Ventura Countywide Stormwater Quality Management Program

2019-2020 Permit Year

Ventura Countywide Stormwater Quality Management Program Annual Report

Attachment D Monitoring Appendices H - L

Camarillo
County of Ventura
Fillmore
Moorpark
Ojai
Oxnard
Port Hueneme
Santa Paula
Simi Valley
Thousand Oaks
Ventura
Ventura County Watershed Protection District

December 15, 2020

Appendix H. RWQCB Permission of Toxicity Species Substitution

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Linda S. Adams
Agency Secretary

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

October 28, 2009

Ms. Norma Camacho, Director
Ventura County Watershed Protection District
800 South Victoria Ave., L#1600
Ventura, CA 93009-1600

Certified Mail
Return Receipt Requested
Claim No. 7009 0820 0001 6811 7509

SUBJECT: TOXICITY TEST SPECIES SUBSTITUTION, VENTURA COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE (MS4) PERMIT (BOARD ORDER No. 09-0057; NPDES No. CAS004002)

Dear Ms. Camacho:

On October 14, 2009, the Regional Board staff received a request from the Ventura County Watershed Protection District (County) to substitute topsmelt, *Atherinops affinis*, with the inland silverside, *Menidia beryllina*, due to the unavailability of topsmelt from the supplier. After consultation with US EPA staff, Regional Board staff denied the request. On October 15, 2009, the Regional Board received an e-mail from the County, titled "Notification of toxicity exception - (species unavailable) Ventura County MS4 NPDES Permit Order No. 09-0057 (Monitoring Program)". The County's e-mail communication was submitted pursuant to requirements in subparts D.5 and D.8(b) of the Ventura County MS4 Permit's Monitoring Program (Monitoring Program), which requires an explanation of the circumstance with documentation when toxicity tests cannot be performed to comply with the requirements of this permit, and written authorization from the Regional Board Executive Officer to substitute test species.

In order to evaluate the appropriateness of substituting topsmelt, *Atherinops affinis*, with the inland silverside, *Menidia beryllina*, in toxicity testing at mass emissions stations in the future, the Regional Board requires the County to conduct comparative static renewal toxicity tests on both species as follows. During the next storm event of this permit year (2009-10) and the first storm event of next permit year (2010-11), the County shall conduct toxicity tests on both topsmelt, *Atherinops affinis*, and the inland silverside, *Menidia beryllina*, along with giant kelp, *Macrocystis pyrifera*, and the purple sea urchin, *Strongylocentrotus purpuratus*, pursuant to subpart D.8(a) of the Monitoring Program. The County shall submit the results of the comparative toxicity tests as part of its reporting requirements.

In the event that topsmelt, *Atherinops affinis*, is unavailable for testing during future sampling events conducted under the Monitoring Program, the County shall follow the protocol set forth in subpart D.5 of the Monitoring Program. The County shall notify the Regional Board by phone and e-mail as soon as possible if a test species is unavailable. Notification shall be sent directly to me as well as Tracy Woods, Stormwater Permitting Unit, with a copy to Renee Purdy, Chief, Regional Programs Section. The County shall submit to the Regional Board documentation of species unavailability from both the County's contract lab and the contract lab's supplier at least 48 hours prior to the planned sampling event to provide adequate time for my staff to evaluate any request for species substitution. Any approval or denial of a request for species substitution must be authorized pursuant to subpart D.8(b) of the Monitoring Program.

If you have any questions, please contact me at (213) 576-6605, or Renee Purdy at (213) 576-6783.

Sincerely,

Tracy J. Egoscue,
Executive Officer

cc: Mr. Bruce Fujimoto, Division of Water Quality, State Water Resources Control Board
Mr. Gerhardt Hubner, Ventura County Watershed Protection District
Mr. Arne Anselm, Ventura County Watershed Protection District

Appendix I. Aquatic Toxicity Testing Lab Results

aquatic bioassay & consulting laboratories, inc

Toxicity Report for Ventura County Watershed Protection District

2019/20 (WET-1)

PROJECT:	2019/20-1 (Wet)
PO:	NA
CLIENT:	Ms. Kelly Hahs
	VCWPD
	800 South Victoria Avenue, L#1670
	Ventura, CA 93003-1670
SAMPLE I.D.:	MO-OXN, MO-HUE, ME-CC, MO-VEN, ME-VR2, MO-OJA, MO-MEI, MO-FIL, MO-SPA, ME-SCR, MO-THO, MO-MPK, MO-SIM, MO-CAM
DATE RECEIVED:	11/27/2019
DATE REPORTED:	12/18/2019
ABC LAB NO.:	VCF1119.274-.287

29 North Olive Street Ventura, California 93001 (805) 643-5621

INTRODUCTION

Toxicity tests using fathead *(P. promelas)*, Ceriodaphnia *(C. dubia)*, green algae *(S.capricornutum)*, Topsmelt *(A.affinis)*, and purple urchin (S.purpuratus) were performed to evaluate the quality of stormwater samples for Ventura County Watershed Protection District. The samples were collected on November 27, 2019 and delivered the same day. Testing was conducted at Aquatic Bioassay and Consulting Labs, Inc. in Ventura California from November 27th, through December 4th, 2019.

MATERIALS AND METHODS

Test Material

Test material consisted of 14 grab samples collected by Ventura County Watershed Protection District (VCWPD) receiving water and major outfall sites. Sample collection was performed by VCWPD personnel and consultants under the direction of Ms. Kelly Hahs. The samples were collected in 5-gallon low-density polyethylene buckets and delivered to Aquatic Bioassay Labs after sampling. Sample temperature was recorded upon acceptance at Aquatic Bioassay Laboratories and is included in the report for each station.

Samples were stored at 4°C. Upon arrival at Aquatic Bioassay, an aliquot of each sample was drawn and water quality parameters of pH, dissolved oxygen (DO), conductivity, temperature, salinity, alkalinity, and hardness were measured and recorded.

Bioassay Testing

The study was performed in accordance with the United States Environmental Protection Agency (USEPA) protocols:

Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, October 2002, US EPA-821-R-02-013.

Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, US EPA/600/R-95/136 (1995).

Summary of results for 100% sample concentration:

Sample ID	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
MO-OXN	Chronic Fathead	Survival (%)	100	93.3	No	Pass	6.67
		Biomass (mg)	0.459	0.4383	No	Pass	4.50
MO-HUE	Chronic Fathead	Survival (%)	100	95.0	No	Pass	5.00
		Biomass (mg)	0.4587	0.4712	No	Pass	-2.73
MO-MEI	Chronic Fathead	Survival (%)	100	96.67	No	Pass	3.33
		Biomass (mg)	0.4587	0.3850	No	Pass	16.06
MO-SPA	Chronic Fathead	Survival (%)	100	100	No	Pass	0.0
		Biomass (mg)	0.4587	0.4237	No	Pass	7.63
MO-CAM	Chronic Fathead	Survival (%)	100	100	No	Pass	0.0
		Biomass (mg)	0.4587	0.4753	No	Pass	-3.63
MO-HUE	Chronic Ceriodaphnia	Survival (%)	100	80	No	Pass	20
		Reproduction #-Neonates	23	16.5	No	Pass	28.26
MO-VEN	Chronic Ceriodaphnia	Survival (%)	100	90	No	Pass	10
		Reproduction #-Neonates	31.6	28.1	No	Pass	11.08
MO-FIL	Chronic Ceriodaphnia	Survival (%)	100	100	No	Pass	0.0
		Reproduction #-Neonates	27.7	30	No	Pass	-8.3
MO-THO	Chronic Ceriodaphnia	Survival (%)	90	90	No	Pass	0.0
		Reproduction #-Neonates	24.1	31	No	Pass	-28.63

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.

