

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

**OFFSHORE MONITORING
AND REPORTING PROGRAM**

SEMIANNUAL EFFLUENT SAMPLING

**CHEMICAL AND BIOASSAY
ANALYSIS RESULTS**

JANUARY 2014



Marine Research Specialists

**3140 Telegraph Rd., Suite A
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

SEMIANNUAL EFFLUENT REPORT

CHEMICAL AND BIOASSAY
ANALYSIS RESULTS

JANUARY 2014

Prepared by
Bonnie Luke
Douglas A. Coats

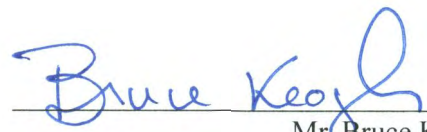
Marine Research Specialists

3140 Telegraph Rd., Suite A
Ventura, California 93003

Telephone: (805) 644-1180
Telefax: (805) 289-3935
E-mail: Marine@Rain.org

January 2014

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. Bruce Keogh
Wastewater Division Manager
City of Morro Bay

Date January 28, 2014

marine research specialists

3140 Telegraph Road, Suite A • Ventura, CA 93003 • (805) 644-1180

Bruce Keogh
Wastewater Division Manager
City of Morro Bay
955 Shasta Avenue
Morro Bay, CA 93442

28 January 2014

Reference: Semiannual Effluent Self-Monitoring Report for January through June 2014

Dear Mr. Keogh:

This self-monitoring report documents the chemical and bioassay analysis results for effluent samples collected in January 2014 as required by NPDES discharge permit CA0047881.¹ Analyses of effluent samples collected on 8 and 24 January 2014 were conducted in accordance with the monitoring requirements specified in the permit, including:

- Chronic bioassays and chemical analyses conducted on composite samples; and
- Nutrient compounds measured in a grab sample.

The three attachments to this report demonstrate that all chemical concentrations and toxicological endpoints were well 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 based on the minimum-level (ML) reporting requirements of the permit, and all units have been converted to those used in the discharge monitoring forms that were submitted under separate cover to the California Division of Water Quality (Attachment B). Attachment C collates the original laboratory reports, including raw data and results, pertinent QA/QC analyses, and chains of custody.

The comprehensive chemical and bioassay analyses of effluent samples collected in January 2014 augment data collected over the past two decades. Together, the 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 2014 samples were typical of wastewater derived from domestic sources, and all concentrations were considerably below the limits specified in the NPDES discharge permit.

Seven chemicals that are monitored on a semiannual basis were detected in the January 2014 effluent. Of those, only four had concentrations high enough to be quantified above their respective MLs. Three of the quantifiable concentrations were associated with commonly occurring metals: copper, lead, and zinc. These metals enter the wastewater collection system through erosion of natural mineral deposits along the central California coast, and through corrosion of household plumbing systems. The concentrations of all three metals were an order of magnitude below levels deemed deleterious to marine organisms.

Cyanide was the only additional chemical detected at a quantifiable level within the January 2014 effluent sample. Although cyanide occurs naturally, it can also form in the treatment process as a byproduct of the disinfection process. It has been detected at low, but quantifiable levels within more than 20% of the effluent samples collected over the past two decades. Nevertheless, cyanide's measured concentration in the January 2014 sample was well below the permit limitation and therefore, not of ecological concern.

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

A chronic bioassay further affirmed the effluent's overall low toxicity. Chronic toxicity tests on the January 2014 composite effluent sample measured its effect on the development of larval red abalone (*Haliotis rufescens*) after exposure to a range of effluent dilutions. Although the larval abalone were highly sensitive to contaminants, adverse effects were not observed in effluent that was seven times more concentrated than that allowed by the discharge permit.

Semi-annual monitoring for the presence of four nutrient constituents within effluent is also required as part of the NPDES permit, although no discharge limits are imposed on their concentrations or mass loading to the marine environment. The nutrient concentrations within the January 2014 effluent grab sample are incorporated within the attachments to this document to satisfy reporting requirements. All the nutrient measurements reported in 2014 will be discussed and compared with other oceanic sources as part of the 2014 annual report.

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

Sincerely,



Bonnie Luke
Program Manager

ATTACHMENT A
MINIMUM LEVEL REPORTING

ATTACHMENT A
Analytical Results for Effluent Samples Collected during January 2014

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	—	0.1	—	— ^e	ND
Urea (as N)	mg/L	Mulvenna & Savid	—	0.01	—	—	0.041 as measured
Ortho-Phosphate (as P)	mg/L	300.0	—	0.1	—	—	0.7 as measured
Dissolved Silica (SiO ₂)	mg/L	200.7	—	0.5	—	—	9. as measured
Objectives for the Protection of Marine Aquatic Life							
Arsenic	mg/L	200.8	0.0007	0.002	0.002	0.67	DNQ 0.0015 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	0.019 as measured
Lead	mg/L	200.8	0.0001	0.001	0.0005	0.27	0.0018 as measured
Mercury	µg/L	245.1	0.024	0.2	0.2	5.29	ND
Nickel	mg/L	200.7	0.0023	0.01	0.02	0.67	DNQ 0.0035 Est. Conc.
Selenium	mg/L	200.8	0.00019	0.002	0.002	2.01	DNQ 0.0014 Est. Conc.
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	0.071 as measured
Cyanide	mg/L	335.4	0.0026	0.005	0.005	0.13	0.094 as measured
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

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: MORRO BAY, CITY OF AND CAYUCOS SANITARY DIS

ADDRESS: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

FACILITY: MORRO BAY/CAYUCOS WWTP

LOCATION: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

ATTN: BRUCE KEOGH

CA0047881	001-S
PERMIT NUMBER	DISCHARGE NUMBER
MONITORING PERIOD	
MM/DD/YYYY	MM/DD/YYYY
01/01/2014	06/30/2014

DMR Mailing ZIP CODE: 93442

MAJOR

(SUBR 03)

