitrate (as N)	mg/L	300.0	—	1.0	—	— ^e	ND
Urea (as N)	mg/L	Mulvenna & Savid	—	0.01	—	—	0.084 as measured
Ortho-Phosphate (as P)	mg/L	300.0	—	0.1	—	—	1.6 as measured
Dissolved Silica (SiO ₂)	mg/L	200.7	—	0.5	—	—	17 as measured
Objectives for the Protection of Marine Aquatic Life							
Arsenic	mg/L	200.8	0.0007	0.002	0.002	0.67	DNQ 0.0017 Est. Conc.
Cadmium	mg/L	200.7	0.0011	0.01	0.01	0.13	ND
Chromium VI ^f	mg/L	200.7	0.0012	0.01	0.01	0.27	ND
Copper	mg/L	200.7	0.0012	0.01	0.01	0.14	0.016 as measured
Lead	mg/L	200.8	0.0001	0.001	0.0005	0.27	0.0013 as measured
Mercury	µg/L	245.1	0.030	0.2	0.2	5.29	ND
Nickel	mg/L	200.7	0.0023	0.01	0.02	0.67	DNQ 0.0055 Est. Conc.
Selenium	mg/L	200.8	0.00019	0.002	0.002	2.01	0.0031 as measured
Silver	mg/L	200.7	0.0013	0.01	0.01	0.07	ND
Zinc	mg/L	200.7	0.0013	0.05	0.02	1.62	0.052 as measured
Cyanide	mg/L	335.4	0.0019	0.005	0.005	0.13	ND
Toxicity-Chronic: H. Rufescens	TUc	600/R-95/136	—	—	—	134.	17.9 as measured

^a The Method Detection Limit (MDL) is the analysis- and instrument-specific minimum concentration at which the presence of a substance can be reported with 99% confidence. It is determined from an analysis of a sample in a matrix containing the analyte.

^b The Practical Quantification Limit (PQL) is the analysis- and instrument-specific minimum concentration of a substance that can be routinely determined with a high degree of certainty (>99.9% confidence).

^c The Minimum Level (ML) is the method-specific minimum concentration of a substance that can be quantitatively measured in a sample given the current analytical performance used by most certified laboratories within California, as specified in the 2005 Ocean Plan.

^d The Permit Limit is the lowest, most-stringent threshold that is associated with the longest-duration averaging period. For limits established to protect marine aquatic life, the six-month median is the most stringent threshold. For other constituents, limits are imposed only on monthly averages.

^e No permit limits have been established for nutrients.

^f Total chromium concentration was reported rather than the concentration of the hexavalent oxidation state alone.

ATTACHMENT B
DISCHARGE MONITORING REPORTS

eSMR PDF Summary: DMR

NPDES Permit #: CA0047881

Facility: MORRO BAY/CAYUCOS WWTP

DMR Parameters

Feature - LS: 001-S				Monitoring Period: 01/01/2017 - 06/30/2017							
Loc	Sea	Param	Param Text	Q1	Q2	C1	C2	C3	Excur Count	Analy Freq	Sample Type
1	0	00620	Nitrogen, nitrate total (as N)					NODI: B Daily Maximum		Semiannual	GRAB
1	0	00720	Cyanide, total (as CN)			NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum		Semiannual	COMP24
1	0	00955	Silica, dissolved (as SiO2)					17.0 mg/L Daily Maximum	0	Semiannual	GRAB
1	0	00978	Arsenic, total recoverable			NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q Instantaneous Maximum		Semiannual	COMP24
1	0	00981	Selenium, total recoverable			0.0031 mg/L 6 Month Median	0.0031 mg/L Daily Maximum	0.0031 mg/L Instantaneous Maximum	0	Semiannual	COMP24
1	0	01032	Chromium, hexavalent (as Cr)			NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum		Semiannual	COMP24
1	0	01074	Nickel, total recoverable			NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q Instantaneous Maximum		Semiannual	
1	0	01079	Silver total recoverable			NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum			
1	0	01094	Zinc, total recoverable			0.052 mg/L 6 Month Median	0.052 mg/L Daily Maximum	0.052 mg/L Instantaneous Maximum	0	Semiannual	COMP24
1	0	01113	Cadmium, total recoverable			NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum			

Feature - LS: 001-S				Monitoring Period: 01/01/2017 - 06/30/2017							
Loc	Sea	Param	Param Text	Q1	Q2	C1	C2	C3	Excur Count	Analy Freq	Sample Type
1	0	01114	Lead, total recoverable			0.0013 mg/L 6 Month Median	0.0013 mg/L Daily Maximum	0.0013 mg/L Instantaneou s Maximum	0	Semiannual	COMP24
1	0	01119	Copper, total recoverable			0.016 mg/L 6 Month Median	0.016 mg/L Daily Maximum	0.016 mg/L Instantaneou s Maximum	0	Semiannual	COMP24
1	0	04175	Phosphate, ortho (as P)					1.6 mg/L Daily Maximum	0	Semiannual	GRAB
1	0	71800	Urea					0.084 mg/L Daily Maximum	0	Semiannual	GRAB
1	0	71901	Mercury, total recoverable			NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneou s Maximum			
1	0	TTK1D	Static 48Hr Chronic Macrocystis Pyrifera					NODI: 9 Daily Maximum			
1	0	TTK3R	Static 48Hr Chronic Haliotis Rufescens					17.9 tox chronic Daily Maximum	0	Semiannual	COMP24

ATTACHMENT C
LABORATORY REPORTS



Date of Report: 02/01/2017

Doug Coats

Marine Research Specialists

4744 Telephone Rd

Ste 3-315

Suite A

Ventura, CA 93003-3238

Client Project: [none]

BCL Project: Semi-Annual Eff

BCL Work Order: 1701793

Invoice ID: B258385

Enclosed are the results of analyses for samples received by the laboratory on 1/18/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Tina Green
Client Services Manager