Summary of results for 100% sample concentration: (Cont.)

Sample ID	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
MO-SIM	Chronic Ceriodaphnia	Survival (%)	90	100	No	Pass	-11.11
		Reproduction #-Neonates	24.1	33.6	No	Pass	-39.42
MO-MPK	Selenastrum	Cell Density	1.440e+6	1.707e+6	No	Pass	-16.59
ME-CC	Chronic Topsmelt	Survival (%)	100	100	No	Pass	0.0
		Biomass (mg)	1.648	1.693	No	Pass	-2.69
ME-VR2	Chronic Topsmelt	Survival (%)	100	96	No	Pass	4.0
		Biomass (mg)	1.630	1.605	No	Pass	1.57
ME-SCR	Chronic Urchin	Fertilization (%)	93	93	No	Pass	0.0

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.

Quality Assurance

All samples were received in good condition at the appropriate temperatures, and all tests were initiated within 72 hours of sample collection. The natural seawater controls met the minimum test acceptability criterion of 80 percent mean survival. Variability among replicates was minimal, and the ability to detect a statistical difference was deemed appropriate.

Survival counts were recorded daily to ensure tests were progressing as expected. Counts were conducted daily on the control replicates. The temperatures in samples were within the recommended range for the entire test duration.

Reference Toxicant Test

A concurrent reference toxicant test using copper chloride was conducted to assess the health of the test organisms. Mean control survival met the test acceptability criterion. The median lethal concentration (LC50) calculated for this test was within two standard deviations of the internal control chart mean, indicating test organism sensitivity was typical. Reference toxicant test results are summarized in the report.

Results and Discussion

Mean survival and statistical differences from control for the tests, error bars, results summaries including individual replicate data, statistical summaries, and raw datasheets are located in in the appendix. Appropriate chain-of-custody (COC) procedures were followed during all phases of this study, and copies of the COC forms are provided in the appendix.

Data Analysis and Reporting

The response observed in this test includes survival of the test organism. Two statistical methods were employed to determine whether there was an effect between the control and test sample: 1) A standard t-test approach following the statistical analysis decision tree in EPA 2002; and 2) A more recent EPA-recommended Test of Significant Toxicity (TST) approach (EPA 2010).

References:

United States Environmental Protection Agency, 1995. Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.

United States Environmental Protection Agency, 2002. Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/821/R-02-014.

United States Environmental Protection Agency, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA/821/R-02/012.

United States Environmental Protection Agency, 2010. National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document. Office of Wastewater Management. EPA 833-R-10-003.

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-OXN
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.274

CHRONIC FATHEAD MINNOW SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
BIOMASS	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas		
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN		
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
00-7161-0384	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	6.52%	1
18-0943-3758	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	19.4%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
08-5961-1292	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	83.33	50	n/a	1.2	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
09-5377-3829	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
00-7161-0384	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
08-5961-1292	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
09-5377-3829	Mean Dry Biomass-mg	Control Resp	0.459	0.25	>>	Yes	Passes Criteria
18-0943-3758	Mean Dry Biomass-mg	Control Resp	0.459	0.25	>>	Yes	Passes Criteria
18-0943-3758	Mean Dry Biomass-mg	PMSD	0.194	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
12.5		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
25		4	0.9667	0.9054	1.0000	0.9333	1.0000	0.0193	0.0385	3.98%	3.33%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
100		4	0.9333	0.8108	1.0000	0.8667	1.0000	0.0385	0.0770	8.25%	6.67%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.459	0.3777	0.5403	0.3933	0.5067	0.02555	0.0511	11.13%	0.00%
6.25		4	0.4895	0.3595	0.6195	0.396	0.586	0.04085	0.0817	16.69%	-6.64%
12.5		4	0.5018	0.4448	0.5589	0.4587	0.544	0.01792	0.03585	7.14%	-9.33%
25		4	0.4878	0.4251	0.5505	0.4367	0.5327	0.0197	0.03941	8.08%	-6.28%
50		4	0.4905	0.4076	0.5734	0.4453	0.5533	0.02606	0.05212	10.63%	-6.86%
100		4	0.4383	0.3749	0.5017	0.3893	0.4787	0.01992	0.03984	9.09%	4.50%

Analyst: Lyn QA: Pass

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	0.9333	1.0000	1.0000
25		0.9333	1.0000	0.9333	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	0.8667	0.8667	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4913	0.3933	0.4447	0.5067
6.25		0.5193	0.396	0.586	0.4567
12.5		0.5127	0.544	0.492	0.4587
25		0.5327	0.4887	0.4367	0.4933
50		0.4453	0.5133	0.5533	0.45
100		0.424	0.4613	0.3893	0.4787

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	14/15	15/15	15/15
12.5		15/15	14/15	15/15	15/15
25		14/15	15/15	14/15	15/15
50		15/15	15/15	15/15	15/15
100		15/15	13/15	13/15	15/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-7161-0384	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	6.52%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	16	10	1	6	CDF	0.6105	Non-Significant Effect
		12.5	16	10	1	6	CDF	0.6105	Non-Significant Effect
		25	14	10	1	6	CDF	0.3451	Non-Significant Effect
		50	18	10	1	6	CDF	0.8333	Non-Significant Effect
		100	14	10	1	6	CDF	0.3451	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0427498	0.00855	5	1.493	0.2410	Non-Significant Effect
Error	0.103058	0.0057254	18			
Total	0.145808		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	23.09	4.248	3.0E-07	Unequal Variances
	Mod Levene Equality of Variance Test	5.916	4.248	0.0021	Unequal Variances
Distribution	Anderson-Darling A2 Normality Test	1.04	3.878	0.0100	Non-Normal Distribution
	D'Agostino Kurtosis Test	0.032	2.576	0.9745	Normal Distribution
	D'Agostino Skewness Test	0.6054	2.576	0.5449	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.3676	9.21	0.8321	Normal Distribution
	Kolmogorov-Smirnov D Test	0.25	0.2056	4.5E-04	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.9176	0.884	0.0518	Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000		1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	0.9833	0.9303	1.0000		0.9333	1.0000	0.0167	3.39%	1.67%
12.5		4	0.9833	0.9303	1.0000		0.9333	1.0000	0.0167	3.39%	1.67%
25		4	0.9667	0.9054	1.0000		0.9333	1.0000	0.0192	3.98%	3.33%
50		4	1.0000	1.0000	1.0000		1.0000	1.0000	0.0000	0.00%	0.00%
100		4	0.9333	0.8108	1.0000		0.8667	1.0000	0.0385	8.25%	6.67%