DISCHARGE 001/ SEMIANNUALLY

External Outfall

No Discharge ☐

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Nitrogen, nitrate total [as N]	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>NODI (B)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Grab</i>
00620 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	Req. Mon. DAILY MX	mg/L		Twice Per Year	GRAB
Cyanide, total [as CN]	SAMPLE MEASUREMENT	*****	*****	*****	<i>0.094</i>	<i>0.094</i>	<i>0.094</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
00720 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.13 6 MO MED	.54 DAILY MX	1.34 INST MAX	mg/L		Twice Per Year	COMP24
Silica, dissolved [as SiO2]	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>9.</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Grab</i>
00955 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	Req. Mon. DAILY MX	mg/L		Twice Per Year	GRAB
Arsenic, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
00978 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.67 6 MO MED	3.89 DAILY MX	10.3 INST MAX	mg/L		Twice Per Year	COMP24
Selenium, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
00981 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	2.01 6 MO MED	8.04 DAILY MX	20.1 INST MAX	mg/L		Twice Per Year	COMP24
Chromium, hexavalent [as Cr]	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01032 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.27 6 MO MED	1.07 DAILY MX	2.68 INST MAX	mg/L		Twice Per Year	COMP24
Nickel, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>NODI (Q)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01074 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.67 6 MO MED	2.68 DAILY MX	6.7 INST MAX	mg/L		Twice Per Year	COMP24

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	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.	TELEPHONE		DATE
Bruce Keogh Wastewater Division Manager		(805) 772-6272		01/29/2014
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA Code NUMBER MM/DD/YYYY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

AFTER SCREENING PERIOD FOR CHRONIC TOXICITY TESTING, REPORT "NODI(9)" FOR SPECIES NOT TESTED.

Total chromium is reported for hexavalent chromium.

DISCHARGE MONITORING REPORT (DMR)

OMB No. 2040-0004

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: MORRO BAY, CITY OF AND CAYUCOS SANITARY DIS

ADDRESS: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

FACILITY: MORRO BAY/CAYUCOS WWTP

LOCATION: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

CA0047881	001-S
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	
MM/DD/YYYY	MM/DD/YYYY
01/01/2014	06/30/2014

DMR Mailing ZIP CODE: 93442

MAJOR

(SUBR 03)

DISCHARGE 001/ SEMIANNUALLY

External Outfall

No Discharge ☐

ATTN: BRUCE KEOGH

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Silver total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01079 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.07 6 MO MED	.35 DAILY MX	.92 INST MAX	mg/L		Twice Per Year	COMP24
Zinc, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>0.071</i>	<i>0.071</i>	<i>0.071</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01094 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	1.62 6 MO MED	9.66 DAILY MX	25.7 INST MAX	mg/L		Twice Per Year	COMP24
Cadmium, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01113 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.13 6 MO MED	.54 DAILY MX	1.34 INST MAX	mg/L		Twice Per Year	COMP24
Lead, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>0.0018</i>	<i>0.0018</i>	<i>0.0018</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01114 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.27 6 MO MED	1.07 DAILY MX	2.68 INST MAX	mg/L		Twice Per Year	COMP24
Copper, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>0.019</i>	<i>0.019</i>	<i>0.019</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
01119 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	.14 6 MO MED	1.34 DAILY MX	3.75 INST MAX	mg/L		Twice Per Year	COMP24
Phosphate, ortho [as P]	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>0.7</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Grab</i>
04175 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	Req. Mon. DAILY MX	mg/L		Twice Per Year	GRAB
Urea	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>0.041</i>	<i>mg/L</i>	0	<i>Semi-annual</i>	<i>Grab</i>
71800 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	Req. Mon. DAILY MX	mg/L		Twice Per Year	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	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.	TELEPHONE		DATE
Bruce Keogh Wastewater Division Manager		(805) 772-6272		01/29/2014
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA Code NUMBER MM/DD/YYYY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

AFTER SCREENING PERIOD FOR CHRONIC TOXICITY TESTING, REPORT "NODI(9)" FOR SPECIES NOT TESTED.

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: MORRO BAY, CITY OF AND CAYUCOS SANITARY DIS

ADDRESS: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

FACILITY: MORRO BAY/CAYUCOS WWTP

LOCATION: 160 ATASCADERO ROAD
MORRO BAY, CA 93442

ATTN: BRUCE KEOGH

CA0047881

PERMIT NUMBER

001-S

DISCHARGE NUMBER

MONITORING PERIOD

MM/DD/YYYY

01/01/2014

MM/DD/YYYY

06/30/2014

DMR Mailing ZIP CODE: 93442

MAJOR

(SUBR 03)

DISCHARGE 001/ SEMIANNUALLY

External Outfall

No Discharge ☐

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Mercury, total recoverable	SAMPLE MEASUREMENT	*****	*****	*****	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>NODI (B)</i>	<i>µg/L</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
71901 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	5.29 6 MO MED	21.4 DAILY MX	53.5 INST MAX	ug/L		Twice Per Year	COMP24
Static 48Hr Chronic Macrocystis Pyrifera	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>NODI (9)</i>		0		
TTK1D 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	134 DAILY MX	tox chronic		Twice Per Year	COMP24
Static 48Hr Chronic Haliotis Rufescens	SAMPLE MEASUREMENT	*****	*****	*****	*****	*****	<i>17.9</i>	<i>TUc</i>	0	<i>Semi-annual</i>	<i>Comp24</i>
TTK3R 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	*****	134 DAILY MX	tox chronic		Twice Per Year	COMP24

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	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.	TELEPHONE		DATE
Bruce Keogh Wastewater Division Manager		(805) 772-6272		01/29/2014
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA Code NUMBER MM/DD/YYYY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

AFTER SCREENING PERIOD FOR CHRONIC TOXICITY TESTING, REPORT "NODI(9)" FOR SPECIES NOT TESTED.

ATTACHMENT C
LABORATORY REPORTS

Date of Report: 01/20/2014

Doug Coats

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Client Project: [none]
BCL Project: Semi-Annual Eff
BCL Work Order: 1400731
Invoice ID: B164430

Enclosed are the results of analyses for samples received by the laboratory on 1/9/2014. 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; 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.

