

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

**MONITORING AND  
REPORTING PROGRAM**

**EFFLUENT SAMPLING**

**CHEMICAL AND BIOASSAY  
ANALYSIS RESULTS**

**JULY 2021**



**Marine Research Specialists**

**4744 Telephone Rd Ste 3 PMB 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**

**ANNUAL EFFLUENT REPORT**

**CHEMICAL AND BIOASSAY**  
**ANALYSIS RESULTS**

**JULY 2021**

**Prepared by**  
**Douglas A. Coats**

**Marine Research Specialists**

**4744 Telephone Rd Ste 3 PMB 315**  
**Ventura California 93003**

**Telephone: (805) 644-1180**  
**E-mail: [Marine@Rain2.org](mailto:Marine@Rain2.org)**

**August 2021**

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: 8/23/21

# marine research specialists

4744 Telephone Rd., Suite 3 PMB 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

21 August 2021

## Reference: Annual Effluent Self-Monitoring Report for January through December 2021

Dear Mr. Gunderlock:

This self-monitoring report documents the chemical and bioassay results for analyses of effluent samples as required by NPDES discharge permit CA0047881.<sup>1</sup> Analyses were conducted to determine:

- Metal concentrations within a composite sample collected on July 20<sup>th</sup>;
- Nutrient and ammonia concentrations within grab samples collected on July 20<sup>th</sup>; and
- Chronic bioassays conducted on a composite sample collected on July 20<sup>th</sup>.

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 reported results with limitations established for each of the effluent parameters specified in the permit. The comparisons are consistent with the minimum-level (ML) reporting protocols promulgated in §XII.B.4 of Attachment E to the discharge permit and in §III.A.7 of the California Ocean Plan (COP).<sup>2</sup> Units are consistent with those contained within Table E-3 in §IV.A.1 of Attachment E to the discharge permit.
- **Attachment B** contains a discharge monitoring report (DMR) that was submitted electronically under separate cover to the California State Water Resources Control Board within the California Integrated Water Quality System (CIWQS). All units were converted to those used in the DMR.
- **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 during July 2021 augment a comprehensive dataset spanning nearly three decades. Together, these measurements demonstrate the consistently benign character of the discharge from the MBSCD<sup>3</sup> 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 performance of the treatment process. The concentrations of the few chemical compounds detected in the July 2021 samples were typical of wastewater derived from domestic sources, and all concentrations were considerably below the limits specified in the NPDES discharge permit.

Twelve of the fifteen chemical compounds that are monitored on an annual basis were detected in the July 2021 composite and grab samples. Of those, eight had concentrations high enough to be quantified above their respective MLs. Three were nutrients whose discharge is not limited in the permit.<sup>4</sup> Four of the five remaining substances with quantifiable concentrations are common wastewater constituents. Ammonia

---

<sup>1</sup> Regional Water Quality Control Board (RWQCB) - Central Coast Region. 2017. Waste Discharge Requirements (Order No. R3-2017-0050) and National Pollutant Discharge Elimination System (NPDES 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 2018.

<sup>2</sup> State Water Resources Control Board. 2015. Water Quality Control Plan Ocean Waters of California. California Ocean Plan (COP). State Water Resources Control Board. California Environmental Protection Agency. Effective 28 January 2016.

<sup>3</sup> City of Morro Bay and the Cayucos Sanitary District, joint owners of the wastewater treatment and disposal facility

<sup>4</sup> Refer to Footnote *f* in Attachment A. In contrast to other effluent parameters, the California Ocean Plan does not specify numerical objectives for nutrient compounds other than ammonia. Although the MBSCD discharge permit requires reporting of nitrate, urea, orthophosphate, and silica concentrations, they have no bearing on the compliance assessment of effluent quality.

derives from its domestic sewage origin. Copper, lead, and zinc enter the wastewater collection system through erosion of natural mineral deposits along the central California coast that are rich in these metals. They also enter the system through corrosion of household plumbing systems.

Regardless of their source, these four constituents are no longer considered a compliance concern. Discharge limits on their effluent concentrations were eliminated when the current MBCSD discharge permit was issued. Based on statistical analyses of the large historical database, their effluent concentrations do not exhibit a reasonable potential to exceed the COP water-quality objectives. Nevertheless, the discharge permit requires regular reporting of their concentrations. In accordance with the historical database, their concentrations within the July 2021 effluent samples were found to be low, and well below levels that would be of concern for the protection of marine aquatic life. Because their concentrations were similar to historical levels, their presence is not indicative of new or enhanced input of these constituents to the collection system.

Hexavalent chromium was the only other chemical constituent with a low-but-quantifiable concentration within the July 2021 effluent sample. At 0.94 µg/L, its concentration was nearly 300-times smaller 270-µg/L threshold deemed deleterious to marine organisms. Nevertheless, its sudden measurable presence in the July 2019, 2020, and 2021 effluent samples was noteworthy because it departed from the undetectable and non-quantifiable concentrations found in 39 prior effluent samples collected over the past two decades.

However, the recent chromium concentrations did not become quantifiable because of a change in effluent quality. Instead, it was purely an artifact of a change in the chemical analysis method that was necessitated when the current discharge permit became effective in 2018. Footnotes in the COP and in prior MBCSD permits allowed compliance with hexavalent chromium objective to be evaluated using total chromium, rather than the concentration associated with the +6 oxidation state alone. That footnote appears to have been inadvertently omitted in the current MBCSD discharge permit. As a result, a more costly and sensitive EPA Method 218.6 was required to specifically determine hexavalent chromium concentrations in the July 2019, 2020, and 2021 chemical assays. Its 0.2-µg/L quantification limit is 50-times lower than the 10-µg/L limit associated with the total chromium methodology. Thus, the 0.94-µg/L chromium concentration found in the July 2021 sample would not have been detected, much less quantified, using the historical EPA Method 200.7 for total chromium.

The chronic toxicity test conducted on July-2021 composite effluent samples measured the effluent's potential to impact the development of larval red abalone (*Haliotis rufescens*). Screening bioassays conducted over the prior twelve years consistently found red abalone to be the marine organism most sensitive to effluent exposure.<sup>5</sup> Despite abalone's increased sensitivity, adverse effects have not been observed within effluent-seawater mixtures that were more than seven-times more concentrated than that allowed by the discharge permit. This was true of the July-2021 bioassay, when measured toxicity (17.9 TU) matched that of prior assays, and thus continued to remain well below the limiting toxicity (134 TU).

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

Sincerely,

Douglas A. Coats  
Program Manager

---

<sup>5</sup> Refer to Table 2 and associated narrative in the 2020 Effluent Monitoring Report: **MRS (2020)**. City of Morro Bay and Cayucos Sanitary District, Offshore Monitoring and Reporting Program, Effluent Sampling Chemical and Bioassay Analysis Results, July 2020. Submitted 17 August 2020.  
<https://www.morro-bay.ca.us/Archive.aspx?ADID=5471> [Accessed 18 August 2021].

*ATTACHMENT A*  
**MINIMUM LEVEL REPORTING**

**ATTACHMENT A**  
**Analytical Results for Effluent Samples Collected during July 2021**

Chemical Compound or Parameter	Units	Method	Detection Limit <sup>a</sup>	Practical <sup>b</sup> Quantification Limit	Minimum Level <sup>c</sup>	Permit <sup>d</sup> Limit	Reported Value
<b>Nutrients</b>							
Nitrate (as N)	mg/L	300.0	0.01	0.1	— <sup>e</sup>	— <sup>f</sup>	ND
Urea (as N)	mg/L	Mulvenna & Savidge	0.008	0.01	— <sup>e</sup>	— <sup>f</sup>	0.155 as measured
Ortho-Phosphate (as P)	mg/L	300.0	0.02	0.06	— <sup>e</sup>	— <sup>f</sup>	2.6 as measured
Dissolved Silica (SiO <sub>2</sub> )	mg/L	200.7	0.25	1.0	— <sup>e</sup>	— <sup>f</sup>	13.4 as measured
<b>Objectives for the Protection of Marine Aquatic Life</b>							
Ammonia (as N)	mg/L	350.1	0.67	2.0	— <sup>e</sup>	— <sup>g</sup>	32. as measured <sup>h</sup>
Arsenic	µg/L	200.8	0.7	2.	2.	670.	DNQ 1.5 Est. Conc. <sup>h</sup>
Cadmium	µg/L	200.7	1.1	10.	10.	130.	ND
Chromium VI <sup>i</sup>	µg/L	218.6	0.02	0.2	— <sup>e</sup>	270.	0.94 as measured
Copper	µg/L	200.7	1.2	10.	10.	— <sup>g</sup>	12. as measured
Lead	µg/L	200.8	0.1	1.	0.5	— <sup>g</sup>	0.8 as measured <sup>h j</sup>

<sup>a</sup> 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.