Authorized Signature

Certifications: CA ELAP #1186; NV #CA00014; OR ELAP #4032-001; AK UST101

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Analysis Effluent Samples to be collected from the Morro Bay Wastewater Treatment Plant in January 2017

17-01793

Analysis	Sample	Method
Level IIA QC Report concentrations that are detected above the MDL, but are below the PQL		
10 Metals:		
Ag Silver	Composite	EPA 200.7
As Arsenic	Composite	EPA 200.8
Cd Cadmium	Composite	EPA 200.7
Cr Chromium (Total)	Composite	EPA 200.7
Cu Copper	Composite	EPA 200.7
Hg Mercury	Composite	EPA 245.1
Ni Nickel	Composite	EPA 200.7
Pb Lead	Composite	EPA 200.8
Se Selenium	Composite	EPA 200.8
Zn Zinc	Composite	EPA 200.7
Cyanide	Composite	EPA 335.3

Bottle Order to be sent to: Morro Bay Wastewater Treatment Plant
160 Atascadero Rd.
Morro Bay, CA 93442
Telephone: (805) 772-6272

Invoice and Report to be sent to: Dr. Douglas A. Coats (Marine@Rain.org)
Marine Research Specialists
4744 Telephone Rd Ste 3-315
Ventura, CA 93003-5258
Telephone: (805) 644-1180

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BC LABORATORIES INC. COOLER RECEIPT FORM Page Of

Submission #: 17-01793

SHIPPING INFORMATION: Fed Ex UPS Ontrac Hand Delivery BC Lab Field Service Other (Specify) _____

SHIPPING CONTAINER: Ice Chest None Box Other (Specify) _____

FREE LIQUID: YES NO W S

Refrigerant: Ice Blue Ice None Other Comments: _____

Custody Seals: Ice Chest Containers None Comments: _____

All samples received? Yes No All samples containers intact? Yes No Description(s) match COC? Yes No

COC Received: YES NO Emissivity: 0.97 Container: PE Thermometer ID: 207 Date/Time: 1/18/93

Temperature: (A) 0.2 °C / (C) 0.5 °C Analyst Init: [Signature]

SAMPLE CONTAINERS	SAMPLE NUMBERS									
	1	2	3	4	5	6	7	8	9	10
QT PE UNPRES										
4oz / 8oz / 16oz PE UNPRES										
2oz Cr ⁶⁺										
QT INORGANIC CHEMICAL METALS										
INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz										
PT CYANIDE										
PT NITROGEN FORMS										
PT TOTAL SULFIDE										
2oz. NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT CHEMICAL OXYGEN DEMAND										
PIA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 1664										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL- 504										
QT EPA 508/608/8080										
QT EPA 515.1/8150										
QT EPA 525										
QT EPA 525 TRAVEL BLANK										
40ml EPA 547										
40ml EPA 531.1										
8oz EPA 548										
QT EPA 549										
QT EPA 8015M										
QT EPA 8270										
8oz / 16oz / 32oz AMBER										
8oz / 16oz / 32oz JAR										
SOIL SLEEVE										
PCB VIAL										
PLASTIC BAG										
TEDLAR BAG										
FERROUS IRON										
ENCORE										
SMART KIT										
SUMMA CANISTER										

Comments: _____ Date/Time: 1-19-93 [Signature] Rev 21 05/23/2016

Sample Number(s) Completed By: [Signature]

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
1701793-01	COC Number:	---	Receive Date:	01/18/2017 19:35
	Project Number:	---	Sampling Date:	01/18/2017 09:30
	Sampling Location:	---	Sample Depth:	---
	Sampling Point:	BC1 Comp ARS	Lab Matrix:	Water
	Sampled By:	---	Sample Type:	Wastewater

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

BCL Sample ID: 1701793-01	Client Sample Name: BC1 Comp ARS, 1/18/2017 9:30:00AM
----------------------------------	--

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Total Cyanide	ND	mg/L	0.0050	0.0019	EPA-335.4	ND		1

Run #	Method	Prep Date	Run		Analyst	Instrument	Dilution	QC
			Date/Time					Batch ID
1	EPA-335.4	01/25/17	01/27/17	15:14	RCC	KONE-1	1	B[A1910

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

BCL Sample ID: 1701793-01	Client Sample Name: BC1 Comp ARS, 1/18/2017 9:30:00AM
----------------------------------	--

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Total Mercury	ND	ug/L	0.20	0.030	EPA-245.1	ND		1
Total Recoverable Arsenic	1.7	ug/L	2.0	0.70	EPA-200.8	ND	J	2
Total Recoverable Cadmium	ND	ug/L	10	1.1	EPA-200.7	ND		3
Total Recoverable Chromium	ND	ug/L	10	1.2	EPA-200.7	ND		3
Total Recoverable Copper	16	ug/L	10	1.2	EPA-200.7	ND		3
Total Recoverable Lead	1.3	ug/L	1.0	0.10	EPA-200.8	ND		2
Total Recoverable Nickel	5.5	ug/L	10	2.3	EPA-200.7	ND	J	3
Total Recoverable Selenium	3.1	ug/L	2.0	0.19	EPA-200.8	0.77		2
Total Recoverable Silver	ND	ug/L	10	1.3	EPA-200.7	ND		3
Total Recoverable Zinc	52	ug/L	50	1.3	EPA-200.7	7.6		3

Run #	Method	Prep Date	Run		Instrument	Dilution	QC
			Date/Time	Analyst			Batch ID
1	EPA-245.1	01/23/17	01/24/17 10:56	MEV	CETAC2	1	B[A1743
2	EPA-200.8	01/24/17	01/24/17 21:10	ARD	PE-EL2	1	B[A1852
3	EPA-200.7	01/27/17	01/30/17 14:50	JRG	PE-OP2	1	B[A2155

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B[A1910]						
Total Cyanide	B[A1910-BLK1	ND	mg/L	0.0050	0.0019	

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4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab	Quals
								Percent Recovery	RPD		
QC Batch ID: B[A1910											
Total Cyanide	B[A1910-BS1	LCS	0.13865	0.15000	mg/L	92.4		90	110		