4100 Atlas Court Bakersfield, CA 93308 (661) 327-4911 FAX (661) 327-1918 www.bclabs.com

Table of Contents

Sample Information

Chain of Custody and Cooler Receipt form.....	3
Laboratory / Client Sample Cross Reference.....	6

Sample Results

1400731-01 - Comp Eff

Water Analysis (General Chemistry).....	7
Metals Analysis.....	8

Quality Control Reports

Water Analysis (General Chemistry)

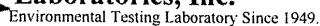
Method Blank Analysis.....	9
Laboratory Control Sample.....	10
Precision and Accuracy.....	11

Metals Analysis

Method Blank Analysis.....	12
Laboratory Control Sample.....	13
Precision and Accuracy.....	14

Notes

Notes and Definitions.....	15
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Chain of Custody Form

Report To: Client: Marine Research Specialists		Project #:		Analysis Requested																									
Attn: Doug Coats		Project Name: MBCSD SemiAnn																											
Street Address: 3140 Telegraph Rd. Suite A		Global ID #:																											
City, State, Zip: Ventura, CA 93003		Sampler(s): SRA																											
Phone: 805-644-1180																													
Email Address: doug.coats@mrsenv.com				Comments: Metals: Silver, Arsenic, Cadmium, Chromium (Total), Copper, Mercury, Nickel, Lead, Selenium and Zinc (EPA 200.7, 200.8, and 245.1)																									
Work Order# 14-00731																													
Sample #				Description				Date Sampled		Time Sampled		Metals (See comments)		Cyanide (EPA 335.3)		Soil		Sludge		Drinking Water		Ground Water		Waste Water		Other		Are there any tests with holding times less than or equal to 48 hours? ☐ Yes ☐ No	
																										Notes			
1				Comp Eff				1/08/14		0910		✓		✓												see comments			

BC Laboratories, Inc. - 4100 Atlas Court Bakersfield, Ca. 93308 661.327-4911 Fax: 661.327-1918

Page 1 of 1

**Analysis Effluent Samples to be collected from the Morro Bay
Wastewater Treatment Plant on Wednesday, January 8, 2014**

14-00731

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

Invoice and Report to be sent to: Dr. Douglas A. Coats (Doug.Coats@mrsenv.com)
Marine Research Specialists
3140 Telegraph Rd., Suite A
Ventura, CA 93003
Telephone: (805) 644-1180

Samples to be collected from: Morro Bay Wastewater Treatment Plant
160 Atascadero Rd.
Morro Bay, CA 93442
Telephone: (805) 772-6272

Chain of Custody and Cooler Receipt Form for 1400731 Page 3 of 3

BC LABORATORIES INC.		COOLER RECEIPT FORM		Rev. No. 15	07/01/13	Page <u>1</u> Of <u>3</u>					
Submission #: <u>14-00731</u>											
SHIPPING INFORMATION Federal Express ☐ UPS ☐ Hand Delivery ☐ BC Lab Field Service ☒ Other ☐ (Specify) _____				SHIPPING CONTAINER Ice Chest ☒ None ☐ Box ☐ Other ☐ (Specify) _____		FREE LIQUID YES ☐ NO ☐					
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: <u>0.95</u> Container: <u>PE</u> Thermometer ID: <u>207</u> Temperature: (A) <u>1.3</u> °C (C) <u>1.4</u> °C		Date/Time: <u>1/14/13</u> 1835 Analyst Init: <u>W</u>							
SAMPLE CONTAINERS		SAMPLE NUMBERS									
		1	2	3	4	5	6	7	8	9	10
QT GENERAL MINERAL/ GENERAL											
PT PE UNPRESERVED											
QT INORGANIC CHEMICAL METALS											
PT INORGANIC CHEMICAL METALS	A										
PT CYANIDE	B										
PT NITROGEN FORMS											
PT TOTAL SULFIDE											
2oz. NITRATE / NITRITE											
PT TOTAL ORGANIC CARBON											
PT TOX											
PT CHEMICAL OXYGEN DEMAND											
PIA PHENOLICS											
40ml VOA VIAL TRAVEL BLANK											
40ml VOA VIAL	()	()	()	()	()	()	()	()	()	()	()
QT EPA 413.1, 413.2, 418.1											
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											
100ml EPA 547											
100ml EPA 531.1											
QT EPA 548											
QT EPA 549											
QT EPA 632											
QT EPA 8015M											
QT AMBER											
8 OZ. JAR											
32 OZ. JAR											
SOIL SLEEVE											
PCB VIAL											
PLASTIC BAG											
FERROUS IRON											
ENCORE											
SMART KIT											
Summa Canister											

Comments: _____
 Sample Numbering Completed By: SAS Date/Time: 1.4.14 1950
 A = Actual / C = Corrected

[S:\MyDOCS\WordPerfect\LAB_DOCS\FORMS\SAMREC15]

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
1400731-01	COC Number:	---	Receive Date:	01/09/2014 18:35
	Project Number:	---	Sampling Date:	01/08/2014 09:10
	Sampling Location:	---	Sample Depth:	---
	Sampling Point:	Comp Eff	Lab Matrix:	Water
	Sampled By:	---	Sample Type:	Wastewater

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

BCL Sample ID:	1400731-01	Client Sample Name:	Comp Eff, 1/8/2014 9:10:00AM					
Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Total Cyanide	0.094	mg/L	0.0050	0.0026	EPA-335.4	ND		1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-335.4	01/13/14	01/14/14 08:08	TDC	KONE-1	1	BXA0673

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

BCL Sample ID: 1400731-01		Client Sample Name: Comp Eff, 1/8/2014 9:10:00AM						
Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Total Mercury	ND	ug/L	0.20	0.024	EPA-245.1	ND		1
Total Recoverable Arsenic	1.5	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	19	ug/L	10	1.2	EPA-200.7	ND		3
Total Recoverable Lead	1.8	ug/L	1.0	0.10	EPA-200.8	ND		2
Total Recoverable Nickel	3.5	ug/L	10	2.3	EPA-200.7	ND	J	3
Total Recoverable Selenium	1.4	ug/L	2.0	0.19	EPA-200.8	ND	J	2
Total Recoverable Silver	ND	ug/L	10	1.3	EPA-200.7	ND		3
Total Recoverable Zinc	71	ug/L	50	1.3	EPA-200.7	2.3		3