<sup>b</sup> 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).

<sup>c</sup> 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 Appendix II of the 2005 Ocean Plan.

<sup>d</sup> 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.

<sup>e</sup> No Minimum Level was specified for this analysis method in Appendix II of the 2005 Ocean Plan.

<sup>f</sup> Permit limits were not specified for nutrients.

<sup>g</sup> Effluent limitations for ammonia, copper, lead, selenium, and zinc were removed in the current discharge permit based on reasonable potential analyses of historical effluent data.

<sup>h</sup> Detection and quantitation limits were raised due to matrix interference.

<sup>i</sup> As described in this report's cover letter, the analysis of hexavalent chromium departs from compliance evaluations of past reports, which were based on total chromium. Additionally, EPA Method 218.6 determines dissolved hexavalent chromium concentrations, rather than "Total Recoverable" hexavalent concentrations specified in the discharge permit.

<sup>j</sup> Because the reported lead concentration (0.8 µg/L) was below the PQL (1. µg/L), it was flagged as an "Estimated Value" by the chemistry laboratory (See Attachment C). However, in accordance with the guidance from the COP, the reported value is listed "as measured" herein, because it exceeded the ML (0.5 µg/L).

**Analytical Results for Effluent Samples Collected during July 2021**

Chemical Compound or Parameter	Units	Method	Detection Limit <sup>a</sup>	Practical <sup>b</sup> Quantification Limit	Minimum Level <sup>c</sup>	Permit <sup>d</sup> Limit	Reported Value
Mercury	µg/L	245.1	0.022	0.2	0.2	5.29	DNQ 0.054 Est. Conc.
Nickel	µg/L	200.7	2.3	10.	20.	670.	ND
Selenium	µg/L	200.8	0.19	2.	2.	— <sup>g</sup>	DNQ 1.5 Est. Conc. <sup>h</sup>
Silver	µg/L	200.7	1.3	10.	10.	70.	ND
Zinc	µg/L	200.7	9.5	50.	20.	— <sup>g</sup>	38. as measured <sup>k</sup>
Toxicity-Chronic: <i>H. Rufescens</i>	TUc	600/R-95/136	—	—	—	134.	17.9 as measured

<sup>k</sup> Because the reported zinc concentration (38 µg/L) was below the PQL (50. µg/L), it was flagged as an “Estimated Value” by the chemistry laboratory (See Attachment C). However, in accordance with the guidance from the COP, the reported value is listed “as measured” herein, because it exceeded the ML (20. µg/L).

*ATTACHMENT B*  
**DISCHARGE MONITORING REPORTS**

# eSMR PDF

## Summary: DMR

**NPDES Permit #:** CA0047881

**Facility:** THE CITY OF MORRO BAY/CAYUCOS SANITARY DISTRICT WWTP

### DMR Parameters

Feature - LS: 001-Y				Monitoring Period: 01/01/2021 - 12/31/2021							
Loc	Sea	Param	Param Text	Q1	Q2	C1	C2	C3	Excur Count	Analy Freq	Sample Type
1	0	00610	Nitrogen, ammonia total (as N)					32.0 mg/L Daily Maximum	0	Annual	GRAB
1	0	00620	Nitrogen, nitrate total (as N)					NODI: B Daily Maximum			
1	0	00955	Silica, dissolved (as SiO2)					13.4 mg/L Daily Maximum	0	Annual	GRAB
1	0	00978	Arsenic, total recoverable	NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q Instantaneous Maximum			
1	0	00981	Selenium, total recoverable					NODI: Q Daily Maximum			
1	0	01032	Chromium, hexavalent (as Cr)	0.009 lb/d 6 Month Median	0.009 lb/d Daily Maximum	0.94 ug/L 6 Month Median	0.94 ug/L Daily Maximum	0.94 ug/L Instantaneous Maximum	0	Annual	COMP24
1	0	01074	Nickel, total recoverable	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum			
1	0	01079	Silver total recoverable	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum			
1	0	01094	Zinc, total recoverable					38.0 ug/L Daily Maximum	0	Annual	COMP24
1	0	01113	Cadmium, total recoverable	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B 6 Month Median	NODI: B Daily Maximum	NODI: B Instantaneous Maximum			

Feature - LS: 001-Y				Monitoring Period: 01/01/2021 - 12/31/2021							
Loc	Sea	Param	Param Text	Q1	Q2	C1	C2	C3	Excur Count	Analy Freq	Sample Type
1	0	01114	Lead, total recoverable					0.8 ug/L Daily Maximum	0	Annual	COMP24
1	0	01119	Copper, total recoverable					12.0 ug/L Daily Maximum	0	Annual	COMP24
1	0	04175	Phosphate, ortho (as P)					2.6 mg/L Daily Maximum	0	Annual	GRAB
1	0	71800	Urea					0.155 mg/L Daily Maximum	0	Annual	GRAB
1	0	71901	Mercury, total recoverable	NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q 6 Month Median	NODI: Q Daily Maximum	NODI: Q Instantaneous Maximum			
1	0	TTJ3L	Static 72Hr Chronic Strongyl. Purpuratus					NODI: 9 Daily Maximum			
1	0	TTJ3N	Static 72Hr Chronic Dendraster Excentri.					NODI: 9 Daily Maximum			
1	0	TTK1D	Static 48Hr Chronic Macrocystis Pyrifera					NODI: 9 Daily Maximum			
1	0	TTK3O	Static 48Hr Chronic Crassostrea Gigas					NODI: 9 Daily Maximum			
1	0	TTK3R	Static 48Hr Chronic Haliotis Rufescens					17.9 tox chronic Daily Maximum	0	Annual	COMP24
1	0	TTK3S	Static 48Hr Chronic Mytilis Species					NODI: 9 Daily Maximum			

Feature - LS: 001-Y				Monitoring Period: 01/01/2021 - 12/31/2021							
Loc	Sea	Param	Param Text	Q1	Q2	C1	C2	C3	Excur Count	Analy Freq	Sample Type
1	0	TTP3E	Static Renewal 7-Day Chronic Mysidopsis bahia					NODI: 9 Daily Maximum			
1	0	TTP3Q	Static Renewal 7-Day Chronic Holmesimysis costata					NODI: 9 Daily Maximum			
1	0	TTP6J	Static Renewal 7-Day Chronic Menidia beryllina					NODI: 9 Daily Maximum			
1	0	TTP6L	Static Renewal 7-Day Chronic Atherinops affinis					NODI: 9 Daily Maximum			
1	0	TTS3L	Static 20Min Chronic Strongyl. Purpuratus					NODI: 9 Daily Maximum			
1	0	TTS3N	Static 20Min Chronic Dendraster Excentri					NODI: 9 Daily Maximum			

*ATTACHMENT C*  
**LABORATORY REPORTS**



Date of Report: 08/05/2021

John Gunderlock

City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

Client Project: 2021  
BCL Project: Annual Effluent Sampling  
BCL Work Order: 2123334  
Invoice ID: B424486

Enclosed are the results of analyses for samples received by the laboratory on 7/21/2021. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Eli Velazquez  
Client Service Rep

Stuart Buttram  
Technical Director

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

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



## Table of Contents

### Sample Information

Chain of Custody and Cooler Receipt form.....	3
Laboratory / Client Sample Cross Reference.....	5