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4744 Telephone Rd
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Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits		Lab Quals	
									RPD	Percent Recovery		
QC Batch ID: B[A1910]		Used client sample: N										
Total Cyanide	DUP	1701835-01	ND	ND		mg/L			10			
	MS	1701835-01	ND	0.094099	0.10000	mg/L		94.1		90 - 110		
	MSD	1701835-01	ND	0.094634	0.10000	mg/L	0.6	94.6	10	90 - 110		

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Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B[A1743]						
Total Mercury	B[A1743-BLK1	ND	ug/L	0.20	0.030	
QC Batch ID: B[A1852]						
Total Recoverable Arsenic	B[A1852-BLK1	ND	ug/L	2.0	0.70	
Total Recoverable Lead	B[A1852-BLK1	ND	ug/L	1.0	0.10	
Total Recoverable Selenium	B[A1852-BLK1	0.77000	ug/L	2.0	0.19	J
QC Batch ID: B[A2155]						
Total Recoverable Cadmium	B[A2155-BLK1	ND	ug/L	10	1.1	
Total Recoverable Chromium	B[A2155-BLK1	ND	ug/L	10	1.2	
Total Recoverable Copper	B[A2155-BLK1	ND	ug/L	10	1.2	
Total Recoverable Nickel	B[A2155-BLK1	ND	ug/L	10	2.3	
Total Recoverable Silver	B[A2155-BLK1	ND	ug/L	10	1.3	
Total Recoverable Zinc	B[A2155-BLK1	7.5814	ug/L	50	1.3	J

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Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B[A1743]										
Total Mercury	B[A1743-BS1	LCS	0.91250	1.0000	ug/L	91.2		85	115	
QC Batch ID: B[A1852]										
Total Recoverable Arsenic	B[A1852-BS1	LCS	93.898	100.00	ug/L	93.9		85	115	
Total Recoverable Lead	B[A1852-BS1	LCS	99.877	100.00	ug/L	99.9		85	115	
Total Recoverable Selenium	B[A1852-BS1	LCS	96.031	100.00	ug/L	96.0		85	115	
QC Batch ID: B[A2155]										
Total Recoverable Cadmium	B[A2155-BS1	LCS	219.65	200.00	ug/L	110		85	115	
Total Recoverable Chromium	B[A2155-BS1	LCS	225.87	200.00	ug/L	113		85	115	
Total Recoverable Copper	B[A2155-BS1	LCS	420.51	400.00	ug/L	105		85	115	
Total Recoverable Nickel	B[A2155-BS1	LCS	450.48	400.00	ug/L	113		85	115	
Total Recoverable Silver	B[A2155-BS1	LCS	107.81	100.00	ug/L	108		85	115	
Total Recoverable Zinc	B[A2155-BS1	LCS	575.69	500.00	ug/L	115		85	115	

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B[A1743]		Used client sample: N								
Total Mercury	DUP	1701889-02	0.057500	0.070000		ug/L	19.6		20	J
	MS	1701889-02	0.057500	1.0700	1.0000	ug/L		101		70 - 130
	MSD	1701889-02	0.057500	1.0875	1.0000	ug/L	1.6	103	20	70 - 130
QC Batch ID: B[A1852]		Used client sample: N								
Total Recoverable Arsenic	DUP	1701804-01	34.780	34.098		ug/L	2.0		20	
	MS	1701804-01	34.780	145.45	100.00	ug/L		111		70 - 130
	MSD	1701804-01	34.780	143.28	100.00	ug/L	1.5	109	20	70 - 130
Total Recoverable Lead	DUP	1701804-01	7.7200	7.8960		ug/L	2.3		20	
	MS	1701804-01	7.7200	106.28	100.00	ug/L		98.6		70 - 130
	MSD	1701804-01	7.7200	108.20	100.00	ug/L	1.8	100	20	70 - 130
Total Recoverable Selenium	DUP	1701804-01	5.7780	6.3800		ug/L	9.9		20	
	MS	1701804-01	5.7780	113.11	100.00	ug/L		107		70 - 130
	MSD	1701804-01	5.7780	107.92	100.00	ug/L	4.7	102	20	70 - 130
QC Batch ID: B[A2155]		Used client sample: N								
Total Recoverable Cadmium	DUP	1701736-01	ND	ND		ug/L			20	
	MS	1701736-01	ND	218.21	200.00	ug/L		109		75 - 125
	MSD	1701736-01	ND	208.99	200.00	ug/L	4.3	104	20	75 - 125
Total Recoverable Chromium	DUP	1701736-01	2.2198	2.1637		ug/L	2.6		20	J
	MS	1701736-01	2.2198	225.49	200.00	ug/L		112		75 - 125
	MSD	1701736-01	2.2198	216.05	200.00	ug/L	4.3	107	20	75 - 125
Total Recoverable Copper	DUP	1701736-01	1.7057	ND		ug/L			20	
	MS	1701736-01	1.7057	428.04	400.00	ug/L		107		75 - 125
	MSD	1701736-01	1.7057	413.08	400.00	ug/L	3.6	103	20	75 - 125
Total Recoverable Nickel	DUP	1701736-01	ND	ND		ug/L			20	
	MS	1701736-01	ND	441.08	400.00	ug/L		110		75 - 125
	MSD	1701736-01	ND	422.69	400.00	ug/L	4.3	106	20	75 - 125
Total Recoverable Silver	DUP	1701736-01	ND	ND		ug/L			20	
	MS	1701736-01	ND	107.97	100.00	ug/L		108		75 - 125
	MSD	1701736-01	ND	103.34	100.00	ug/L	4.4	103	20	75 - 125
Total Recoverable Zinc	DUP	1701736-01	8.4661	9.2489		ug/L	8.8		20	J
	MS	1701736-01	8.4661	568.30	500.00	ug/L		112		75 - 125
	MSD	1701736-01	8.4661	545.80	500.00	ug/L	4.0	107	20	75 - 125

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Marine Research Specialists
4744 Telephone Rd
Ste 3-315
Suite A
Ventura, CA 93003-3238

Reported: 02/01/2017 11:54
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Notes And Definitions

- J Estimated Value (CLP Flag)
- MDL Method Detection Limit
- ND Analyte Not Detected
- PQL Practical Quantitation Limit

LABORATORY REPORT



"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA ELAP Cert. No.: 1775

Date: January 24, 2017
Client: Marine Research Specialists
4744 Telephone Rd
Suite 3-315
Ventura, CA 93003-5258
Attn: Doug Coats

Laboratory No.: A-17011802-001
Sample I.D.: Morro Bay Effluent

Sample Control: The sample was received by ATL within the recommended hold time, in a chilled state, and with the chain of custody record attached.