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-7161-0384	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442		1.441	1.441	0	0.00%	0.00%
6.25		4	1.408	1.304	1.513		1.31	1.441	0.03292	4.68%	2.28%
12.5		4	1.408	1.304	1.513		1.31	1.441	0.03292	4.68%	2.28%
25		4	1.375	1.254	1.496		1.31	1.441	0.03802	5.53%	4.57%
50		4	1.441	1.441	1.442		1.441	1.441	0	0.00%	0.00%
100		4	1.319	1.095	1.544		1.197	1.441	0.07053	10.69%	8.48%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	0.9333	1.0000	1.0000
25		0.9333	1.0000	0.9333	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	0.8667	0.8667	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
6.25		1.441	1.31	1.441	1.441
12.5		1.441	1.31	1.441	1.441
25		1.31	1.441	1.31	1.441
50		1.441	1.441	1.441	1.441
100		1.441	1.197	1.197	1.441

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-0943-3758	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	19.40%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	-0.8243	2.407	0.089	6	CDF	0.9726	Non-Significant Effect
	12.5	-1.158	2.407	0.089	6	CDF	0.9888	Non-Significant Effect
	25	-0.7793	2.407	0.089	6	CDF	0.9692	Non-Significant Effect
	50	-0.8514	2.407	0.089	6	CDF	0.9744	Non-Significant Effect
	100	0.5586	2.407	0.089	6	CDF	0.6218	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.459	0.25	>>	Yes	Passes Criteria
PMSD	0.194	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01155	0.00231	5	0.8437	0.5364	Non-Significant Effect
Error	0.049284	0.002738	18			
Total	0.060834		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	2.742	15.09	0.7396	Equal Variances
	Levene Equality of Variance Test	1.4	4.248	0.2711	Equal Variances
	Mod Levene Equality of Variance Test	1.307	4.248	0.3050	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2842	3.878	0.6602	Normal Distribution
	D'Agostino Kurtosis Test	0.4494	2.576	0.6531	Normal Distribution
	D'Agostino Skewness Test	0.06656	2.576	0.9469	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.2064	9.21	0.9019	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1058	0.2056	0.7306	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9806	0.884	0.9075	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.459	0.3777	0.5403		0.3933	0.5067	0.02555	11.13%	0.00%
6.25		4	0.4895	0.3595	0.6195		0.396	0.586	0.04085	16.69%	-6.64%
12.5		4	0.5018	0.4448	0.5589		0.4587	0.544	0.01792	7.14%	-9.33%
25		4	0.4878	0.4251	0.5505		0.4367	0.5327	0.0197	8.08%	-6.28%
50		4	0.4905	0.4076	0.5734		0.4453	0.5533	0.02606	10.63%	-6.86%
100		4	0.4383	0.3749	0.5017		0.3893	0.4787	0.01992	9.09%	4.50%

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-0943-3758	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4913	0.3933	0.4447	0.5067
6.25		0.5193	0.396	0.586	0.4567
12.5		0.5127	0.544	0.492	0.4587
25		0.5327	0.4887	0.4367	0.4933
50		0.4453	0.5133	0.5533	0.45
100		0.424	0.4613	0.3893	0.4787

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-5961-1292	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	83.33	50	n/a	1.2	n/a	2
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
6.25		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9833	1.67%
12.5		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9833	1.67%
25		4	0.9667	0.9333	1.0000	0.0385	3.98%	3.33%	58/60	0.9833	1.67%
50		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.9833	1.67%
100		4	0.9333	0.8667	1.0000	0.0770	8.25%	6.67%	56/60	0.9333	6.67%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	0.9333	1.0000	1.0000
25		0.9333	1.0000	0.9333	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	0.8667	0.8667	1.0000

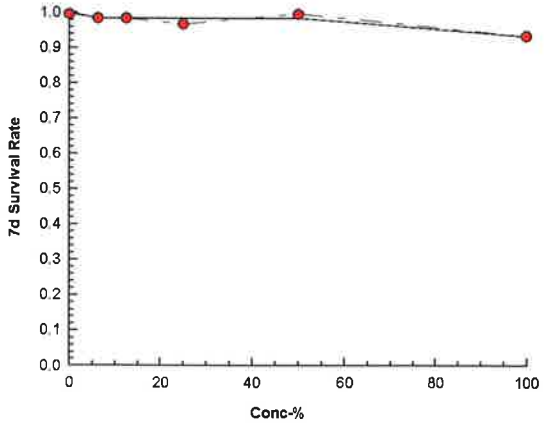
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	14/15	15/15	15/15
12.5		15/15	14/15	15/15	15/15
25		14/15	15/15	14/15	15/15
50		15/15	15/15	15/15	15/15
100		15/15	13/15	13/15	15/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-5961-1292	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-5377-3829	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.459	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	0.459	0.3933	0.5067	0.0511	11.13%	0.0%	0.4857	0.0%
6.25		4	0.4895	0.396	0.586	0.0817	16.69%	-6.65%	0.4857	0.0%
12.5		4	0.5018	0.4587	0.544	0.03585	7.14%	-9.33%	0.4857	0.0%
25		4	0.4878	0.4367	0.5327	0.03941	8.08%	-6.28%	0.4857	0.0%
50		4	0.4905	0.4453	0.5533	0.05212	10.63%	-6.86%	0.4857	0.0%
100		4	0.4383	0.3893	0.4787	0.03984	9.09%	4.5%	0.4383	9.76%

Mean Dry Biomass-mg Detail

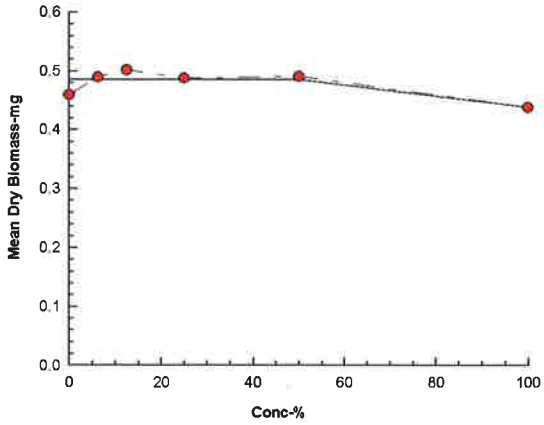
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4913	0.3933	0.4447	0.5067
6.25		0.5193	0.396	0.586	0.4567
12.5		0.5127	0.544	0.492	0.4587
25		0.5327	0.4887	0.4367	0.4933
50		0.4453	0.5133	0.5533	0.45
100		0.424	0.4613	0.3893	0.4787

Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-5377-3829	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 10:36	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-0535-8434	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Joe Freas		
Start Date:	27 Nov-19 15:18	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 14:50	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	00-9901-9562	**Code:**	VCF1119.274fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-OXN
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	16	16	16	16	16	0	0	0.0%	0
Overall		16	38	25.89	50.11	16	60	5.68	22.72	59.79%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	321.8	318.2	325.3	318	329	1.521	4.301	1.34%	0
12.5		8	305.5	302.5	308.5	302	314	1.282	3.625	1.19%	0
25		8	273.5	272.3	274.7	272	276	0.5	1.414	0.52%	0
50		8	209.9	208.1	211.6	207	213	0.7425	2.1	1.0%	0
100		8	76.62	73.44	79.81	72	84	1.349	3.815	4.98%	0
Overall		48	254.8	228.3	281.3	72	360	13.17	91.24	35.80%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.7	7.384	8.016	7	8.2	0.1336	0.378	4.91%	0
12.5		8	7.563	7.191	7.934	6.8	8.1	0.1569	0.4438	5.87%	0
25		8	7.363	6.717	8.008	6.1	8	0.2732	0.7726	10.49%	0
50		8	7.2	6.307	8.093	5.3	8.2	0.3775	1.068	14.83%	0
100		8	6.85	5.606	8.094	4.2	9.2	0.5261	1.488	21.72%	0
Overall		48	7.413	7.16	7.665	4.2	9.2	0.1256	0.8705	11.74%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	23	23	23	23	23	0	0	0.0%	0
Overall		16	59.25	39.3	79.2	23	96	9.36	37.44	63.19%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.675	7.543	7.807	7.5	8	0.0559	0.1581	2.06%	0
12.5		8	7.637	7.529	7.746	7.5	7.9	0.04605	0.1302	1.71%	0
25		8	7.587	7.474	7.701	7.4	7.8	0.04795	0.1356	1.79%	0
50		8	7.475	7.335	7.615	7.2	7.7	0.05901	0.1669	2.23%	0
100		8	7.263	7.108	7.417	7	7.5	0.06529	0.1847	2.54%	0
Overall		48	7.573	7.501	7.645	7	8.3	0.0357	0.2473	3.27%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
6.25		8	24.15	23.99	24.31	24	24.5	0.06813	0.1927	0.8%	0
12.5		8	24.24	24.07	24.4	24	24.5	0.07054	0.1995	0.82%	0
25		8	24.24	24.08	24.39	24	24.6	0.06528	0.1846	0.76%	0
50		8	24.2	24.07	24.33	24	24.4	0.05669	0.1603	0.66%	0
100		8	24.24	24.08	24.4	24	24.5	0.06797	0.1922	0.79%	0
Overall		48	24.18	24.12	24.23	24	24.6	0.02634	0.1825	0.75%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				16					
0	N	2		60					
100				16					
0	N	3		60					
100				16					
0	N	4		60					
100				16					
0	N	5		60					
100				16					
0	N	6		60					
100				16					
0	N	7		60					
100				16					
0	N	8		60					
100				16					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				318					
12.5				306					
25				273					
50				209					
100				72					
0	N	2		332					
6.25				318					
12.5				304					
25				276					
50				207					
100				75					
0	N	3		331					
6.25				320					
12.5				302					
25				274					
50				207					
100				73					
0	N	4		339					
6.25				321					
12.5				304					
25				273					
50				210					
100				75					
0	N	5		335					
6.25				320					
12.5				304					
25				273					
50				211					
100				78					
0	N	6		330					
6.25				320					
12.5				305					
25				272					
50				211					
100				77					
0	N	7		360					
6.25				328					
12.5				305					
25				272					
50				211					
100				79					
0	N	8		360					
6.25				329					
12.5				314					
25				275					
50				213					
100				84					

Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.7					
12.5				7.7					
25				7.9					
50				8.2					
100				9.2					
0	N	2		8					
6.25				7.7					
12.5				7.8					
25				7.8					
50				7.8					
100				7.4					
0	N	3		7.3					
6.25				7.7					
12.5				7.6					
25				7.6					
50				7.4					
100				7.5					
0	N	4		7.7					
6.25				8.1					
12.5				7.9					
25				7.9					
50				7.8					
100				6.5					
0	N	5		7.6					
6.25				8.2					
12.5				8.1					
25				8					
50				8					
100				7.8					
0	N	6		7.9					
6.25				7.8					
12.5				7.6					
25				7.4					
50				7.3					
100				6.3					
0	N	7		7.7					
6.25				7.4					
12.5				7					
25				6.2					
50				5.8					
100				5.9					
0	N	8		8.3					
6.25				7					
12.5				6.8					
25				6.1					
50				5.3					
100				4.2					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				23					
0	N	2		96					
100				23					
0	N	3		96					
100				23					
0	N	4		96					
100				23					
0	N	5		95					
100				23					
0	N	6		95					
100				23					
0	N	7		95					
100				23					
0	N	8		95					
100				23					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.5					
100				7.3					
0	N	2		7.7					
6.25				7.6					
12.5				7.7					
25				7.6					
50				7.6					
100				7.3					
0	N	3		7.5					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.4					
100				7.3					
0	N	4		7.6					
6.25				7.7					
12.5				7.6					
25				7.6					
50				7.5					
100				7.1					
0	N	5		7.8					
6.25				7.8					
12.5				7.7					
25				7.7					
50				7.6					
100				7.5					
0	N	6		7.5					
6.25				7.5					
12.5				7.5					
25				7.4					
50				7.2					
100				7					
0	N	7		8.3					
6.25				8					
12.5				7.9					
25				7.8					
50				7.7					
100				7.5					
0	N	8		7.8					
6.25				7.6					
12.5				7.5					
25				7.4					
50				7.3					
100				7.1					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.5					
12.5				24.5					
25				24.6					
50				24.4					
100				24.5					
0	N	2		24					
6.25				24					
12.5				24.4					
25				24.1					
50				24					
100				24					
0	N	3		24					
6.25				24.1					
12.5				24.2					
25				24.2					
50				24.1					
100				24.2					
0	N	4		24					
6.25				24.1					
12.5				24.1					
25				24.2					
50				24.2					
100				24.3					
0	N	5		24					
6.25				24					
12.5				24.1					
25				24.2					
50				24.3					
100				24.2					
0	N	6		24					
6.25				24.4					
12.5				24.5					
25				24.4					
50				24.4					
100				24.5					
0	N	7		24					
6.25				24.1					
12.5				24.1					
25				24.2					
50				24.2					
100				24.2					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