### Sample Results

<b>2123334-01 - Grab Effluent ARS</b>	
Water Analysis (General Chemistry).....	6
<b>2123334-02 - Comp Effluent ARS</b>	
Metals Analysis.....	7

### Quality Control Reports

<b>Water Analysis (General Chemistry)</b>	
Method Blank Analysis.....	8
Laboratory Control Sample.....	9
Precision and Accuracy.....	10
<b>Metals Analysis</b>	
Method Blank Analysis.....	11
Laboratory Control Sample.....	12
Precision and Accuracy.....	13

### Notes

Notes and Definitions.....	14
----------------------------	----





BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of 1

Submission #: 21-23334

SHIPPING INFORMATION Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> GSO / GLS <input type="checkbox"/> Hand Delivery <input type="checkbox"/> BC Lab Field Service <input checked="" type="checkbox"/> Other <input type="checkbox"/> (Specify) _____		SHIPPING CONTAINER Ice Chest <input checked="" type="checkbox"/> None <input type="checkbox"/> Box <input type="checkbox"/> Other <input type="checkbox"/> (Specify) _____		FREE LIQUID YES <input type="checkbox"/> NO <input type="checkbox"/> W / S
---	--	--	--	--

Refrigerant: Ice  Blue Ice  None  Other  Comments: \_\_\_\_\_

Custody Seals: Ice Chest  Containers  None  Comments: \_\_\_\_\_  
 Intact? Yes  No  Intact? Yes  No

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

COC Received  YES  NO

Emissivity: 0.95 Container: PE Thermometer ID: 208 Date/Time: 7/21/21 2040  
 Temperature: (A) 1.3 °C / (C) 1.2 °C Analyst Init: PPE

SAMPLE CONTAINERS	SAMPLE NUMBERS									
	1	2	3	4	5	6	7	8	9	10
QT PE UNPRES										
4oz / 8oz / 16oz PE UNPRES										
2oz Cr <sup>6+</sup>		A								
QT INORGANIC CHEMICAL METALS										
INORGANIC CHEMICAL METALS 4oz / 8oz <u>C</u>		B								
PT CYANIDE										
PT NITROGEN FORMS	A									
PT TOTAL SULFIDE										
2oz NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT CHEMICAL OXYGEN DEMAND										
PA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 1664B										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL - 504										
QT EPA 508/608.3/8281A										
QT EPA 515.1/8151A										
QT EPA 525.2										
QT EPA 525.2 TRAVEL BLANK										
40ml EPA 547										
40ml EPA 531.1										
8oz EPA 548.1										
QT EPA 549.2										
QT EPA 8015M										
QT EPA 8270C										
8oz / 16oz / 32oz AMBER										
8oz / 16oz / 32oz JAR										
SOIL SLEEVE										
PCE VIAL										
PLASTIC BAG										
TEDLAR BAG										
FERROUS IRON										
ENCORE										
SMART KIT										
SUMMA CANISTER										

Comments: \_\_\_\_\_

Sample Numbering Completed By: PPE Date/Time: 7/21/21 2140 Rev 22 04/13/21

A = Actual / C = Corrected [S:\WP\Decl\Word\Perfor\LAB\_SCS\FORMS\SRM\REC\rev 24]



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
Project: Annual Effluent Sampling  
Project Number: 2021  
Project Manager: John Gunderlock

### Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
2123334-01	<b>COC Number:</b>	---	<b>Receive Date:</b>	07/21/2021 20:40
	<b>Project Number:</b>	---	<b>Sampling Date:</b>	07/20/2021 08:15
	<b>Sampling Location:</b>	---	<b>Sample Depth:</b>	---
	<b>Sampling Point:</b>	Grab Effluent ARS	<b>Lab Matrix:</b>	Water
	<b>Sampled By:</b>	---	<b>Sample Type:</b>	Wastewater
2123334-02	<b>COC Number:</b>	---	<b>Receive Date:</b>	07/21/2021 20:40
	<b>Project Number:</b>	---	<b>Sampling Date:</b>	07/20/2021 08:30
	<b>Sampling Location:</b>	---	<b>Sample Depth:</b>	---
	<b>Sampling Point:</b>	Comp Effluent ARS	<b>Lab Matrix:</b>	Water
	<b>Sampled By:</b>	---	<b>Sample Type:</b>	Wastewater

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
**Project:** Annual Effluent Sampling  
**Project Number:** 2021  
**Project Manager:** John Gunderlock

### Water Analysis (General Chemistry)

<b>BCL Sample ID:</b> 2123334-01	<b>Client Sample Name:</b> Grab Effluent ARS, 7/20/2021 8:15:00AM
----------------------------------	---

Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Ammonia as N	32	mg/L	2.0	0.67	EPA-350.1	ND	A10	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID	Prep Method
1	EPA-350.1	07/27/21 13:30	07/27/21 16:01	JMH2	SC-2	10.033	B115488	No Prep

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
**Project:** Annual Effluent Sampling  
**Project Number:** 2021  
**Project Manager:** John Gunderlock

### Metals Analysis

BCL Sample ID: 2123334-02		Client Sample Name: Comp Effluent ARS, 7/20/2021 8:30:00AM							
Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #	
Hexavalent Chromium	0.94	ug/L	0.20	0.020	EPA-218.6	ND		1	
Total Recoverable Arsenic	1.5	ug/L	2.0	0.70	EPA-200.8	ND	J,A10	2	
Total Recoverable Cadmium	ND	ug/L	10	1.1	EPA-200.7	ND		3	
Total Recoverable Copper	12	ug/L	10	1.2	EPA-200.7	ND		3	
Total Recoverable Lead	0.80	ug/L	1.0	0.10	EPA-200.8	ND	J,A10	2	
Total Recoverable Mercury	0.054	ug/L	0.20	0.022	EPA-245.1	0.040	J	4	
Total Recoverable Nickel	ND	ug/L	10	2.3	EPA-200.7	ND		3	
Total Recoverable Selenium	1.5	ug/L	2.0	0.19	EPA-200.8	0.28	J,A10	2	
Total Recoverable Silver	ND	ug/L	10	1.3	EPA-200.7	ND		3	
Total Recoverable Zinc	38	ug/L	50	9.5	EPA-200.7	ND	J	3	

Run #	Method	Prep Date	Run		Analyst	Instrument	Dilution	QC	
			Date/Time					Batch ID	Prep Method
1	EPA-218.6	07/27/21 18:00	07/27/21	23:03	KB1	IC-4	1	B115578	No Prep
2	EPA-200.8	07/29/21 22:30	07/31/21	14:59	ARD	PE-EL2	1	B115764	EPA 200.2
3	EPA-200.7	08/02/21 21:45	08/03/21	20:12	JRG	PE-OP4	1	B115972	EPA 200.2
4	EPA-245.1	07/28/21 09:20	07/28/21	14:33	TMT	CETAC3	1	B115550	EPA 245.1

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
**Project:** Annual Effluent Sampling  
**Project Number:** 2021  
**Project Manager:** John Gunderlock

## Water Analysis (General Chemistry)

### Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
<b>QC Batch ID: B115488</b>						
Ammonia as N	B115488-BLK1	ND	mg/L	0.20	0.067	

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
Project: Annual Effluent Sampling  
Project Number: 2021  
Project Manager: John Gunderlock

## 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
								Percent Recovery	RPD	
<b>QC Batch ID: B115488</b>										
Ammonia as N	B115488-BS1	LCS	2.0333	2.0000	mg/L	102		90 - 110		

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
Project: Annual Effluent Sampling  
Project Number: 2021  
Project Manager: John Gunderlock

### 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	
<b>QC Batch ID: B115488</b>		Used client sample: N									
Ammonia as N	DUP	2123335-01	0.085389	0.083523		mg/L	2.2		10		J
	MS	2123335-01	0.085389	2.2253	2.3033	mg/L		92.9		90 - 110	
	MSD	2123335-01	0.085389	2.3370	2.3033	mg/L	4.9	97.8	10	90 - 110	

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
**Project:** Annual Effluent Sampling  
**Project Number:** 2021  
**Project Manager:** John Gunderlock