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-245.1	01/13/14	01/14/14 13:28	MEV	CETAC1	1	BXA0717
2	EPA-200.8	01/13/14	01/13/14 21:34	SRM	PE-EL2	1	BXA0663
3	EPA-200.7	01/13/14	01/13/14 16:37	JRG	PE-OP2	1	BXA0660

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
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: BXA0673						
Total Cyanide	BXA0673-BLK1	ND	mg/L	0.0050	0.0026	

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

Quality Control Report - Laboratory Control Sample

								<u>Control Limits</u>		
Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Percent Recovery	RPD	Lab Quals
QC Batch ID: BXA0673										
Total Cyanide	BXA0673-BS1	LCS	0.15975	0.15000	mg/L	107		90 - 110		

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Water Analysis (General Chemistry)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: BXA0673		Used client sample: N									
Total Cyanide	DUP	1400749-05	ND	ND		mg/L			10		
	MS	1400749-05	ND	0.11094	0.10000	mg/L		111		90 - 110	Q03
	MSD	1400749-05	ND	0.10597	0.10000	mg/L	4.6	106	10	90 - 110	

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
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: BXA0660						
Total Recoverable Cadmium	BXA0660-BLK1	ND	ug/L	10	1.1	
Total Recoverable Chromium	BXA0660-BLK1	ND	ug/L	10	1.2	
Total Recoverable Copper	BXA0660-BLK1	ND	ug/L	10	1.2	
Total Recoverable Nickel	BXA0660-BLK1	ND	ug/L	10	2.3	
Total Recoverable Silver	BXA0660-BLK1	ND	ug/L	10	1.3	
Total Recoverable Zinc	BXA0660-BLK1	2.3215	ug/L	50	1.3	J
QC Batch ID: BXA0663						
Total Recoverable Arsenic	BXA0663-BLK1	ND	ug/L	2.0	0.70	
Total Recoverable Lead	BXA0663-BLK1	ND	ug/L	1.0	0.10	
Total Recoverable Selenium	BXA0663-BLK1	ND	ug/L	2.0	0.19	
QC Batch ID: BXA0717						
Total Mercury	BXA0717-BLK1	ND	ug/L	0.20	0.024	

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
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: BXA0660										
Total Recoverable Cadmium	BXA0660-BS1	LCS	203.58	200.00	ug/L	102		85 - 115		
Total Recoverable Chromium	BXA0660-BS1	LCS	195.61	200.00	ug/L	97.8		85 - 115		
Total Recoverable Copper	BXA0660-BS1	LCS	372.98	400.00	ug/L	93.2		85 - 115		
Total Recoverable Nickel	BXA0660-BS1	LCS	408.97	400.00	ug/L	102		85 - 115		
Total Recoverable Silver	BXA0660-BS1	LCS	98.254	100.00	ug/L	98.3		85 - 115		
Total Recoverable Zinc	BXA0660-BS1	LCS	530.67	500.00	ug/L	106		85 - 115		
QC Batch ID: BXA0663										
Total Recoverable Arsenic	BXA0663-BS1	LCS	100.65	100.00	ug/L	101		85 - 115		
Total Recoverable Lead	BXA0663-BS1	LCS	102.31	100.00	ug/L	102		85 - 115		
Total Recoverable Selenium	BXA0663-BS1	LCS	98.982	100.00	ug/L	99.0		85 - 115		
QC Batch ID: BXA0717										
Total Mercury	BXA0717-BS1	LCS	1.0150	1.0000	ug/L	102		85 - 115		

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
Project: Semi-Annual Eff
Project Number: [none]
Project Manager: Doug Coats

Metals Analysis

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: BXA0660		Used client sample: N									
Total Recoverable Cadmium	DUP	1400627-01	ND	ND		ug/L			20		
	MS	1400627-01	ND	192.74	200.00	ug/L		96.4		75 - 125	
	MSD	1400627-01	ND	204.03	200.00	ug/L	5.7	102	20	75 - 125	
Total Recoverable Chromium	DUP	1400627-01	ND	ND		ug/L			20		
	MS	1400627-01	ND	185.10	200.00	ug/L		92.6		75 - 125	
	MSD	1400627-01	ND	193.19	200.00	ug/L	4.3	96.6	20	75 - 125	
Total Recoverable Copper	DUP	1400627-01	ND	ND		ug/L			20		
	MS	1400627-01	ND	362.69	400.00	ug/L		90.7		75 - 125	
	MSD	1400627-01	ND	377.91	400.00	ug/L	4.1	94.5	20	75 - 125	
Total Recoverable Nickel	DUP	1400627-01	ND	ND		ug/L			20		
	MS	1400627-01	ND	384.73	400.00	ug/L		96.2		75 - 125	
	MSD	1400627-01	ND	403.69	400.00	ug/L	4.8	101	20	75 - 125	
Total Recoverable Silver	DUP	1400627-01	ND	ND		ug/L			20		
	MS	1400627-01	ND	93.289	100.00	ug/L		93.3		75 - 125	
	MSD	1400627-01	ND	97.233	100.00	ug/L	4.1	97.2	20	75 - 125	
Total Recoverable Zinc	DUP	1400627-01	6.6629	5.5195		ug/L	18.8		20		J
	MS	1400627-01	6.6629	506.33	500.00	ug/L		99.9		75 - 125	
	MSD	1400627-01	6.6629	530.07	500.00	ug/L	4.6	105	20	75 - 125	
QC Batch ID: BXA0663		Used client sample: N									
Total Recoverable Arsenic	DUP	1400658-01	5.9160	5.3410		ug/L	10.2		20		
	MS	1400658-01	5.9160	108.29	100.00	ug/L		102		70 - 130	
	MSD	1400658-01	5.9160	109.45	100.00	ug/L	1.1	104	20	70 - 130	
Total Recoverable Lead	DUP	1400658-01	0.72000	0.66200		ug/L	8.4		20		J
	MS	1400658-01	0.72000	100.97	100.00	ug/L		100		70 - 130	
	MSD	1400658-01	0.72000	105.43	100.00	ug/L	4.3	105	20	70 - 130	
Total Recoverable Selenium	DUP	1400658-01	0.50000	0.34900		ug/L	35.6		20		J,A02
	MS	1400658-01	0.50000	98.209	100.00	ug/L		97.7		70 - 130	
	MSD	1400658-01	0.50000	100.74	100.00	ug/L	2.5	100	20	70 - 130	
QC Batch ID: BXA0717		Used client sample: N									
Total Mercury	DUP	1400749-01	ND	ND		ug/L			20		
	MS	1400749-01	ND	1.0550	1.0000	ug/L		106		70 - 130	
	MSD	1400749-01	ND	1.0100	1.0000	ug/L	4.4	101	20	70 - 130	

Marine Research Specialists
3140 Telegraph Road, Suite A
Suite A
Ventura, CA 93003-3238

Reported: 01/20/2014 12:19
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 at or above the reporting limit
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
A02	The difference between duplicate readings is less than the PQL.
Q03	Matrix spike recovery(s) is(are) not within the control limits.