CHEMICAL ANALYSIS DATA SHEET

VCF 1

Start Date: 11/27/19 1518

Lab # : VCF 1 19. 274

End Date: 12/4/19 1450

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1		11/29 2		11/30 3		12/1 4		12/2 5		12/3 6		12/4 7
Initials	TD	TD	1007	1200	[illegible]	1105	[illegible]	1015	[illegible]	TD	1034	TD	1125	[illegible]
DISSOLVED OXYGEN (mg/L)														
Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.7	7.2	7.7	6.7	7.7	8.2	8.1	8.2	8.2	7.2	7.8	6.8	7.4	7.0
12.5%	7.7	7.2	7.8	6.7	7.6	8.3	7.9	8.3	8.1	7.2	7.6	6.5	7.0	6.8
25%	7.9	7.3	7.6	6.5	7.6	8.1	7.9	8.3	8.0	7.2	7.4	5.5	6.2	6.1
50%	8.2	7.4	7.6	6.4	7.4	7.9	7.8	8.2	8.0	7.1	7.3	5.5	5.8	5.3
100%	9.2	7.4	7.4	6.4	7.5	7.4	7.65	8.0	7.8	7.1	6.3	4.4	5.9	4.2
TEMPERATURE (°C)														
Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.5	24.0	24.0	24.0	24.1	24.0	24.1	24.0	24.0	24.0	24.4	24.0	24.1	24.0
12.5%	24.5	24.0	24.4	24.0	24.2	24.0	24.1	24.0	24.1	24.0	24.5	24.0	24.1	24.0
25%	24.6	24.0	24.1	24.0	24.2	24.0	24.2	24.0	24.2	24.0	24.4	24.0	24.2	24.0
50%	24.4	24.0	24.0	24.0	24.1	24.0	24.2	24.0	24.3	24.0	24.4	24.0	24.2	24.0
100%	24.5	24.0	24.0	24.0	24.2	24.0	24.3	24.0	24.2	24.0	24.5	24.0	24.2	24.0
pH														
Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
6.25%	7.6	7.8	7.6	7.8	7.6	7.9	7.7	7.6	7.8	7.8	7.5	8.2	8.0	7.6
12.5%	7.6	7.7	7.7	7.7	7.6	7.8	7.6	7.7	7.7	7.7	7.5	7.8	7.9	7.5
25%	7.6	7.6	7.6	7.7	7.6	7.8	7.6	7.7	7.7	7.7	7.4	7.7	7.8	7.4
50%	7.5	7.5	7.6	7.5	7.4	7.8	7.5	7.7	7.6	7.7	7.2	7.6	7.4	7.3
100%	7.3	7.4	7.3	7.5	7.3	7.6	7.1	7.7	7.5	7.7	7.0	7.4	7.5	7.1

	0	1	2	3	4	5	6	7
CONDUCTIVITY (uS/cm)								
Control	347	332	331	339	335	330	360	360
6.25%	318	314	320	321	320	320	328	329
12.5%	306	304	302	304	304	305	305	314
25%	273	276	274	273	273	272	272	275
50%	209	207	207	210	211	211	211	213
100%	72	75	73	75	78	77	79	84
ALKALINITY								
Control	60	60	60	60	60	60	60	60
100%	16	16	16	16	16	16	16	16
HARDNESS								
Control	96	96	96	96	95	95	95	95
100%	23	23	23	23	23	23	23	23

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

ppt

Aquatic Bioassay Consulting Laboratories, Inc. QC: [signature]

Chronic juvenile Fathead minnow (*Pimephales promelas*) toxicity test - Survival

Aquatic Bioassay & Consulting Laboratories, Inc

Company: VCF 1 Lab #: VCF 11 19. 274

Sample I.D.:

Date & Time Start: 11/27/19 1510 Date & Time End: 12/4/19 1450

Conc.	Rep.#	INITIAL	1 TD	2	3	4	5 TD	6 TD	FINAL TD
CONTROL	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
6.25%	1	15	15	15	15	15	15	15	15
	2	15	14	14	14	14	14	14	14
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
12.5%	1	15	15	15	15	15	15	15	15
	2	15	15	15	(V) 14 15	15	15	15	14
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
25%	1	15	14	14	14 (V)	14	14	14	14
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	14	14
	4	15	15	15	15	15	15	15	15
50%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
100%	1	15	15	15	15	15	15	15	15
	2	15	15	15	14	14	14	13	13
	3	15	15	15	15	15	TD ~~15~~ 14	13	13
	4	15	15	15	15	15	15	15	15

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
XB 1	CONTROL	1		1.13098	1.13835	0.00737	
2		2		1.13684	1.14274	0.00590	
3		3		1.14121	1.14788	0.00667	
4		4		1.13984	1.13944	0.00760	
XB 5	6.25%	1		1.14052	1.14831	0.00779	
6		2		1.14138	1.14732	0.00594	
7		3		1.14690	1.15569	0.00879	
8		4		1.14483	1.15168	0.00685	
XB 9	12.5%	1		1.14425	1.15194	0.00769	
10		2		1.14497	1.15313	0.00816	
11		3		1.14734	1.15472	0.00738	
12		4		1.13329	1.14017	0.00688	
XB 13	25%	1		1.14709	1.15508	0.00799	
14		2		1.13434	1.14167	0.00733	
15		3		1.12647	1.13302	0.00655	
16		4		1.13957	1.14697	0.00740	
XB 17	50%	1		1.13154	1.13822	0.00668	
18		2		1.13734	1.14504	0.00770	
19		3		1.13898	1.14728	0.00830	
20		4		1.12747	1.13422	0.00675	
XB 21	100%	1		1.14241	1.14877	0.00636	
22		2		1.13385	1.14077	0.00692	
23		3		1.14139	1.14723	0.00584	
24		4		1.15586	1.16304	0.00718	

QC:

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-OJA
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.279

CHRONIC FATHEAD MINNOW SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
BIOMASS	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA		
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
20-0475-3675	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	3.04%	1
14-0426-3597	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	16.1%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
11-8363-0111	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	100	80	n/a	1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
05-2235-8213	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
11-8363-0111	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
20-0475-3675	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
05-2235-8213	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
14-0426-3597	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
14-0426-3597	Mean Dry Biomass-mg	PMSD	0.1611	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
100		4	0.9500	0.8970	1.0000	0.9333	1.0000	0.0167	0.0333	3.51%	5.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.3827	0.4967	0.02576	0.05151	11.23%	0.00%
6.25		4	0.507	0.4536	0.5604	0.4887	0.5573	0.01679	0.03358	6.62%	-10.54%
12.5		4	0.5113	0.4833	0.5393	0.4967	0.5367	0.008794	0.01759	3.44%	-11.48%
25		4	0.4805	0.4379	0.5231	0.446	0.5073	0.0134	0.02679	5.58%	-4.76%
50		4	0.5077	0.4357	0.5796	0.4647	0.5627	0.0226	0.0452	8.90%	-10.68%
100		4	0.4712	0.365	0.5773	0.384	0.542	0.03335	0.06671	14.16%	-2.73%

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test
Aquatic Bioassay & Consulting Labs, Inc.