Date Sampled: 01/17/17 (composite)
Date Received: 01/18/17
Temp. Received: 0.9°C
Chlorine (TRC): 0.0 mg/l
Dates Tested: 01/18/17 to 01/20/17

Sample Analysis: The following analyses were performed on your sample:
Abalone Larval Development Short-Term Toxicity Test (EPA 600/R-95/136).

Attached are the test data generated from the analysis of your sample.

Result Summary:

<u>Test</u>	<u>NOEC</u>	<u>TUc</u>
Abalone Development:	5.6%	17.9

Quality Control: Reviewed and approved by:


Joseph A. LeMay
Laboratory Director

ABALONE LARVAL DEVELOPMENT SHORT-TERM TOXICITY TEST



Lab No.: A-17011802-001
Client/ID: Morro Bay WWTP

Date tested: 01/18/17 - 01/20/17

TEST SUMMARY

Species: *Haliotis rufescens*.
Protocol: EPA/600/R-95/136.
Test type: Static.
Test chamber: glass beakers.
Temperature: 15 +/- 1°C.
Number of embryos per chamber: 1600 (approx.).
QA/QC Batch No.: RT-170118 (ran concurrently)

Source: Cultured Abalone Farms.
Dilution water: Lab seawater.
Endpoints: NOEC.
Test volume: 200 ml.
Aeration: None.
Number of replicates: 5.

RESULTS SUMMARY

Sample Concentration	Percent Normal Development	
Control (Brine)	96.0%	
Control (Dilution)	96.0%	
3.2%	96.4%	
5.6%	94.7%	
10.0%	0%	*
18.0%	0%	*
32.0%	0%	*
* Statistically significantly less than control at P = 0.05 level		

CHRONIC TOXICITY

NOEC	5.6%
TUc	17.9

QA/QC TEST ACCEPTABILITY

Parameter	Result
Average control normality ≥ 80%	PASSED (96.0%)
%MSD < 20% relative to control	PASSED (%MSD = 1.9%)
Please see RT-170118 report for additional test acceptability criteria.	

Abalone Larval Development Test-Proportion Normal

Start Date: 1/18/2017 14:00 Test ID: 17011802ab Sample ID: Morro Bay
 End Date: 1/20/2017 14:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW
 Sample Date: 1/17/2017 09:35 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens

Comments:

Conc-%	1	2	3	4	5
B-Control	0.9717	0.9381	0.9459	0.9626	0.9810
D-Control	0.9720	0.9817	0.9450	0.9455	0.9537
3.2	0.9554	0.9640	0.9810	0.9554	0.9636
5.6	0.9444	0.9459	0.9630	0.9459	0.9364
10	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0000

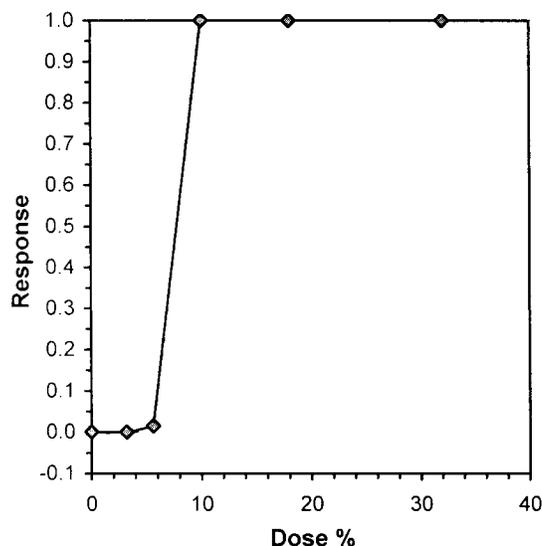
Conc-%	Transform: Arcsin Square Root							1-Tailed			Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
B-Control	0.9599	1.0003	1.3731	1.3193	1.4323	3.378	5					
D-Control	0.9595	1.0000	1.3721	1.3340	1.4349	3.265	5	*			0.9616	1.0000
3.2	0.9639	1.0045	1.3814	1.3579	1.4323	2.204	5	-0.433	2.110	0.0452	0.9616	1.0000
5.6	0.9471	0.9871	1.3396	1.3158	1.3771	1.688	5	1.515	2.110	0.0452	0.9471	0.9849
10	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000
18	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000
32	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89402	0.881	0.82595	-0.3446
Bartlett's Test indicates equal variances (p = 0.43)	1.67449	9.21034		
The control means are not significantly different (p = 0.97)	0.03665	2.306		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs D-Control	5.6	10	7.48331	17.8571	0.01937	0.02015	0.0024	0.00115	0.16606	2, 12

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	5.7561	0.0262	5.6830	5.8172	0.0304
IC10	5.9795	0.0248	5.9102	6.0373	0.0304
IC15	6.2028	0.0235	6.1374	6.2575	0.0304
IC20	6.4262	0.0221	6.3647	6.4776	0.0304
IC25	6.6495	0.0207	6.5919	6.6978	0.0304
IC40	7.3196	0.0166	7.2735	7.3582	0.0304
IC50	7.7664	0.0138	7.7279	7.7985	0.0304