LABORATORY REPORT



"dedicated to providing quality aquatic toxicity testing"

Date: January 27, 2014

Client: Marine Research Specialists
3140 Telegraph Road, Suite A
Ventura, CA 93003
Attn: Doug Coats

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

Laboratory No.: A-14012404-001
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 records attached.

Date Sampled: 01/24/14 (composite)
Date Received: 01/24/14
Temp. Received: 3.2°C
Chlorine (TRC): 0.0 mg/l
Dates Tested: 01/24/14 to 01/26/14

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-14012404-001
Client/ID: Morro Bay WWTP

Date tested: 01/24/14 - 01/26/14

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-140124 (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)	96.6 %	
Control (Dilution)	96.3 %	
3.2 %	96.5 %	
5.6 %	96.3 %	
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 (96.3 %)
%MSD < 20 % relative to control	PASSED (%MSD = 2.6 %)
Please see RT-140124 report for additional test acceptability criteria.	

Abalone Larval Development Test-Proportion Normal

Start Date: 1/24/2014 14:00 Test ID: 14012404ab Sample ID: Morro Bay
 End Date: 1/26/2014 14:30 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW
 Sample Date: 1/24/2014 08:52 Protocol: WCCCH-EPA-600-R-95-136 Test Species: HR-Haliotis rufescens
 Comments:

Conc-%	1	2	3	4	5
B-Control	0.9626	0.9439	0.9811	0.9727	0.9720
D-Control	0.9619	0.9541	0.9459	0.9813	0.9720
3.2	0.9810	0.9358	0.9720	0.9623	0.9722
5.6	0.9533	0.9810	0.9375	0.9630	0.9813
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

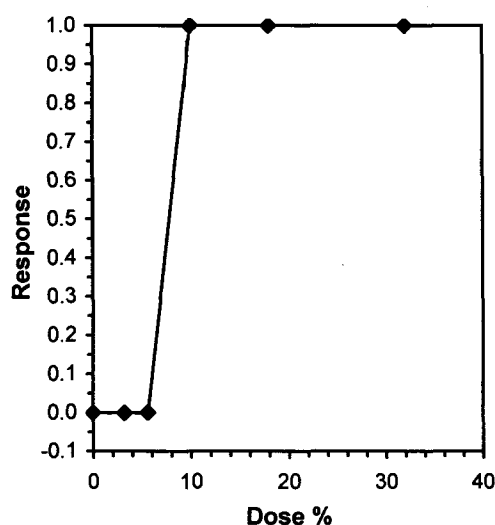
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
B-Control	0.9665	1.0036	1.3897	1.3317	1.4330	2.743	5					
D-Control	0.9631	1.0000	1.3803	1.3362	1.4336	2.798	5	*			0.9637	1.0000
3.2	0.9646	1.0016	1.3856	1.3146	1.4323	3.215	5	-0.187	2.110	0.0597	0.9637	1.0000
5.6	0.9632	1.0002	1.3828	1.3181	1.4336	3.643	5	-0.088	2.110	0.0597	0.9629	0.9992
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 ($p > 0.05$)	0.93424	0.881	-0.2695	-1.0149
Bartlett's Test indicates equal variances ($p = 0.88$)	0.25104	9.21035		
The control means are not significantly different ($p = 0.71$)	0.38508	2.30601		

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	0.02547	0.02642	3.5E-05	0.002	0.98269	2, 12

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	5.8165	0.0267	5.7045	5.8210	-1.3108
IC10	6.0367	0.0253	5.9305	6.0410	-1.3108
IC15	6.2569	0.0239	6.1566	6.2609	-1.3108
IC20	6.4771	0.0225	6.3827	6.4809	-1.3108
IC25	6.6973	0.0211	6.6088	6.7008	-1.3108
IC40	7.3578	0.0169	7.2870	7.3607	-1.3108
IC50	7.7982	0.0141	7.7392	7.8005	-1.3108



ABALONE CHRONIC BIOASSAY



Lab No.: A-14012404-001

Client ID: MRS - Morro Bay Effluent

Start Date: 01/24/2014

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)	15.4	8.0	8.1	34	15.4	8.1	15.2	7.7	8.1	34
Control (lab)	15.3	8.1	8.1	34	15.3	8.1	15.3	7.6	8.1	34
3.2%	15.4	8.1	8.2	34	15.2	8.1	15.2	7.6	8.1	34
5.6%	15.3	8.0	8.2	34	15.1	8.1	15.0	7.6	8.1	34
10%	15.4	8.1	8.2	34	15.1	8.1	15.0	7.5	8.1	34
18%	15.4	8.0	8.2	34	15.1	8.2	14.9	7.6	8.1	34
32%	15.5	7.9	8.2	34	15.2	8.2	15.2	7.6	8.2	34

Sample as received: Chlorine: 0 mg/l; pH: 8.2; Salinity: 0 ppt; Temp: 3.2 °C; DO: 7.1 mg/l.