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		0.9333	1.0000	0.9333	0.9333

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5573	0.4887	0.492	0.49
12.5		0.5367	0.4967	0.5087	0.5033
25		0.446	0.4947	0.5073	0.474
50		0.5627	0.4773	0.4647	0.526
100		0.384	0.462	0.4967	0.542

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	15/15	15/15
50		15/15	15/15	15/15	15/15
100		14/15	15/15	14/15	14/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0475-3675	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:25	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	3.04%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		12.5	18	10	1	6	CDF	0.8333	Non-Significant Effect
		25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		50	18	10	1	6	CDF	0.8333	Non-Significant Effect
		100	12	10	1	6	CDF	0.1424	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03252	0.006504	5	9	2.0E-04	Significant Effect
Error	0.013008	0.0007227	18			
Total	0.045528		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	9	4.248	2.0E-04	Unequal Variances
	Mod Levene Equality of Variance Test	1	4.248	0.4457	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	6.297	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Kurtosis Test	4.325	2.576	1.5E-05	Non-Normal Distribution
	D'Agostino Skewness Test	4.595	2.576	4.3E-06	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	39.82	9.21	<1.0E-37	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.4583	0.2056	1.0E-14	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.4634	0.884	2.5E-08	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		4	0.9500	0.8970	1.0000	0.9333	0.9333	1.0000	0.0167	3.51%	5.00%

Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 20-0475-3675 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.5
Analyzed: 16 Dec-19 16:25 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
6.25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
12.5		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
50		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
100		4	1.343	1.238	1.447	1.31	1.31	1.441	0.03292	4.90%	6.85%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		0.9333	1.0000	0.9333	0.9333

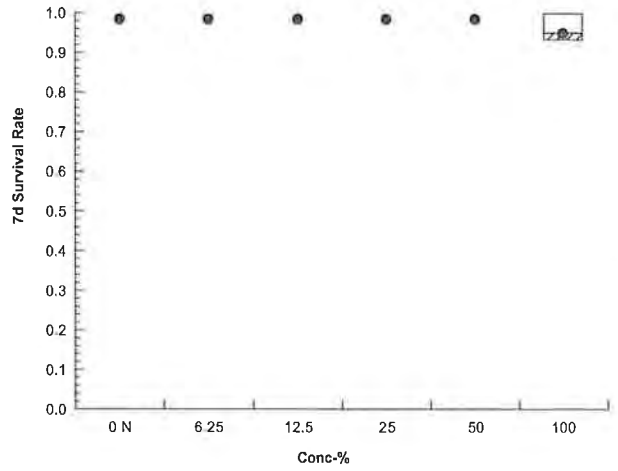
Angular (Corrected) Transformed Detail

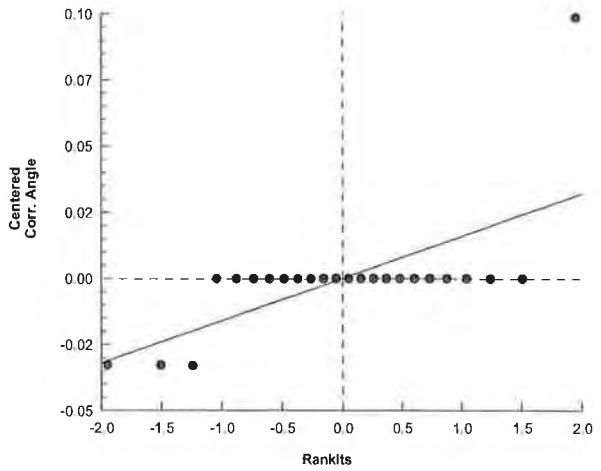
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
6.25		1.441	1.441	1.441	1.441
12.5		1.441	1.441	1.441	1.441
25		1.441	1.441	1.441	1.441
50		1.441	1.441	1.441	1.441
100		1.31	1.441	1.31	1.31

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	15/15	15/15
50		15/15	15/15	15/15	15/15
100		14/15	15/15	14/15	14/15

Graphics





Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-0426-3597	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:26	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	16.11%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	-1.575	2.407	0.074	6	CDF	0.9967	Non-Significant Effect
	12.5	-1.716	2.407	0.074	6	CDF	0.9979	Non-Significant Effect
	25	-0.7114	2.407	0.074	6	CDF	0.9635	Non-Significant Effect
	50	-1.597	2.407	0.074	6	CDF	0.9969	Non-Significant Effect
	100	-0.4073	2.407	0.074	6	CDF	0.9257	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
PMSD	0.1611	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0099228	0.0019846	5	1.054	0.4176	Non-Significant Effect
Error	0.0339047	0.0018836	18			
Total	0.0438275		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	5.313	15.09	0.3789	Equal Variances
	Levene Equality of Variance Test	1.425	4.248	0.2629	Equal Variances
	Mod Levene Equality of Variance Test	0.8726	4.248	0.5187	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.3088	3.878	0.5862	Normal Distribution
	D'Agostino Kurtosis Test	0.5092	2.576	0.6106	Normal Distribution
	D'Agostino Skewness Test	0.9073	2.576	0.3642	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	1.083	9.21	0.5820	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1082	0.2056	0.6883	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9726	0.884	0.7310	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.4777	0.3827	0.4967	0.02576	11.23%	0.00%
6.25		4	0.507	0.4536	0.5604	0.491	0.4887	0.5573	0.01679	6.62%	-10.54%
12.5		4	0.5113	0.4833	0.5393	0.506	0.4967	0.5367	0.008794	3.44%	-11.48%
25		4	0.4805	0.4379	0.5231	0.4843	0.446	0.5073	0.0134	5.58%	-4.76%
50		4	0.5077	0.4357	0.5796	0.5017	0.4647	0.5627	0.0226	8.90%	-10.68%
100		4	0.4712	0.365	0.5773	0.4793	0.384	0.542	0.03335	14.16%	-2.73%

Analyst: _____ QA: _____

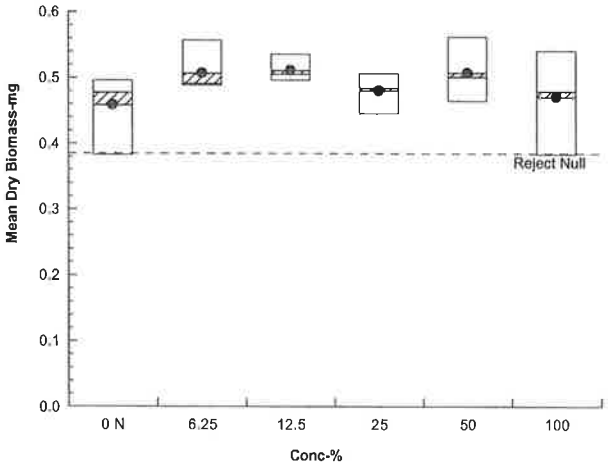
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

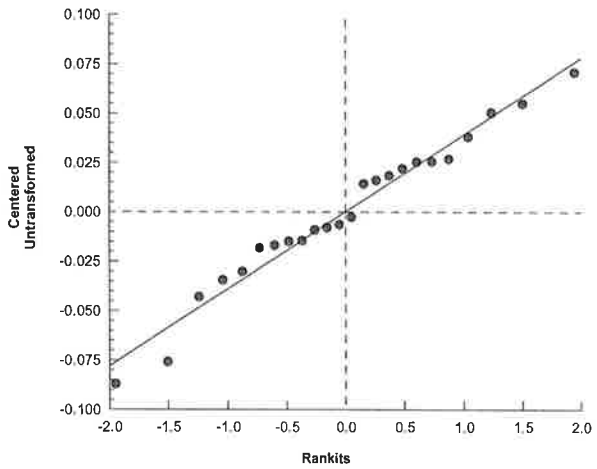
Analysis ID:	14-0426-3597	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:26	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5573	0.4887	0.492	0.49
12.5		0.5367	0.4967	0.5087	0.5033
25		0.446	0.4947	0.5073	0.474
50		0.5627	0.4773	0.4647	0.526
100		0.384	0.462	0.4967	0.542