ABALONE CHRONIC BIOASSAY



Lab No.: A-17011802-001

Client ID: MRS - Morro Bay Effluent

Start Date: 01/18/2017

WATER QUALITY READINGS

Sample	Initial Readings				24 Hrs		Final Readings			
	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)	Temp (°C)	pH	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)
Control (brine)	14.3	8.3	8.2	34	14.3	8.1	14.2	8.2	8.1	34
Control (lab)	14.3	8.4	8.2	34	14.3	8.1	14.2	8.2	8.1	34
3.2%	14.2	8.4	8.2	34	14.4	8.1	14.3	8.3	8.1	34
5.6%	14.2	8.4	8.2	34	14.1	8.1	14.4	8.3	8.1	34
10%	14.3	8.4	8.2	34	14.2	8.1	14.3	8.2	8.1	34
18%	14.3	8.4	8.2	34	14.2	8.1	14.2	8.2	8.1	34
32%	14.2	8.4	8.1	34	14.1	8.1	14.4	8.0	8.1	34

Sample as received: Chlorine: 0 mg/l; pH: 8.0; Salinity: 0 ppt; Temp: 0.9 °C; DO: 9.7 mg/l. NH₃-N = 33

Initial readings: JL Date/Time: 1-18-17 1400 Final readings: JL Date/Time: 1-20-17 1400

MICROSCOPIC EXAMINATION

Beaker No.	Sample Conc.	Number Normal	Number Abnormal	Beaker No.	Sample Conc.	Number Normal	Number Abnormal	Beaker No.	Sample Conc.	Number Normal	Number Abnormal
1	5.6	102	6	13	BC	106	7	25	BC	103	4
2	BC	103	3	14	32	0	100	26	32	0	100
3	10	0	100	15	C	103	6	27	C	104	6
4	C	104	3	16	18	0	100	28	3.2	107	5
5	18	0	100	17	3.2	103	2	29	C	103	5
6	3.2	107	5	18	32	0	100	30	32	0	100
7	32	0	100	19	BC	105	6	31	10	0	100
8	C	107	7	20	5.6	104	4	32	3.2	106	4
9	3.2	107	4	21	10	0	100	33	18	0	100
10	18	0	100	22	5.6	105	6	34	5.6	103	7
11	5.6	105	6	23	18	0	100	35	BC	103	2
12	10	0	100	24	10	0	100				

Microscopic examination: Analyst: [Signature] Date: 1-23-17 Time: 0700



ABALONE CHRONIC BIOASSAY

Lab No.: A-17011802-001
 Client ID: MRS - Morro Bay Effluent

Start Date: 01/18/2017

RANDOMIZATION WORKSHEET

Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Notes
1	5.6	13	BL	25	BL	Add 1600 fertilized eggs per 200 ml test volume.
2	BL	14	3.2	26	3.2	
3	10	15	L	27	L	
4	L	16	18	28	3.2	
5	18	17	3.2	29	L	
6	3.2	18	3.2	30	3.2	
7	3.2	19	BL	31	10	
8	L	20	4.6	32	3.2	
9	3.2	21	10	33	18	
10	18	22	5.6	34	5.6	
11	5.6	23	18	35	BL	
12	10	24	10			

Analyst: *[Signature]* Date: 1-18-17 Time: 1000



CHAIN OF CUSTODY

CHAIN OF CUSTODY

Client: City of Morro Bay

Wastewater Treatment Plant
 Address: _____
160 Atascadero Road

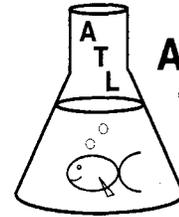
Morro Bay, CA 93442

 Project Manager: Doug Coats - MRS

 Phone: (805) 644-1180

 Fax: (805) 289-3935

 Purchase Order No: _____



**Aquatic
Testing
Laboratories**

4350 Transport Street, Unit 107
 Ventura, CA 93003
 (805) 650-0546 Fax (805) 650-0756

Sample ID	Sample Date	Sample Time	Sample Type *	Chlorine (TRC)**	Number of Containers	Testing Requested
Comp. Eff.	17 Jan 17	0935	E	0.1 mg/L	1 (one gallon)	Abalone Chronic

Special Instructions:

**** Note: Total residual chlorine must be taken immediately after sample collection if sample is a chlorinated effluent.**

* L - Liquid, S - Solid, SS - Semi-Solid/sludge, RW - Receiving Water, GW - Ground Water, E - Effluent

CUSTODY TRANSFERS

Relinquished by (signature)	Received by (signature)	Date (mm/dd/yy)	Time (hh:mm)	Sample Intact? (Yes, No)	Temperature Received (°C)
<i>Scott R. Ancker</i>	<i>Fred Per</i>	17 Jan 17	1430	Yes	0.9
<i>Fred Per</i>	<i>[Signature]</i>	1-18-17	1000	Yes	0.9



***REFERENCE
TOXICANT
DATA***

**ABALONE LARVAL DEVELOPMENT
SHORT-TERM TOXICITY TEST
* REFERENCE TOXICANT ***



QA/QC Batch No.: RT-170118

Date tested: 01/18/17 – 01/20/17

TEST SUMMARY

Species: *Haliotis rufescens*.

Protocol: EPA/600/R-95/136.

Test type: Static.

Test chamber: Plastic beakers.

Temperature: 15 +/- 1°C.

Number of embryos per chamber: 1600 (approx.).

Reference Toxicant: ZnSO₄(7H₂O).

Source: Cultured Abalone Farm.

Dilution water: Lab seawater.

Endpoints: NOEC, IC25 at 48 hrs.

Test volume: 200 ml.

Aeration: None.

Number of replicates: 5.

Ref. Tox. source: Mallinckrodt.