## Metals Analysis

### Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
<b>QC Batch ID: B115550</b>						
Total Recoverable Mercury	B115550-BLK1	0.040000	ug/L	0.20	0.022	J
<b>QC Batch ID: B115578</b>						
Hexavalent Chromium	B115578-BLK1	ND	ug/L	0.20	0.020	
<b>QC Batch ID: B115764</b>						
Total Recoverable Arsenic	B115764-BLK1	ND	ug/L	2.0	0.70	
Total Recoverable Lead	B115764-BLK1	ND	ug/L	1.0	0.10	
Total Recoverable Selenium	B115764-BLK1	0.28200	ug/L	2.0	0.19	J
<b>QC Batch ID: B115972</b>						
Total Recoverable Cadmium	B115972-BLK1	ND	ug/L	10	1.1	
Total Recoverable Copper	B115972-BLK1	ND	ug/L	10	1.2	
Total Recoverable Nickel	B115972-BLK1	ND	ug/L	10	2.3	
Total Recoverable Silver	B115972-BLK1	ND	ug/L	10	1.3	
Total Recoverable Zinc	B115972-BLK1	ND	ug/L	50	9.5	

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
Project: Annual Effluent Sampling  
Project Number: 2021  
Project Manager: John Gunderlock

### Metals Analysis

#### Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	Control Limits		Lab RPD Quals
							Percent Recovery	RPD	
<b>QC Batch ID: B115550</b>									
Total Recoverable Mercury	B115550-BS1	LCS	0.99500	1.0000	ug/L	99.5	85 - 115		
<b>QC Batch ID: B115578</b>									
Hexavalent Chromium	B115578-BS1	LCS	21.922	20.000	ug/L	110	90 - 110		
<b>QC Batch ID: B115764</b>									
Total Recoverable Arsenic	B115764-BS1	LCS	100.69	100.00	ug/L	101	85 - 115		
Total Recoverable Lead	B115764-BS1	LCS	105.50	100.00	ug/L	106	85 - 115		
Total Recoverable Selenium	B115764-BS1	LCS	103.29	100.00	ug/L	103	85 - 115		
<b>QC Batch ID: B115972</b>									
Total Recoverable Cadmium	B115972-BS1	LCS	188.05	200.00	ug/L	94.0	85 - 115		
Total Recoverable Copper	B115972-BS1	LCS	363.88	400.00	ug/L	91.0	85 - 115		
Total Recoverable Nickel	B115972-BS1	LCS	376.55	400.00	ug/L	94.1	85 - 115		
Total Recoverable Silver	B115972-BS1	LCS	92.953	100.00	ug/L	93.0	85 - 115		
Total Recoverable Zinc	B115972-BS1	LCS	502.28	500.00	ug/L	100	85 - 115		

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

Reported: 08/05/2021 9:38  
Project: Annual Effluent Sampling  
Project Number: 2021  
Project Manager: John Gunderlock

### 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	
<b>QC Batch ID: B115550</b>		Used client sample: N								
Total Recoverable Mercury	DUP	123278-01RE	0.029750	0.030500		ug/L	2.5		20	J
	MS	123278-01RE	0.029750	1.0600	1.0000	ug/L		103	70 - 130	
	MSD	123278-01RE	0.029750	1.0500	1.0000	ug/L	0.9	102	20 70 - 130	
<b>QC Batch ID: B115578</b>		Used client sample: N								
Hexavalent Chromium	DUP	2123330-01	0.47600	0.46800		ug/L	1.7		10	
	MS	2123330-01	0.47600	20.042	20.202	ug/L		96.9	90 - 110	
	MSD	2123330-01	0.47600	20.091	20.202	ug/L	0.2	97.1	10 90 - 110	
<b>QC Batch ID: B115764</b>		Used client sample: N								
Total Recoverable Arsenic	DUP	2123128-11	ND	ND		ug/L			20	
	MS	2123128-11	ND	105.71	100.00	ug/L		106	70 - 130	
	MSD	2123128-11	ND	106.71	100.00	ug/L	0.9	107	20 70 - 130	
Total Recoverable Lead	DUP	2123128-11	ND	ND		ug/L			20	
	MS	2123128-11	ND	105.34	100.00	ug/L		105	70 - 130	
	MSD	2123128-11	ND	108.58	100.00	ug/L	3.0	109	20 70 - 130	
Total Recoverable Selenium	DUP	2123128-11	ND	ND		ug/L			20	
	MS	2123128-11	ND	113.19	100.00	ug/L		113	70 - 130	
	MSD	2123128-11	ND	114.44	100.00	ug/L	1.1	114	20 70 - 130	
<b>QC Batch ID: B115972</b>		Used client sample: N								
Total Recoverable Cadmium	DUP	2123339-01	ND	ND		ug/L			20	
	MS	2123339-01	ND	173.46	200.00	ug/L		86.7	75 - 125	
	MSD	2123339-01	ND	181.32	200.00	ug/L	4.4	90.7	20 75 - 125	
Total Recoverable Copper	DUP	2123339-01	2.1805	ND		ug/L			20	
	MS	2123339-01	2.1805	336.52	400.00	ug/L		83.6	75 - 125	
	MSD	2123339-01	2.1805	351.69	400.00	ug/L	4.4	87.4	20 75 - 125	
Total Recoverable Nickel	DUP	2123339-01	ND	ND		ug/L			20	
	MS	2123339-01	ND	346.86	400.00	ug/L		86.7	75 - 125	
	MSD	2123339-01	ND	358.04	400.00	ug/L	3.2	89.5	20 75 - 125	
Total Recoverable Silver	DUP	2123339-01	ND	ND		ug/L			20	
	MS	2123339-01	ND	86.437	100.00	ug/L		86.4	75 - 125	
	MSD	2123339-01	ND	88.794	100.00	ug/L	2.7	88.8	20 75 - 125	
Total Recoverable Zinc	DUP	2123339-01	ND	ND		ug/L			20	
	MS	2123339-01	ND	461.94	500.00	ug/L		92.4	75 - 125	
	MSD	2123339-01	ND	476.18	500.00	ug/L	3.0	95.2	20 75 - 125	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



City of Morro Bay  
160 Atascadero Rd.  
Morro Bay, CA 93442

**Reported:** 08/05/2021 9:38  
**Project:** Annual Effluent Sampling  
**Project Number:** 2021  
**Project Manager:** John Gunderlock

**Notes And Definitions**

- J Estimated Value (CLP Flag)
- MDL Method Detection Limit
- ND Analyte Not Detected
- PQL Practical Quantitation Limit
- A10 Detection and quantitation limits were raised due to matrix interference.



4 Justin Court Suite D  
Monterey, CA 93940  
Phone: (831) 375-MBAS (6227)  
www.MBASinc.com

ELAP Certification Number: 2385

## Certificate of Analysis

August 13, 2021

John Gunderlock  
City of Morro Bay Public Works/WWTP  
955 Shasta Ave.  
Morro Bay, CA 93442

Thank you for using Monterey Bay Analytical Services for your analytical testing needs. In the following pages please find the test results for the samples submitted on July 21, 2021 for order ID #: 210721\_08

Sample results are on the Sample Results page and are related only to the samples analyzed.

The samples were analyzed in accordance with the attached Chain of Custody document. Sample receipt conditions were noted on the chain of custody forms and are reported at the end of this report. Any deviations from the quality requirements are specified in the Quality Control report attached (if applicable) to the analytical report.

This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

Authorized by

A handwritten signature in black ink, appearing to read "David Holland", is written over a white background.

David Holland  
Laboratory Director  
Monterey Bay Analytical Services



Thank you again for using MBAS. We value your business and appreciate your loyalty.