Initial readings: [Signature] Date/Time: 1-24-14 1400 Final readings: [Signature] Date/Time: 1-26-14 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	10	0	100	13	10	104	5	25	10	0	100
2	CB	103	4	14	10	0	100	26	CB	107	3
3	5.6	102	5	15	CB	104	2	27	3.2	0	100
4	10	101	4	16	3.2	104	3	28	3.2	102	4
5	3.2	0	100	17	10	0	100	29	10	0	100
6	3.2	103	2	18	3.2	0	100	30	3.2	105	3
7	18	0	100	19	10	105	4	31	CB	104	3
8	CB	101	6	20	5.6	105	7	32	3.2	0	100
9	3.2	0	100	21	18	0	100	33	18	0	100
10	3.2	102	7	22	5.6	104	4	34	5.6	105	2
11	18	0	100	23	18	0	100	35	10	104	3
12	5.6	103	2	24	10	105	2				

Microscopic examination:

Analyst: [Signature]

Date: 1-27-14

Time: 0900



ABALONE CHRONIC BIOASSAY

Lab No.: A-14012404-001

Client ID: MRS - Morro Bay Effluent

Start Date: 01/24/2014

RANDOMIZATION WORKSHEET

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

Analyst:  Date: 1-24-14 Time: 1200



CHAIN OF CUSTODY

CHAIN OF CUSTODY

Client: City of Morro Bay

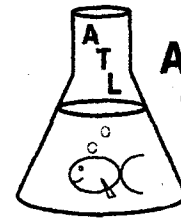
Address: Wastewater Treatment Plant
160 Atascadero Road
Morro Bay, CA 93442

Project Manager: Doug Coats - MRS

Phone: (805) 644-1180

Fax: (805) 289-3935

Purchase Order No:



**Aquatic
Testing
Laboratories**

**4350 Transport 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. Eff.	24 Jan 14	0852	E	.02	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)	Seals Intact? (Yes, No, NA)	Temperature Received (°C)
<i>Steve R. Adkins</i>	<i>[Signature]</i>	24 Jan 14	0900	NA	—
<i>[Signature]</i>	<i>[Signature]</i>	1-24-14	11:50	NA	3.2



REFERENCE TOXICANT DATA

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



QA/QC Batch No.: RT-140124

Date tested: 01/24/14 - 01/26/14

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	95.6%
10 µg/l	95.4%
18 µg/l	95.4%
32 µg/l	5.8% *
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	21.7 µg/l

QA/QC TEST ACCEPTABILITY

Parameter	Result
Average control normality ≥80%	Yes (95.6%)
56 µg/l treatment response significantly less than control response	Yes (NOEC = 18 µg/l)
%MSD <20% relative to control	Yes (%MSD = 3.8%)

Abalone Larval Development Test-Proportion Normal

Start Date: 1/24/2014 14:00 Test ID: RT140124ab Sample ID: REF-Ref Toxicant
 End Date: 1/26/2014 14:30 Lab ID: CAATL-Aquatic Testing Labs Sample Type: ZNSO-Zinc sulfate
 Sample Date: 1/24/2014 Protocol: WCCH-EPA-600-R-95-136 Test Species: HR-Haliotis rufescens
 Comments:

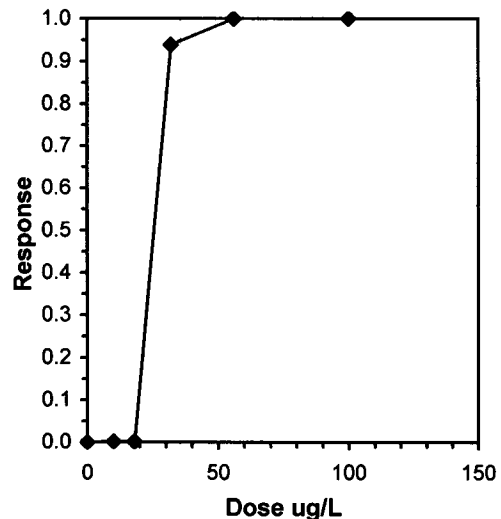
Conc-ug/L	1	2	3	4	5
D-Control	0.9352	0.9810	0.9714	0.9369	0.9537
10	0.9806	0.9369	0.9352	0.9714	0.9450
18	0.9455	0.9364	0.9528	0.9815	0.9528
32	0.0561	0.1028	0.0288	0.0734	0.0286
56	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
D-Control	0.9556	1.0000	1.3635	1.3134	1.4323	3.831	5				0.9553	1.0000
10	0.9538	0.9981	1.3592	1.3134	1.4310	3.931	5	0.122	2.230	0.0779	0.9535	0.9981
18	0.9538	0.9981	1.3578	1.3158	1.4343	3.335	5	0.164	2.230	0.0779	0.9535	0.9981
*32	0.0579	0.0606	0.2361	0.1698	0.3264	28.649	5	32.269	2.230	0.0779	0.0583	0.0610
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)					0.91462	0.905	0.44399	-1.167
Bartlett's Test indicates equal variances (p = 0.89)					0.6225	11.3449		
Hypothesis Test (1-tail, 0.05)					NOEC	LOEC	ChV	TU
Dunnett's Test					18	32	24	
Treatments vs D-Control					0.0368	0.03843	1.57957	0.00305
								3.9E-16
								3, 16