Lot No.: 8872 KCXG

RESULTS SUMMARY

SAMPLE CONCENTRATION	PERCENT NORMAL DEVELOPMENT
Control	95.3%
10 µg/l	94.6%
18 µg/l	94.8%
32 µg/l	13.7% *
56 µg/l	0% *
100 µg/l	0% *

* Statistically significantly less than control at P = 0.05 level

CHRONIC TOXICITY

NOEC	18 µg/l
IC25	22.0 µg/l

QA/QC TEST ACCEPTABILITY

Parameter	Result
Average control normality ≥ 80%	Yes (95.3%)
56 µg/l treatment response significantly less than control response	Yes (NOEC = 18 µg/l)
%MSD <20% relative to control	Yes (%MSD = 4.7%)

Abalone Larval Development Test-Proportion Normal

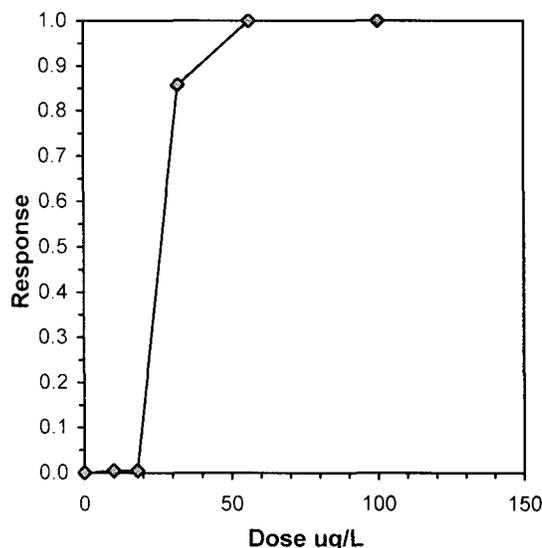
Start Date: 1/18/2017 14:00 Test ID: RT170118ab Sample ID: REF-Ref Toxicant
 End Date: 1/20/2017 14:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: ZNSO-Zinc sulfate
 Sample Date: 1/18/2017 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens
 Comments:

Conc-ug/L	1	2	3	4	5
D-Control	0.9903	0.9196	0.9709	0.9304	0.9524
10	0.9810	0.9286	0.9459	0.9286	0.9464
18	0.9423	0.9623	0.9364	0.9196	0.9810
32	0.1667	0.0762	0.1068	0.1373	0.1961
56	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Transform: Arcsin Square Root							t-Stat	1-Tailed Critical	MSD	Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N				Mean	N-Mean
D-Control	0.9527	1.0000	1.3619	1.2834	1.4721	5.592	5				0.9517	1.0000
10	0.9461	0.9930	1.3412	1.3002	1.4323	4.033	5	0.500	2.230	0.0922	0.9468	0.9948
18	0.9483	0.9954	1.3470	1.2834	1.4323	4.306	5	0.360	2.230	0.0922	0.9468	0.9948
*32	0.1366	0.1434	0.3743	0.2797	0.4587	18.875	5	23.897	2.230	0.0922	0.1365	0.1435
56	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000

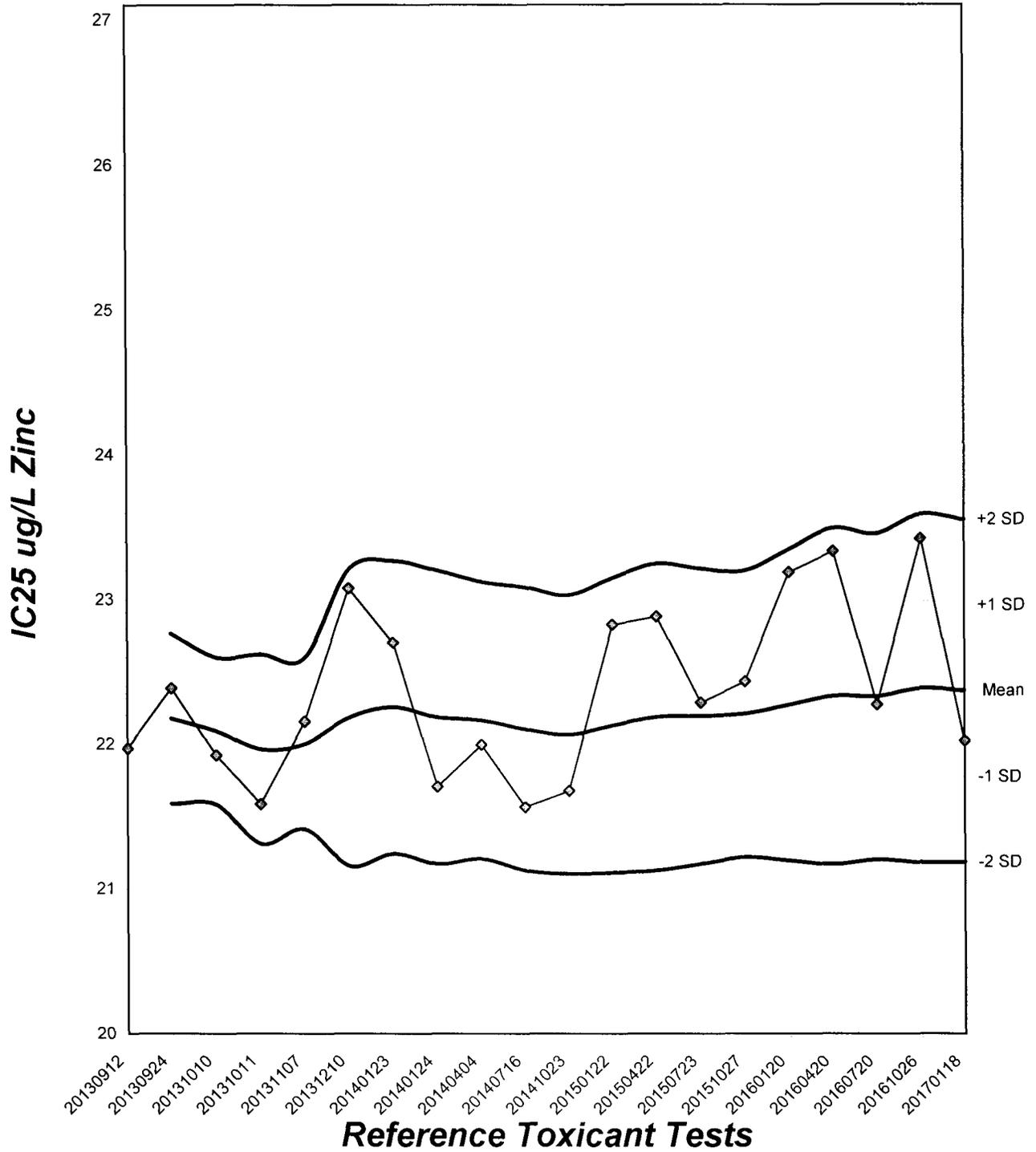
Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95093	0.905	0.39644	-0.8407						
Bartlett's Test indicates equal variances (p = 0.91)	0.55927	11.3449								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	18	32	24		0.04492	0.04694	1.19055	0.00427	5.1E-14	3, 16