### Monterey Bay Analytical Services

4 Justin Court Suite D, Monterey, CA 93940

831.375.MBAS (6227)

www.MBASinc.com

ELAP Certification Number: 2385

### City of Morro Bay Public Works/WWTP

John Gunderlock

955 Shasta Ave.

Morro Bay, CA 93442

Friday, August 13, 2021

## Sample Results

**Lab Number: 210721\_08-01    Sample Description: Morro Bay WWTP Annual Effluent, M1 ARS Grab**

Collection Date/Time: 7/20/2021 8:15    Sample Collector: Gunderlock J    Client Sample #:

Received Date/Time: 7/21/2021 10:04    System ID:

Analyte	Method	Unit	Result	Dilution	Qual	PQL	MDL	Analysis Date / Time	Analyst
Silica SiO <sub>2</sub> , Dissolved	EPA200.7	mg/L	13.4	1		1	0.25	8/12/2021 12:05	BS
Nitrate as N	EPA300.0	mg/L	ND	1		0.1	0.01	7/21/2021 17:37	BS
Orthophosphate as P	EPA300.0	mg/L	2.6	1		0.06	0.02	7/21/2021 17:37	BS
Urea-N	Mulvenna&Savidge	µg/L	155	1	LN	10	8	7/26/2021 11:00	OW

*LN: MS and/or MSD below acceptance limits.*

**Abbreviations/Definitions:**  
 mg/L: Milligrams per liter (=ppm)  
 MDL: Method Detection Limit  
 E: Analysis performed by External Laboratory; see Report attachments  
 J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

µg/L: Micrograms per liter (=ppb)  
 MCL: Maximum Contamination Level  
 H: Analyzed outside of method hold time  
 MPN: Most Probable Number  
 ND: Not Detected at the PQL (or MDL, if shown)  
 QC: Quality Control



## Monterey Bay Analytical Services

4 Justin Court Suite D, Monterey, CA 93940

831.375.MBAS (6227)

www.MBASinc.com

ELAP Certification Number: 2385

### City of Morro Bay Public Works/WWTP

John Gunderlock

955 Shasta Ave.

Morro Bay, CA 93442

Friday, August 13, 2021

### Quality Control Results

QC Batch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limits
QC21072201	210721_31-01: MS 1	Nitrate as N	9.7	mg/L	95		80 - 120
	210721_31-01: MSD 1	Nitrate as N	9.8	mg/L	96	1.2	0 - 10
	CCVB 1	Nitrate as N	ND	mg/L			
	LCS 1	Nitrate as N	9.7	mg/L	97		90 - 110
	LCSD 1	Nitrate as N	9.7	mg/L	97	0.2	0 - 10
	LCSL 1	Nitrate as N	0.1	mg/L	74		50 - 150
	Method Blank 1	Nitrate as N	ND	mg/L			
	210721_31-01: MS 1	Orthophosphate as P	1.1	mg/L	100		80 - 120
	210721_31-01: MSD 1	Orthophosphate as P	1.1	mg/L	104	3.7	0 - 10
	CCVB 1	Orthophosphate as P	ND	mg/L			
	LCS 1	Orthophosphate as P	0.9	mg/L	94		90 - 110
	LCSD 1	Orthophosphate as P	1.0	mg/L	98	4.6	0 - 10
	LCSL 1	Orthophosphate as P	0.1	mg/L	98		50 - 150
	Method Blank 1	Orthophosphate as P	ND	mg/L			
QC21072608	210721_12-01: MS 1	Urea-N	174.0	ug/L	70		85 - 115
	210721_12-01: MSD 1	Urea-N	174.0	ug/L	70	0.0	0 - 20
	LFB 1	Urea-N	99.0	ug/L	99		85 - 115
	LFBD 1	Urea-N	104.0	ug/L	104	4.9	0 - 25
	LFBL 1	Urea-N	11.0	ug/L	110		70 - 130
	Method Blank 1	Urea-N	ND	ug/L			
	QCS 1	Urea-N	48.0	ug/L	102		85 - 115



## Monterey Bay Analytical Services

4 Justin Court Suite D, Monterey, CA 93940

831.375.MBAS (6227)

www.MBASinc.com

ELAP Certification Number: 2385

### City of Morro Bay Public Works/WWTP

John Gunderlock

955 Shasta Ave.

Morro Bay, CA 93442

Tuesday, August 17, 2021

### Quality Control Results

<u>QCBatch ID</u>	<u>QC ID</u>	<u>Parameter</u>	<u>Results</u>	<u>Units</u>	<u>% Rec</u>	<u>% RPD</u>	<u>Control Limits</u>
QC21081716	210721_17-01: MS 1	Silica (SiO <sub>2</sub> ), Total	93.0	mg/L	108		70 - 130
	210721_17-01: MSD 1	Silica (SiO <sub>2</sub> ), Total	98.9	mg/L	119	6.1	0 - 20
	CCVB 1	Silica (SiO <sub>2</sub> ), Total	ND	mg/L			
	LCS 1	Silica (SiO <sub>2</sub> ), Total	49.1	mg/L	98		95 - 105
	LCSD 1	Silica (SiO <sub>2</sub> ), Total	50.6	mg/L	101	3.0	0 - 10
	Method Blank 1	Silica (SiO <sub>2</sub> ), Total	ND	mg/L			
	QCS 1	Silica (SiO <sub>2</sub> ), Total	50.4	mg/L	101		95 - 105



City of Morro Bay Public Works/WWTP  
John Gunderlock  
955 Shasta Ave.  
Morro Bay, CA 93442

4 Justin Court Suite D, Monterey, CA 93940  
831.375.MBAS (6227)  
www.MBASinc.com  
ELAP Certification Number: 2385

Friday, August 13, 2021

**Sample Condition Upon Receipt**

**Order ID: 210721\_08**

Is there evidence of chilling? Yes

\*NOTE: Systems are encouraged but not required to hold samples  
<10°C (Microbiology) or <6°C (Chemistry) during transit.

---

Did bottle arrive intact? Yes

---

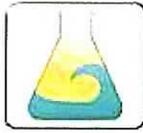
Did bottle labels agree with COC? Yes

---

Adequate sample volume? Yes

---

MBAS Order ID: 210721-08



# MBAS

Monterey Bay Analytical Services

## Chain of Custody / Analysis Request

4 Justin Court, Suite D, Monterey, CA 93940  
 (831) 375-MBAS (6227) \* Fax: (831) 641-0734

[info@mbasinc.com](mailto:info@mbasinc.com) [www.MBASinc.com](http://www.MBASinc.com)

**Requested Analysis**

Nitrate (as NO3) [EPA 300.0]	O-Phosphate-P [EPA 300.0]	Dissolved Silica (as SiO2) [EPA 4500-Si-E]	Urea-N [Mulvenna & Savid]
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- \*LAB USE ONLY\***
- DW  WW  Soil  
 Other \_\_\_\_\_
  - Is there evidence of chilling?  Y  N  
N/A < 2hrs
  - Adequate sample volume?  Y  N
  - Was the sample filtered?  Y  N
  - Did bottles agree with the COC?  Y  N
- IR Used: 02

<b>Client / Company Name:</b> City of Morro Bay	<b>Attention:</b> John Gunderlock	<b>Email Address(es) to Send Report/Invoice:</b> jgunderlock@morrobayca.gov	<b>Phone Number:</b> 805.395.1595
<b>Project/System Info:</b> 2021 WWTP Annual Effluent	<b>State System ID:</b>	<b>Billing Address:</b> 955 Shasta Avenue Morro Bay, CA 93442	<b>Contract/ P.O. #:</b>
<b>For Regulatory Reporting?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (Please select one)			

MBAS Lab #	Source Code or Client Sample ID	Sample Description	Sample Collection		Receiving Temp (°C)	Coliform Analysis					Container		
			Date	Time		CL2 Residual (mg/L)	Routine	Other	Repeat	Special	# Cont.	Type*	Size
01	↗	M1 ARS Grab	7/20/21	0815	3.6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3	<input type="checkbox"/>	
	↘	M1 ARS Grab***	7/20/21	0815	5.4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	
							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	

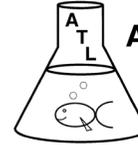
Preservative (include pH)  
Initials:

HNO3	H2SO4	NaOH	HCl	Na2S2O3

	Printed Name	Signature	Date	Time	Comments
Sampled and Relinquished by:	John Gunderlock		7/20/21	1300	H01 250 mL PRES W HNO3 p1L2 *** Pour off 50ml freeze to m5 hold for Urea test. rec'd via Fedex 7/21/21
Received by:	Holly Aniswell		7/21/21	1009	
Relinquished by:					
Received by:					

Payment Received      Check #: \_\_\_\_\_      Amount: \_\_\_\_\_      Date: \_\_\_\_\_

# LABORATORY REPORT



**Aquatic  
Testing  
Laboratories**

*"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:** July 26, 2021

**Client:** City of Morro Bay Public Works  
Wastewater Treatment Plant  
160 Atascadero Road  
Morro Bay, CA 93442  
Attn: John Gunderlock

**Laboratory No.:** A-21072007-001

**Sample I.D.:** Comp 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. Client supplied receiving water was used for dilution/control.