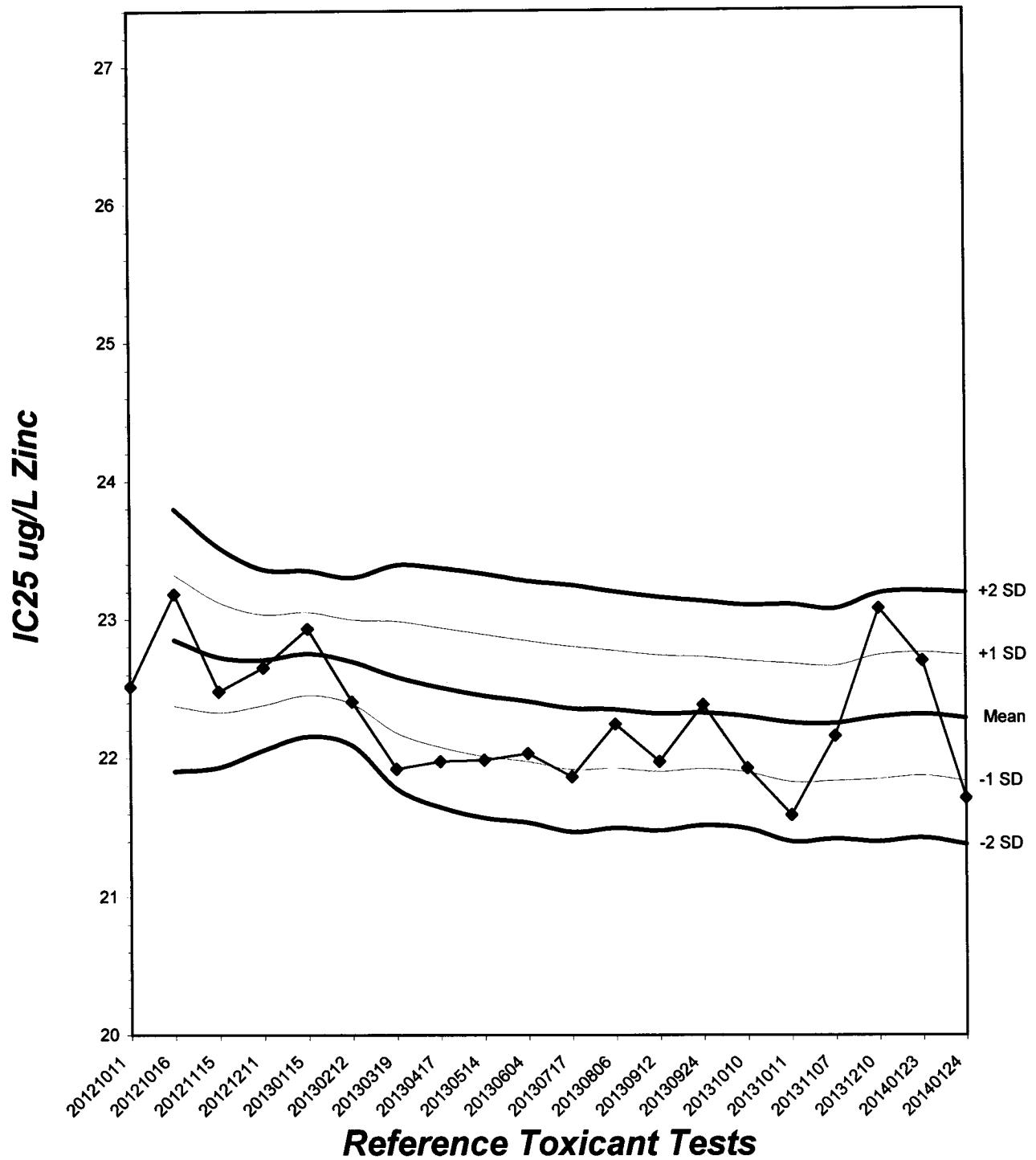
Linear Interpolation (200 Resamples)

Point	ug/L	SD	95% CL(Exp)		Skew
IC05	18.719	0.117	18.151	18.777	-0.8924
IC10	19.466	0.112	18.929	19.541	-0.8488
IC15	20.213	0.108	19.726	20.305	-0.7765
IC20	20.960	0.106	20.485	21.068	-0.6748
IC25	21.707	0.104	21.274	21.834	-0.5484
IC40	23.948	0.109	23.508	24.164	-0.1308
IC50	25.442	0.119	25.033	25.747	0.0782



Abalone Larval Development Laboratory Control Chart

CV% = 2.04



ABALONE CHRONIC BIOASSAY
Reference Toxicant - Zinc Sulfate



QA/QC No.: RT-140124

Start Date: 01/24/2014

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	15.4	8.0	8.0	34	15.7	8.1	15.6	7.6	8.1	34
10 µg/l Zn	15.3	8.1	8.1	34	15.8	8.1	15.4	7.6	8.1	34
18 µg/l Zn	15.3	8.1	8.1	34	15.4	8.1	15.7	7.6	8.1	34
32 µg/l Zn	15.3	8.2	8.1	34	15.6	8.1	15.5	7.4	8.1	34
56 µg/l Zn	15.3	8.2	8.1	34	15.4	8.1	15.6	7.4	8.1	34
100 µg/l Zn	15.4	8.2	8.1	34	15.7	8.1	15.5	7.5	8.1	34

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

Initial readings: Date/Time: 1-24-14 1420 Final readings: Date/Time: 1-24-14 1430

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	10	101	2	11	32	11	96	21	32	8	101
2	56	0	100	12	18	103	7	22	1	104	7
3	1	101	7	13	10	101	7	23	18	106	2
4	18	104	6	14	100	0	100	24	56	0	100
5	100	0	100	15	10	102	3	25	1	103	5
6	1	103	2	16	56	0	100	26	32	3	102
7	100	0	100	17	18	101	5	27	10	103	6
8	32	6	101	18	32	3	101	28	100	0	100
9	10	104	7	19	1	102	3	29	56	0	100
10	56	0	100	20	100	0	100	30	18	101	5