Linear Interpolation (200 Resamples)					
Point	ug/L	SD	95% CL(Exp)		Skew
IC05	18.737	0.188	18.010	18.886	-1.6122
IC10	19.559	0.168	18.860	19.738	-0.8966
IC15	20.382	0.162	19.711	20.589	-0.8160
IC20	21.204	0.159	20.561	21.443	-0.7021
IC25	22.026	0.159	21.412	22.298	-0.5702
IC40	24.493	0.176	23.911	24.930	-0.2444
IC50	26.137	0.200	25.502	26.666	-0.1465



Abalone Larval Development Laboratory Control Chart

CV% = 2.64



ABALONE CHRONIC BIOASSAY
Reference Toxicant - Zinc Sulfate



QA/QC No.: RT-170118

Start Date: 01/18/2017

RANDOMIZATION WORKSHEET

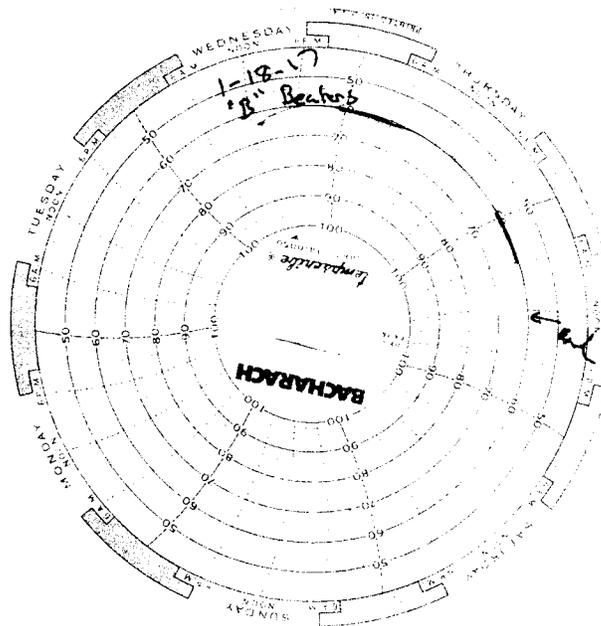
Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Notes
1	18	11	10	21	32	Number Males used: <u>4</u> Number females used: <u>5</u> Time H ₂ O ₂ added: <u>10:30</u> Time water changed: <u>13:00</u> Time spawned: <u>13:45</u> Time placed in test: <u>14:15</u> Add 1600 fertilized eggs per 200 ml. Time glutaraldehyde added: <u>14:30</u>
2	C	12	18	22	C	
3	100	13	C	23	10	
4	32	14	100	24	18	
5	56	15	10	25	10	
6	10	16	56	26	32	
7	32	17	18	27	100	
8	56	18	32	28	C	
9	10	19	10	29	56	
10	C	20	56	30	18	
Analyst: <u>[Signature]</u> Date: <u>1-18-17</u> Time: <u>1000</u>						

Test Temperature Chart

Test No: RT-170118

Date Tested: 01/18/17 to 01/22/17

Acceptable Range: 15 +/- 1°C





Monterey Bay Analytical Services

4 Justin Court Suite D, Monterey, CA 93940

831.375.MBAS

www.MBASinc.com

ELAP Certification Number: 2385

Dr. Doug Coats/Bonnie Luke
Marine Research Specialists
3140 Telegraph Road Suite A
Ventura CA, 93003
805.772.6272

Page 1 of 1

Friday, February 03, 2017

Lab Number: AB60421

Collection Date/Time: 1/18/2017 9:30 Sample Collector: ASCHENBRENER S Client Sample #:
Submittal Date/Time: 1/19/2017 9:49 Sample ID: H1 2017 Coliform Designation:

Sample Description: Morro Bay WWTP Semi Annual Effluent, M1-M3 Ars Grab

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	Not Detected		1	45	1/19/2017	MW
o-Phosphate-P, Dissolved	EPA300.0	mg/L	1.6		0.1		1/19/2017	MW
Silica as SiO2, Dissolved	EPA200.7	mg/L	17		0.5		1/27/2017	MW
Urea-N	Mulvenna&Savid	µg/L	84		10		2/2/2017	MP

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

Monterey Bay Analytical Services Chain Of Custody / Analysis Request

4 Justin Ct. Suite D • Monterey, Ca 93940 • (831) 375-MBAS (6227) • (831) 641-0734 (Fax)



Client/Company Name: Marine Research Specialists		Attention: Douglas A Coats	
Billing Address: 4744 Telephone Rd Ste 3-315, Ventura CA 93003-5258			
E-Mail Address(es): Marine@Rain.org		Contract/P.O. #:	
Turn Around Time: STD (7-14 Days) <input checked="" type="checkbox"/> 48-Hour <input type="checkbox"/> 5-Day <input type="checkbox"/> 24-Hour <input type="checkbox"/>		Phone # 805.218.3662 Fax #	
Drinking water <input type="checkbox"/> Wastewater <input checked="" type="checkbox"/> Monitoring Well <input type="checkbox"/> Soil <input type="checkbox"/> Sludge <input type="checkbox"/> Other <input type="checkbox"/>			