Date Sampled: 07/20/21  
Date Received: 07/20/21  
Temp. Received: 4.0°C  
Chlorine (TRC): < 0.1 mg/l  
Date Tested: 07/21/21 to 07/23/21

**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. All testing was conducted under the direct supervision of Joseph A. LeMay. Daily test readings were taken by Joseph A. LeMay (initials: JAL).

## 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-21072007-001  
Client/ID: Morro Bay WWTP

Date tested: 07/21/21 - 07/23/21

## 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-210721 (ran concurrently)

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

## RESULTS SUMMARY

Sample Concentration	Percent Normal Development	
Control-Brine (Receiving Water)	96.2%	
Control-Dilution (Receiving Water)	95.7%	
Control-Culture (Lab Seawater)	95.0%	
1.8%	96.7%	
3.2%	96.6%	
5.6%	96.4%	
10.0%	70.8%	*
18.0%	0%	*
32.0%	0%	*

\* Statistically significantly less than control at P = 0.05 level  
Dilution and brine control not statistically significantly less than culture water control at P = 0.05 level  
Dilution water is client supplied receiving water  
Culture water control obtained from The Cultured Abalone Farm.

## CHRONIC TOXICITY

NOEC	5.6%
TUc	17.9

## QA/QC TEST ACCEPTABILITY

Parameter	Result
Average control normality \$80%	PASS (95.7%)
Concentration response relationship acceptable	PASS (Response curve normal)

Please see RT-210721 report for additional test acceptability criteria.

**Abalone Larval Development Test-Proportion Normal**

Start Date: 7/21/2021 15:00 Test ID: A21072007 Sample ID: Morro Bay  
 End Date: 7/23/2021 15:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW  
 Sample Date: 7/20/2021 08:30 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens

Comments:

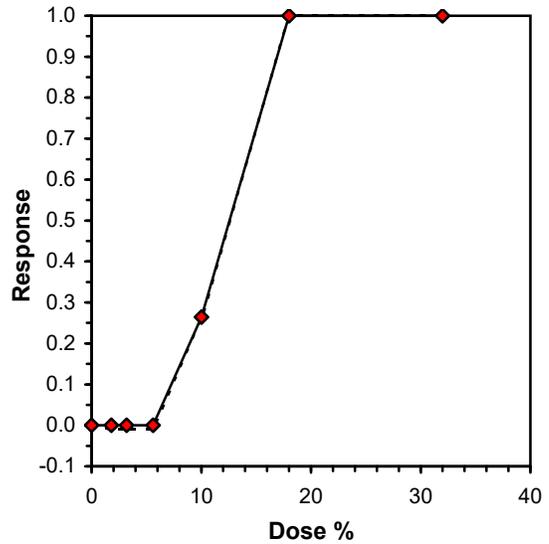
Conc-%	1	2	3	4	5
B-Control	0.9636	0.9636	0.9725	0.9369	0.9720
D-Control	0.9633	0.9727	0.9455	0.9292	0.9725
1.8	0.9811	0.9815	0.9286	0.9720	0.9732
3.2	0.9908	0.9720	0.9224	0.9615	0.9815
5.6	0.9352	0.9712	0.9817	0.9725	0.9619
10	0.6000	0.7339	0.6972	0.7593	0.7500
18	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N			Mean	N-Mean
B-Control	0.9617	1.0053	1.3763	1.3170	1.4041	2.569	5			0.9632	1.0000
D-Control	0.9566	1.0000	1.3647	1.3015	1.4049	3.322	5	*		0.9632	1.0000
1.8	0.9673	1.0111	1.3953	1.3002	1.4343	3.950	5	33.00	17.00	0.9632	1.0000
3.2	0.9656	1.0094	1.3947	1.2885	1.4749	5.042	5	30.00	17.00	0.9632	1.0000
5.6	0.9645	1.0082	1.3854	1.3134	1.4349	3.294	5	29.50	17.00	0.9632	1.0000
*10	0.7081	0.7402	1.0016	0.8861	1.0580	6.975	5	15.00	17.00	0.7087	0.7358
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 non-normal distribution (p <= 0.05)	0.90068	0.918	-0.9072	-0.0468
Bartlett's Test indicates equal variances (p = 0.85)	1.34733	13.2767		
The control means are not significantly different (p = 0.66)	0.45034	2.306		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	5.6	10	7.48331	17.8571
Treatments vs D-Control				

Linear Interpolation (200 Resamples)					
Point	%	SD	95% CL(Exp)	Skew	
IC05	6.433	0.127	5.998	6.607	-0.4630
IC10	7.265	0.183	6.782	7.628	-0.0587
IC15	8.098	0.257	7.437	8.659	-0.0344
IC20	8.930	0.336	8.070	9.717	-0.0455
IC25	9.763	0.366	8.703	10.435	-0.5002
IC40	11.476	0.247	10.691	11.928	-0.7977
IC50	12.563	0.206	11.909	12.940	-0.7977



**Abalone Larval Development Test-Proportion Normal**

Start Date: 7/21/2021 15:00 Test ID: A21072007 Sample ID: Morro Bay  
 End Date: 7/23/2021 15:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW  
 Sample Date: 7/20/2021 08:30 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens  
 Comments:

Conc-%	1	2	3	4	5
B-Control	0.9636	0.9636	0.9725	0.9369	0.9720
D-Control	0.9633	0.9727	0.9455	0.9292	0.9725
1.8	0.9811	0.9815	0.9286	0.9720	0.9732
3.2	0.9908	0.9720	0.9224	0.9615	0.9815
5.6	0.9352	0.9712	0.9817	0.9725	0.9619
10	0.6000	0.7339	0.6972	0.7593	0.7500
18	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					N	t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%					
B-Control	0.9617	1.0053	1.3763	1.3170	1.4041	2.569	5				
D-Control	0.9566	1.0000	1.3647	1.3015	1.4049	3.322	5	*			
1.8	0.9673	1.0111	1.3953	1.3002	1.4343	3.950	5	-0.829	2.300	0.0848	
3.2	0.9656	1.0094	1.3947	1.2885	1.4749	5.042	5	-0.814	2.300	0.0848	
5.6	0.9645	1.0082	1.3854	1.3134	1.4349	3.294	5	-0.560	2.300	0.0848	
*10	0.7081	0.7402	1.0016	0.8861	1.0580	6.975	5	9.844	2.300	0.0848	
18	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				
32	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.90068	0.918	-0.9072	-0.0468
Bartlett's Test indicates equal variances (p = 0.85)	1.34733	13.2767		
The control means are not significantly different (p = 0.66)	0.45034	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	0.04039	0.04216	0.14775	0.0034	1.4E-09	4, 20

**Abalone Larval Development Test-Proportion Normal**

Start Date: 7/21/2021 15:00 Test ID: A21072007 Sample ID: Morro Bay  
 End Date: 7/23/2021 15:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW  
 Sample Date: 7/20/2021 08:30 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens  
 Comments:

Conc-%	1	2	3	4	5
D-Control	0.9633	0.9727	0.9455	0.9292	0.9725
Culture Control	0.9455	0.9722	0.9115	0.9815	0.9369

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed	
			Mean	Min	Max	CV%	N		Critical	MSD
D-Control	0.9566	1.0000	1.3647	1.3015	1.4049	3.322	5	0.361	1.860	0.0671
Culture Control	0.9495	0.9926	1.3517	1.2687	1.4343	4.943	5			