Microscopic examination: Analyst: Date: 1-27-14 Time: 0900

ABALONE CHRONIC BIOASSAY
Reference Toxicant - Zinc Sulfate



QA/QC No.: RT-140124

Start Date: 01/24/2014

RANDOMIZATION WORKSHEET

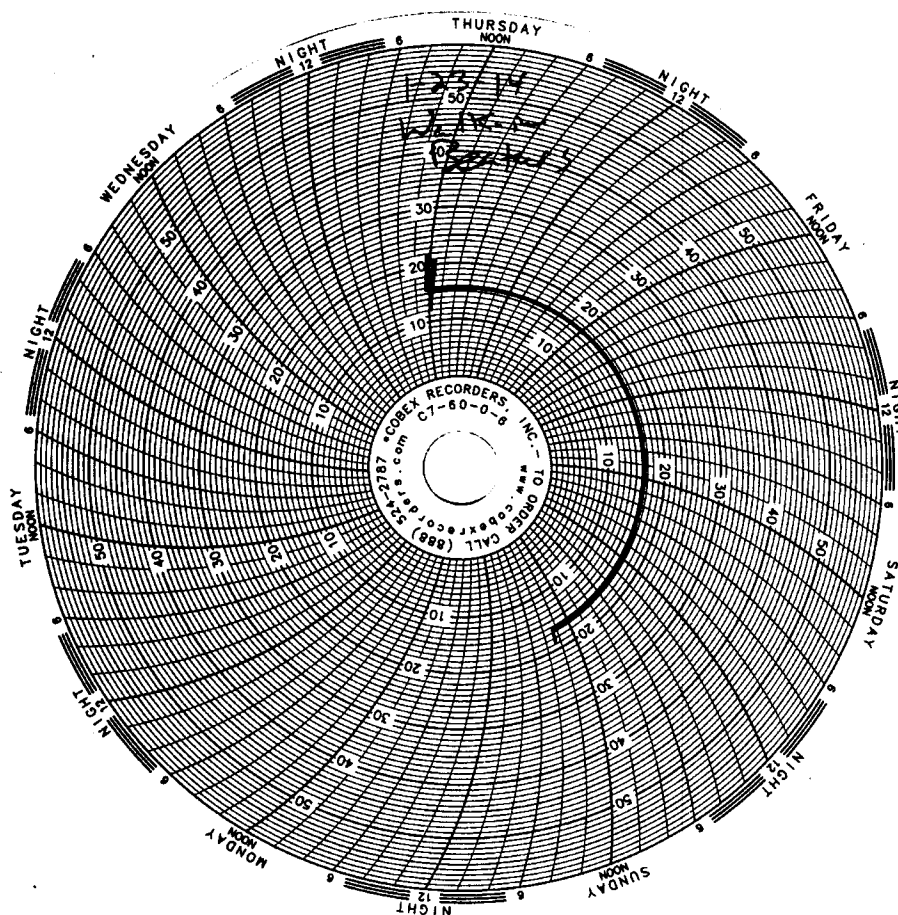
Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Beaker No.	Sample Conc.	Notes
1	10	11	32	21	32	Number Males used: <u>4</u> Number females used: <u>4</u> Time H ₂ O ₂ added: <u>10:00</u> Time water changed: <u>12:30</u> Time spawned: <u>♂ 1330 ♀ 1345</u> Time placed in test: <u>1400</u> Add 1600 fertilized eggs per 200 ml.. Time glutaraldehyde added: <u>1430</u>
2	56	12	18	22	C	
3	C	13	10	23	18	
4	18	14	100	24	56	
5	100	15	10	25	C	
6	C	16	56	26	32	
7	100	17	18	27	10	
8	32	18	32	28	10	
9	10	19	C	29	56	
10	56	20	100	30	18	
Analyst: <u>[Signature]</u> Date: <u>1-24-13</u> Time: <u>1000</u>						

Test Temperature Chart

Test No: RT-140124

Date Tested: 01/24/14 to 01/26/14

Acceptable Range: 15 +/- 1°C



Dr. Doug Coats/Bonnie Luke
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Page 1 of 1

Monday, January 27, 2014

Lab Number: AB10217

Collection Date/Time: 1/8/2014 9:30 Sample Collector: ASCHENBRENER S
Submittal Date/Time: 1/9/2014 11:00 Sample ID: MBCSD SEMI ANN

Sample Description: Grab Eff A.R.S. E1-E3

Analyte	Method	Unit	Result	Qual	PQL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	Not Detected		1	1/10/2014	DC
Nitrate as NO3-N	EPA300.0	mg/L	Not Detected		0.1	1/10/2014	DC
o-Phosphate-P	EPA300.0	mg/L	0.7		0.1	1/10/2014	DC
Silica as SiO2, Dissolved	EPA200.7	mg/L	9		0.5	1/14/2014	HC
Urea-N	Mulvenna&Savid	ug/L	41		10	1/23/2014	MW

Sample Comments:

Report Approved by:

David Holland
Laboratory Director

Monterey Bay Analytical Services

QC Summary for Urea Analyses

Batch ID 20140123

Spiked Sample ID	Sample	Spiked	MS	MSD	MS-MSD	MS-MSD	LCS	LCSD	LCS-LCSD	LCS-LCSD	Acceptance Criteria %			
	ug/L	ug/L	ug/L	ug/L	% RPD	% Rec	ug/L	ug/L	% RPD	% Rec	MS/MSD	RPD	LCS/LCSD	RPD
10297	54	100	154	149	3.30	98.38	90	96	6.5%	93.0	80-120	20	85-115	20
10314	18	100	117	120	2.53	100.42			#DIV/0!	#DIV/0!	80-120	20	85-115	20
10481	94	100	175	170	2.90	88.92	96	96	0.0%	96.0	80-120	20	85-115	20

Second Source	Value	Result	% Rec	Acceptance Criteria %
	ug/L	ug/L		Second Source
Absolute #051509	47	46	97.872	85-115

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

QC SUMMARY EPA 300

10-Jan-14

		NO3-N	PO4-P
		2	2
1	IPC	2.02	1.80
% Recovery	90%-110%	101.00	90.00
2	CCV	2.02	1.78
% Recovery	90%-110%	101.00	89.00
RPD	10%	0.00	1.10

LFM check:		NO3-N	PO4-P
	AB10181	0.69	0.00
	AB10181+LFM	2.69	1.41
	AB10181+LFMD	2.70	1.46
average:		2.70	1.44
% Recovery:	80%-120%	100.25	77.00
% Difference	< 10%	1.40	3.40
LFM recovery low but data reported because of acceptable IPC and CCV recoveries			

Batch # 20140114

Analyte/		IC	Prep	LCS	%Rec	LCSD	%Rec	%Diff	IC Verification			QCS Average (95-105%)		
WL	Range	Blank	Blank	Value	85-115%	Value	85-115%		Value	Result	%Rec	Value	Result	%Rec
Si 251.611	0.5-200ppm	-0.19	-0.27	52.67	105.3%	53.72	107.4%	2.0%	50	50.03	100.1%	107	107.3	100.3%

Sample ID AB10181

Analyte/	Sample	MS	%Rec	MSD	%Rec	%Diff	CCV (90-110%)			%Diff	CC
WL	Value	Value	70-130%	Value	70-130%		Value	Result	%Rec	10%	Blank
Si 251.611	50.0	102.0	104.0%	102.3	104.5%	0.2%	50	53.6	107.1%	6.8%	-0.28