Project/System Information:
Morro Bay WWTP Semi Annual Effluent

For Regulatory Compliance? YES NO
 For State or Local Health Department reporting: YES NO
 Electronic Data Transfer (EDT)? YES NO
 System ID Number: _____

Analysis Requested				
Nitrate as NO3 [EPA 300.0]	O-Phosphate-P [EPA 300.0]	Dissolved Silica as SiO2 [EPA 4500-SI-E]	Urea [Mulvenna & Savid]	
✓	✓		✓	

MBAS Lab #	Project ID or Source Code #	Sample Site / Description (Well Name, APN#, Address, Stormdrain #)	Sampling		Receiving Temp.	Cl2 Residual	Coliform Analysis					# Cont.	Container						
			Date	Time			Routine	Other	Repeat	Special	Type		Size						
60421	H1 2017	M1 ARS Grab	18 Jan 17	0930	0.3						1			✓	✓				
60422	H1 2017	M2 ARS Grab*	18 Jan 17	0930	0.3						1						✓		
60423	H1 2017	M3 ARS Grab	18 Jan 17	0930	0.3						1					✓			

Printed Name	Signature	Date	Time	Comments or Special Instructions:
Sampled by: Steven Aschenbrener	<i>Steven Aschenbrener</i>	18 Jan 17	0930	*Pour off 50 ml & freeze to hold for Urea test
Relinquished by: Steven Aschenbrener	<i>Steven Aschenbrener</i>	18 Jan 17	1430	
Received by:				
Relinquished by:				
Received by: Monterey Bay Analytical Services	<i>Lee R. H...</i>	1/19/17	9:49	

<input type="checkbox"/> Payment received	Check #	Amount:	Receipt #	Date:
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LRH

Sample Condition Upon Receipt

COC Info

Was temp acceptable? Chemistry $\leq 6^{\circ}\text{C}$ Micro $\leq 10^{\circ}\text{C}$	YES	NO	NA	<2 Hr	Is there evidence of chilling?	YES	NO	NA
Did bottles arrive intact?	YES	NO	NA					
Did bottle labels agree with COC?	YES	NO	NA					

Discrepancy Documentation:

Person Contacted: _____ Method: In Person/Phone/Email _____

Problem _____

Resolution _____

Person Contacted: _____ Method: In Person/Phone/Email _____

Problem _____

Resolution _____

Sample Split/Filtration

Hand 0.45 um

Lab ID	Cont. Size	Pres	Date/Initials
60421	250	HNO ₃	1/18/17 MP

Lab ID	Cont. Size	Pres	Date/Initials

Comments

Batch # 20170127

EPA 200.7

Analyte/		IC	Prep	LCS	%Rec	LCSD	%Rec	%Diff	IC Verification			QCS (95-105%)		
WL	Range	Blank	Blank	Result	85-115%	Result	85-115%		Value	Result	%Rec	Value	Result	%Rec
Si 251.611	0.5-200ppm	0.01	-0.09	51.2	102.4%	51.2	102.3%	0.1%	50	49.2	98.4%	50	49.4	98.8%
Si 252.411	0.5-200ppm	-0.07	-0.13	50.9	101.8%	50.6	101.2%	0.6%	50	48.8	97.5%	50	48.7	97.5%

Matrix Spikes

Sample ID AB60439

Analyte/	Sample	MS	%Rec	MSD	%Rec	%Diff	CCV (90-110%)			%Diff	CC
WL	Value	Result	70-130%	Result	70-130%		Value	Result	%Rec	10%	Blank
Si 251.611	7.3	55.7	96.6%	56.4	98.2%	1.4%	50	49.8	99.7%	1.3%	-0.11
Si 252.411	7.2	55.0	95.7%	55.8	97.2%	1.4%	50	49.1	98.3%	0.8%	-0.11

4 Justin Court Ste D, Monterey, CA 93940

831.375.MBAS (6227), 831.641.0734 (Fax)

MontereyBayAnalytical@usa.net

<http://www.MBASinc.com>

All units expressed in mg/L
method EPA 300.0

20170120

	NO3-N	PO4-P
Spike amount	2	2
ICVB	0.00	0.00
ICV	1.99	1.74
Rec 90-110%	99.27	86.84
ICVL	0.14	0.14
Rec 50-150%	70.67	72.29
Sample ID AB60428	0.07	0.03
MS	2.00	1.98
Rec 80-120%	96.74	97.49
MSD	1.86	1.93
Rec 80-120%	89.75	94.98
Diff 10%	7.24	2.57
CCV	1.97	1.96
Rec 90-110%	98.26	98.17
Diff 10%	1.64	5.52
CCVB	0.00	0.02



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Urea QC Summary

Date Analyzed: 2/2/2017
 Time Analyzed: 9:00
 LCS Stock Lot# 15477 LCS Stock exp: 2/4/2017
 QCS Stock Lot# 20812 QCS Stock exp: 2/8/2017

	Value (µg/L)	Result (µg/L)	% Rec	Duplicate (µg/L)	% Rec	% RPD	Acceptance Criteria	
							% Rec	%RPD
ICVB	---	<10	---		---	---	<10	
LCSL	10	9	90		0	100	80%-120%	≤20%
QCS (Absolute #051509)	47	49	104.26		0	100	85%-115%	≤20%

Spiked Sample ID	Sample (µg/L)	Spiked (µg/L)	MS (µg/L)	MSD (µg/L)	MS % Rec	MSD % Rec	MS-MSD RPD	Acceptance Criteria	
								MS/MSD	RPD
60338	87	100	174	172	87	85	1.2	85%-115%	≤20%

	Value (µg/L)	Result (µg/L)	% Rec	% RPD/ %RSD	Acceptance Criteria	
					% Rec	%RPD
LCS	100	99	99	NA	85%-115%	≤20%

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; SS = Second Source;
 RPD = Relative Percent Difference; Rec = Recovery