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96347	0.842	-0.0588	-1.1062		
F-Test indicates equal variances (p = 0.47)	2.17131	23.1545				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs D-Control	0.03094	0.03229	0.00043	0.00326	0.72737	1, 8

# ABALONE CHRONIC BIOASSAY



Lab No.: A-21072107-001  
Client ID: Morro Bay Effluent

Start Date: 07/21/2021

## 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)	14.4	7.2	8.1	34	14.2	8.1	15.0	8.2	8.1	34
Control (dilution)	14.4	7.2	8.1	34	14.3	8.1	14.4	8.2	8.1	34
1.8%	14.4	7.2	8.1	34	14.3	8.1	14.3	8.3	8.1	34
3.2%	14.4	7.3	8.1	34	14.3	8.1	14.3	8.2	8.1	34
5.6%	14.4	7.2	8.1	34	14.4	8.1	14.3	8.2	8.1	34
10%	14.4	7.3	8.2	34	14.4	8.1	14.4	8.3	8.1	34
18%	14.4	7.2	8.2	34	14.5	8.2	14.4	8.3	8.1	34
32%	14.4	8.23	8.2	34	14.5	8.2	14.4	8.3	8.1	34

Sample as received: Chlorine: 0 mg/l; pH: 7.6; Salinity: 0 ppt; Temp: 4.0 °C; DO: 5.7 mg/l; NH<sub>3</sub>-N: 46 mg/l  
Dilution water is client supplied receiving water.  
Initial readings: JKL Date/Time: 7-21-21 1500 Final readings: JKL Date/Time: 7-23-21 1500

## 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	C	105	4	15	C	104	6	29	5.6	101	4
2	10	63	42	16	5.6	107	2	30	C	106	3
3	1.8	104	2	17	BC	106	3	31	10	81	27
4	5.6	101	7	18	3.2	107	9	32	3.2	0	100
5	3.2	108	1	19	18	0	100	33	1.8	0	100
6	BC	106	4	20	1.8	104	8	34	3.2	0	100
7	1.8	0	100	21	10	76	33	35	3.2	0	100
8	C	107	3	22	BC	104	7	36	3.2	0	100
9	3.2	104	3	23	C	105	8	37	3.2	106	2
10	10	80	24	24	3.2	100	4	38	1.8	109	3
11	BC	106	4	25	10	82	26	39	BC	104	3
12	1.8	106	2	26	5.6	106	3	40	3.2	0	100
13	5.6	101	3	27	1.8	0	100				
14	1.8	0	100	28	1.8	104	3				

Microscopic examination: Analyst: JKL Date: 7-24-21 Time: 1000



## ABALONE CHRONIC BIOASSAY

Lab No.: A-21072107-001  
 Client ID: Morro Bay Effluent

Start Date: 07/21/2021

### RANDOMIZATION WORKSHEET

Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Notes
1	C	15	C	29	5.6	Add 1600 fertilized eggs per 200 ml test volume.
2	1.0	16	5.6	30	C	
3	1.6	17	13.6	31	1.0	
4	5.6	18	3.2	32	3.2	
5	3.2	19	1.6	33	1.6	
6	13.6	20	1.0	34	3.2	
7	1.6	21	1.0	35	3.2	
8	C	22	13.6	36	3.2	
9	3.2	23	C	37	3.2	
10	1.0	24	3.2	38	1.6	
11	13.6	25	1.0	39	13.6	
12	1.6	26	5.6	40	3.2	
13	5.6	27	1.6			
14	1.6	28	1.6			

Analyst:           *ML*                Date:           7-21-21                Time:           1000



# ***CHAIN OF CUSTODY***

# CHAIN OF CUSTODY

Client: City of Morro Bay

Address: 955 Shasta Avenue  
Morro Bay, CA 93442

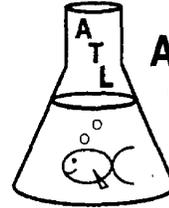
Project Manager: John Gunderlock

Phone: 805.395.1595

Fax: \_\_\_\_\_

Email: jgunderlock@morrobayca.gov

Purchase Order No: \_\_\_\_\_



**Aquatic  
Testing  
Laboratories**

**4350 Transport St., 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. Effluent	07/20/21	0830	E	2.05	1 (1 gallon)	1 Species Marine Chronic
Sea Water	07/20/21	0800	RW	/	1 (5 gallon)	

**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)	Custody Seals Intact? (Yes, No, NA)	Temperature Received (°C)
<i>John Gunderlock</i>	<i>MBSS</i>	7/20/21	0940	N/A	~
<i>Salvatore Lehwor</i>	<i>[Signature]</i>	7-20-21	1:45	N/A	4.0
				N/A	
				N/A	



***REFERENCE  
TOXICANT  
DATA***

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



QA/QC Batch No.: RT-210721

Date tested: 07/21/21 – 07/23/21

**TEST SUMMARY**

Species: <i>Haliotis rufescens</i> .	Source: Cultured Abalone Farm.
Protocol: EPA/600/R-95/136.	Dilution water: Lab seawater.
Test type: Static.	Endpoints: NOEC, IC25 at 48 hrs.
Test chamber: Plastic beakers.	Test volume: 200 ml.
Temperature: 15 +/- 1°C.	Aeration: None.
Number of embryos per chamber: 1600 (approx.).	Number of replicates: 5.
Reference Toxicant: ZnSO <sub>4</sub> (7H <sub>2</sub> O).	Ref. Tox. source: VWR.
	Lot No.: 3357C295.

**RESULTS SUMMARY**

SAMPLE CONCENTRATION	PERCENT NORMAL DEVELOPMENT
Control	96.3%
10 Fg/l	95.6%
18 Fg/l	95.8%
32 Fg/l	39.8% *
56 Fg/l	0% *
100 Fg/l	0% *

\* Statistically significantly less than control at P = 0.05 level

**CHRONIC TOXICITY**

NOEC	18 Fg/l
IC25	23.9 Fg/l

**QA/QC TEST ACCEPTABILITY**

Parameter	Result
Average control normality \$80%	Yes (96.3%)
56 Fg/l treatment response significantly less than control response	Yes (NOEC = 18 Fg/l)
%MSD <20% relative to control	Yes (%MSD = 4.6%)

**Abalone Larval Development Test-Proportion Normal**

Start Date: 7/21/2021 15:00 Test ID: RT210721ab Sample ID: REF-Ref Toxicant  
 End Date: 7/23/2021 15:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: ZNSO-Zinc sulfate  
 Sample Date: 7/21/2021 Protocol: EPAW 95-EPA/600/R-95/136 Test Species: HR-Haliotis rufescens  
 Comments:

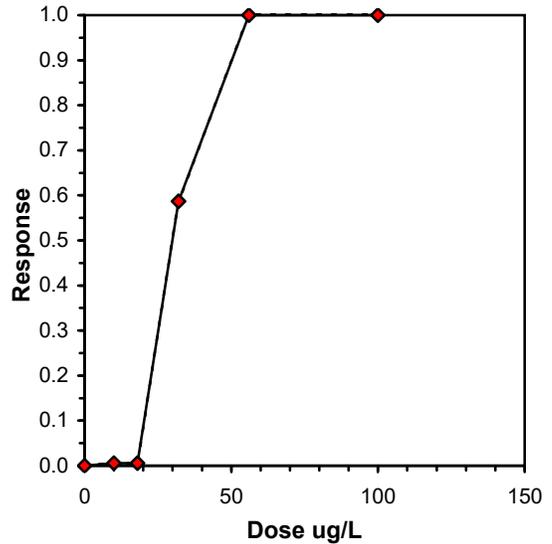
Conc-ug/L	1	2	3	4	5
D-Control	0.9528	0.9810	0.9273	0.9712	0.9811
10	0.9099	0.9717	0.9817	0.9434	0.9732
18	0.9469	0.9364	0.9818	0.9815	0.9455
32	0.3818	0.3922	0.5385	0.3019	0.3750
56	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					N	t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	Mean					N-Mean	
D-Control	0.9627	1.0000	1.3830	1.2977	1.4330	4.195	5				0.9623	1.0000	
10	0.9560	0.9930	1.3679	1.2659	1.4349	5.026	5	0.344	2.230	0.0978	0.9571	0.9945	
18	0.9584	0.9956	1.3718	1.3158	1.4355	4.247	5	0.256	2.230	0.0978	0.9571	0.9945	
*32	0.3979	0.4133	0.6815	0.5817	0.8239	12.918	5	15.994	2.230	0.0978	0.3970	0.4125	
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)	0.9622	0.905	0.22759	-0.2134
Bartlett's Test indicates equal variances (p = 0.83)	0.88877	11.3449		

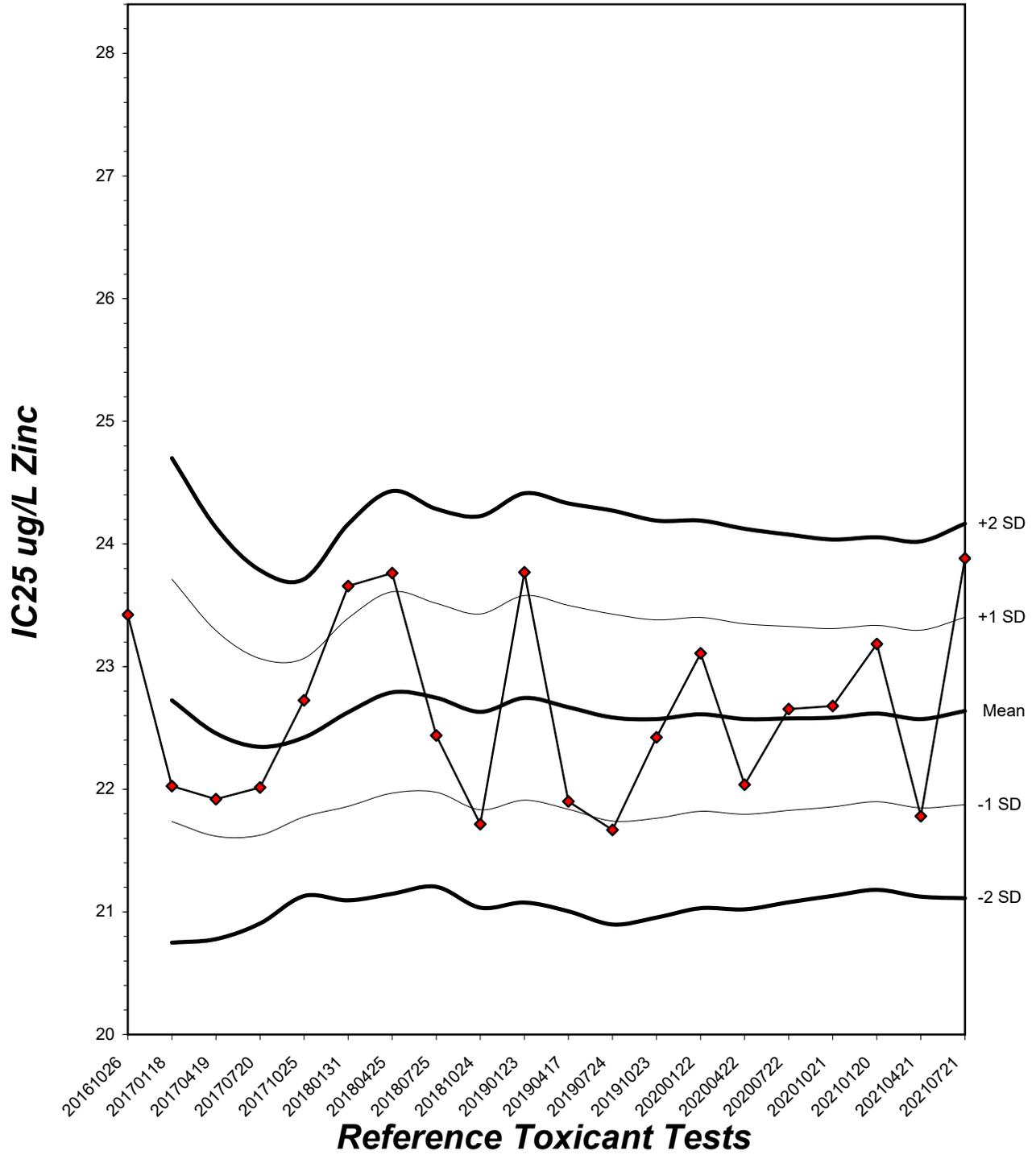
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs D-Control	18	32	24		0.04452	0.04613	0.60009	0.00481	2.6E-11	3, 16

Linear Interpolation (200 Resamples)					
Point	ug/L	SD	95% CL(Exp)	Skew	
IC05	19.071	0.233	18.169	19.423	-0.5436
IC10	20.274	0.247	19.332	20.784	-0.2799
IC15	21.477	0.283	20.630	22.154	-0.0678
IC20	22.679	0.333	21.720	23.553	0.0814
IC25	23.882	0.393	22.854	25.009	0.1851
IC40	27.491	0.597	26.137	29.376	0.3560
IC50	29.896	0.743	28.263	32.536	0.4149



# Abalone Larval Development Laboratory Control Chart

CV% = 3.37



# ABALONE CHRONIC BIOASSAY

## Reference Toxicant - Zinc Sulfate



QA/QC No.: RT-210721

Start Date: 07/21/2021

### WATER QUALITY READINGS

Sample	Initial Readings				24 Hr		Final Readings			
	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)	Temp (°C)	pH	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)
Control	14.2	7.3	8.1	34	15.2	8.0	14.8	8.0	8.0	34
10 µg/l Zn	14.1	7.3	8.0	34	15.0	8.0	14.6	8.1	8.0	34
18 µg/l Zn	14.2	7.3	8.0	34	15.0	8.0	14.4	8.1	8.0	34
32 µg/l Zn	14.2	7.2	8.0	34	14.6	8.0	14.5	8.0	8.0	34
56 µg/l Zn	14.2	7.3	8.0	34	14.4	8.0	14.4	8.1	8.0	34
100 µg/l Zn	14.1	7.3	8.0	34	14.4	8.0	14.2	8.2	8.0	34

Control and dilutions made with laboratory reference seawater filtered to 0.2 µm.

Initial readings:     Date/Time: 7-21-21 1500      Final readings:     Date/Time: 7-23-21 1500

### 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	56	0	100	11	100	0	100	21	C	101	3
2	10	101	10	12	C	103	2	22	10	100	6
3	100	0	100	13	32	56	45	23	32	32	74
4	32	42	68	14	10	107	2	24	100	0	100
5	18	107	6	15	100	0	100	25	C	104	2
6	C	101	5	16	18	108	2	26	18	104	6
7	32	40	62	17	C	102	8	27	56	0	100
8	56	0	100	18	56	0	100	28	10	109	3
9	10	103	3	19	18	106	2	29	32	42	70
10	18	103	7	20	56	0	100	30	100	0	100

Microscopic examination: Analyst:     Date: 7-24-21 Time: 0800

**ABALONE CHRONIC BIOASSAY**  
Reference Toxicant - Zinc Sulfate



QA/QC No.: RT-210721

Start Date: 07/21/2021

**RANDOMIZATION WORKSHEET**

Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Notes
1	56	11	100	21	C	Number Males used: <u>4</u> Number females used: <u>7</u> Time H <sub>2</sub> O <sub>2</sub> added: <u>11:30</u> Time water changed: <u>1400</u> Time spawned: <u>1430</u> Time placed in test: <u>1500</u> Add 1600 fertilized eggs per 200 ml.. Time glutaraldehyde added: <u>1500</u>
2	10	12	C	22	10	
3	100	13	32	23	32	
4	32	14	10	24	100	
5	18	15	100	25	C	
6	C	16	18	26	18	
7	32	17	C	27	56	
8	56	18	56	28	10	
9	10	19	18	29	32	
10	18	20	56	30	100	
Analyst: <u>me</u> Date: <u>7-21-21</u> Time: <u>8600</u>						

# Test Temperature Chart

Test No: RT-210721

Date Tested: 07/21/21 to 07/23/21

Acceptable Range: 15 +/- 1°C