Graphics





Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-8363-0111	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:25	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	100	80	n/a	1	n/a	1.25
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
6.25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
12.5		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
50		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
100		4	0.9500	0.9333	1.0000	0.0333	3.51%	5.0%	57/60	0.95	5.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		0.9333	1.0000	0.9333	0.9333

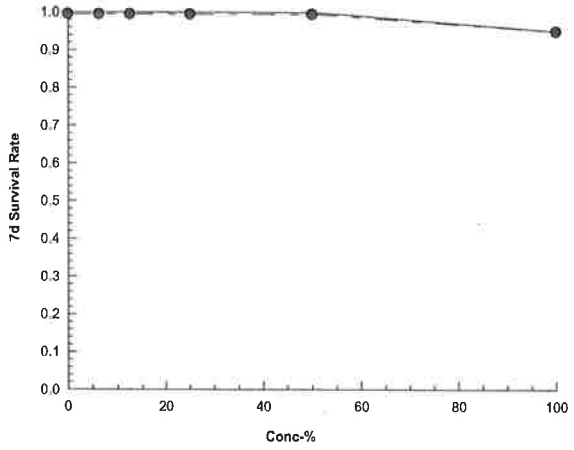
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	15/15	15/15
50		15/15	15/15	15/15	15/15
100		14/15	15/15	14/15	14/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-8363-0111	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:25	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-2235-8213	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:25	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	902727	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	0.4587	0.3827	0.4967	0.05151	11.23%	0.0%	0.493	0.0%
6.25		4	0.507	0.4887	0.5573	0.03358	6.62%	-10.54%	0.493	0.0%
12.5		4	0.5113	0.4967	0.5367	0.01759	3.44%	-11.48%	0.493	0.0%
25		4	0.4805	0.446	0.5073	0.02679	5.58%	-4.76%	0.493	0.0%
50		4	0.5077	0.4647	0.5627	0.0452	8.90%	-10.68%	0.493	0.0%
100		4	0.4712	0.384	0.542	0.06671	14.16%	-2.73%	0.4712	4.44%

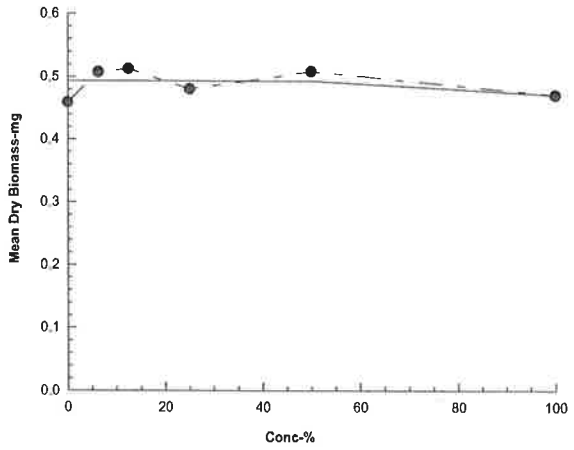
Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5573	0.4887	0.492	0.49
12.5		0.5367	0.4967	0.5087	0.5033
25		0.446	0.4947	0.5073	0.474
50		0.5627	0.4773	0.4647	0.526
100		0.384	0.462	0.4967	0.542

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-2235-8213	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:25	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-4160-1990	**Test Type:**	Growth-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 15:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable	
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	18-6873-8261	**Code:**	VCF1119.279fml	**Project:**	2019/20-1 (Wet)	
Sample Date:	27 Nov-19 07:00	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-OJA	
Sample Age:	8h (8.8 °C)	**Client:**	VCWPD			

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	33	33	33	33	33	0	0	0.0%	0
Overall		16	46.5	39.07	53.93	33	60	3.486	13.94	29.98%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	317	315.3	318.7	315	320	0.7071	2	0.63%	0
12.5		8	312.6	310.6	314.7	308	317	0.8647	2.446	0.78%	0
25		8	294.1	288.1	300.2	291	312	2.567	7.259	2.47%	0
50		8	249.4	248.3	250.5	247	251	0.4605	1.302	0.52%	0
100		8	158.1	154.5	161.8	152	164	1.552	4.39	2.78%	0
Overall		48	278.8	260.9	296.8	152	360	8.92	61.8	22.16%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.688	7.429	7.946	7.3	8.1	0.1093	0.3091	4.02%	0
12.5		8	7.538	7.189	7.886	6.8	8	0.1475	0.4173	5.54%	0
25		8	7.263	6.736	7.789	6.5	7.9	0.2228	0.6301	8.68%	0
50		8	6.838	5.962	7.713	5.2	7.9	0.3703	1.047	15.32%	0
100		8	6.038	4.641	7.434	4.4	8.8	0.5907	1.671	27.67%	0
Overall		48	7.194	6.894	7.494	4.4	8.8	0.149	1.032	14.35%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	35	35	35	35	35	0	0	0.0%	0
Overall		16	65.25	48.6	81.9	35	96	7.811	31.24	47.88%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.425	7.309	7.541	7.2	7.6	0.0491	0.1389	1.87%	0
12.5		8	7.5	7.391	7.609	7.3	7.7	0.04629	0.1309	1.75%	0
25		8	7.463	7.363	7.562	7.3	7.6	0.04199	0.1188	1.59%	0
50		8	7.425	7.309	7.541	7.2	7.6	0.0491	0.1389	1.87%	0
100		8	7.175	6.94	7.41	6.7	7.4	0.09955	0.2816	3.92%	0
Overall		48	7.465	7.388	7.541	6.7	8.3	0.03819	0.2646	3.54%	0 (0%)

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
6.25		8	24.18	24.02	24.33	24	24.5	0.06747	0.1908	0.79%	0
12.5		8	24.22	24.03	24.42	24	24.6	0.08399	0.2376	0.98%	0
25		8	24.15	24.02	24.28	24	24.4	0.05345	0.1512	0.63%	0
50		8	24.12	23.93	24.32	24	24.5	0.08183	0.2315	0.96%	0
100		8	24.22	24.05	24.4	24	24.5	0.07258	0.2053	0.85%	0
Overall		48	24.15	24.09	24.21	24	24.6	0.02793	0.1935	0.80%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				33					
0	N	2		60					
100				33					
0	N	3		60					
100				33					
0	N	4		60					
100				33					
0	N	5		60					
100				33					
0	N	6		60					
100				33					
0	N	7		60					
100				33					
0	N	8		60					
100				33					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				317					
12.5				313					
25				312					
50				249					
100				153					
0	N	2		332					
6.25				320					
12.5				313					
25				291					
50				247					
100				152					
0	N	3		331					
6.25				316					
12.5				312					
25				291					
50				248					
100				156					
0	N	4		339					
6.25				320					
12.5				313					
25				292					
50				250					
100				157					
0	N	5		335					
6.25				315					
12.5				312					
25				291					
50				250					
100				159					
0	N	6		330					
6.25				316					
12.5				308					
25				292					
50				250					
100				162					
0	N	7		360					
6.25				317					
12.5				313					
25				291					
50				250					
100				162					
0	N	8		360					
6.25				315					
12.5				317					
25				293					
50				251					
100				164					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				8					
12.5				7.8					
25				7.8					
50				7.9					
100				8.8					
0	N	2		8					
6.25				7.5					
12.5				7.6					
25				7.4					
50				6.8					
100				4.5					
0	N	3		7.3					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.6					
100				7.2					
0	N	4		7.7					
6.25				8.1					
12.5				8					
25				7.9					
50				7.8					
100				7					
0	N	5		7.6					
6.25				8					
12.5				8					
25				7.9					
50				7.6					
100				7					
0	N	6		7.9					
6.25				7.7					
12.5				7.3					
25				6.6					
50				5.8					
100				4.5					
0	N	7		7.7					
6.25				7.4					
12.5				7.2					
25				6.5					
50				6					
100				4.9					
0	N	8		8.3					
6.25				7.3					
12.5				6.8					
25				6.5					
50				5.2					
100				4.4					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				35					
0	N	2		96					
100				35					
0	N	3		96					
100				35					
0	N	4		96					
100				35					
0	N	5		95					
100				35					
0	N	6		95					
100				35					
0	N	7		95					
100				35					
0	N	8		95					
100				35					

Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.4					
0	N	2		7.7					
6.25				7.5					
12.5				7.5					
25				7.4					
50				7.3					
100				6.7					
0	N	3		7.5					
6.25				7.2					
12.5				7.4					
25				7.5					
50				7.5					
100				7.4					
0	N	4		7.6					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.5					
100				7.3					
0	N	5		7.8					
6.25				7.5					
12.5				7.6					
25				7.6					
50				7.5					
100				7.3					
0	N	6		7.5					
6.25				7.3					
12.5				7.3					
25				7.3					
50				7.2					
100				6.8					
0	N	7		8.3					
6.25				7.6					
12.5				7.7					
25				7.6					
50				7.6					
100				7.4					
0	N	8		7.8					
6.25				7.3					
12.5				7.4					
25				7.3					
50				7.3					
100				7.1					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.4					
12.5				24.3					
25				24.2					
50				24.5					
100				24.4					
0	N	2		24					
6.25				24.2					
12.5				24.5					
25				24.2					
50				24					
100				24					
0	N	3		24					
6.25				24.2					
12.5				24.3					
25				24.3					
50				24					
100				24.4					
0	N	4		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24.2					
0	N	5		24					
6.25				24					
12.5				24					
25				24.1					
50				24					
100				24.3					
0	N	6		24					
6.25				24.5					
12.5				24.6					
25				24.4					
50				24.5					
100				24.5					
0	N	7		24					
6.25				24.1					
12.5				24.1					
25				24					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

CHEMICAL ANALYSIS DATA SHEET

VCF 2

Start Date: 11/27/19 1520

End Date: 12/4/19 1500

Lab # : VCF 11 19.279

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	1030	1245	1120	1020	TD 1046	TD 1136	

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	8.0	6.9	7.5	6.7	7.5	8.1	8.1	8.1	8.0	7.2	7.7	7.3	7.4	7.3
12.5%	7.8	7.0	7.6	6.7	7.6	8.1	8.0	8.2	8.0	7.1	7.3	6.9	7.2	6.8
25%	7.8	7.1	7.4	6.8	7.5	8.0	7.9	7.9	7.9	7.1	6.6	6.0	6.5	6.5
50%	7.9	7.0	6.8	6.4	7.6	7.3	7.8	7.4	7.6	7.1	5.8	5.4	6.0	5.2
100%	8.8	7.0	4.5	5.1	3.9/7.2	7.2	3.1/7.0	6.7	7.0	7.2	4.5	4.5	4.9	4.4

TEMPERATURE (°C)

Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.4	24.0	24.2	24.2	24.2	24.0	24.0	24.0	24.0	24.0	24.5	24.0	24.1	24.0
12.5%	24.3	24.0	24.8	24.3	24.3	24.0	24.0	24.0	24.0	24.0	24.6	24.0	24.1	24.0
25%	24.2	24.0	24.2	24.2	24.3	24.0	24.0	24.0	24.1	24.0	24.4	24.0	24.0	24.0
50%	24.5	24.0	24.0	24.0	24.4	24.0	24.0	24.0	24.2	24.0	24.5	24.0	24.0	24.0
100%	24.4	24.0	24.0	24.0	24.4	24.0	24.2	24.0	24.3	24.0	24.5	24.0	24.0	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
6.25%	7.5	7.8	7.5	7.5	7.2	7.6	7.5	7.5	7.5	7.7	7.3	7.6	7.6	7.3
12.5%	7.5	7.7	7.5	7.4	7.4	7.7	7.6	7.6	7.6	7.5	7.3	7.6	7.7	7.4
25%	7.5	7.6	7.4	7.4	7.5	7.7	7.5	7.6	7.6	7.5	7.3	7.5	7.6	7.3
50%	7.5	7.5	7.3	7.2	7.5	7.6	7.5	7.5	7.5	7.5	7.2	7.4	7.6	7.3
100%	7.4	7.4	6.7	7.1	7.4	7.6	7.3	7.4	7.3	7.5	6.9	7.3	7.4	7.1

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	360	360
6.25%	317	320	316	320	315	316	317	315
12.5%	313	313	312	313	312	308	313	317
25%	312	291	291	292	291	292	291	293
50%	249	247	248	250	250	250	250	251
100%	153	152	156	157	159	162	162	164

ALKALINITY

Control	60	60	60	60	60	60	60	60
100%	33	33	33	33	33	33	33	33

HARDNESS

Control	96	96	96	96	95	95	95	95
100%	35	35	35	35	35	35	35	35

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

0 ppt

QC: Jm PASS

Chronic juvenile Fathead minnow (*Pimephales promelas*) toxicity test - Survival

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: VCF 2 Lab #: VCF 11 19. 279

Sample I.D.:

Date & Time Start: 11/27/19 1522 Date & Time End: 12/4/19 1500

Conc.	Rep.#	INITIAL	1	2	3	4	5 TD	6 TD	FINAL TD
USE CONTROL of VCF119.280	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
6.25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
12.5%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
50%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
100%	1	15	15	15	15	15	15	15	14
	2	15	15	15	15	15	15	15	15
	3	15	15	15 DEAD	15	14	14	14	14
	4	15	15	15	15	15	14	14	14

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
XC1	CONTROL	1		1.13077	1.13934	0.00857	
2		2		1.13378	1.14209	0.00831	
3		3		1.14637	1.15420	0.00783	
4		4		1.14840	1.15651	0.00811	
5	6.25%	1		1.12346	1.13182	0.00836	
XC 6		2		1.14458	1.15191	0.00733	
7		3		1.13718	1.14456	0.00738	
8		4		1.12540	1.13275	0.00735	
XC 9	12.5%	1		1.12757	1.13562	0.00805	
10		2		1.14172	1.14917	0.00745	
11		3		1.14320	1.15133	0.00763	
12		4		1.12401	1.13156	0.00755	
XC 13	25%	1		1.14142	1.14811	0.00669	
14		2		1.14361	1.15103	0.00742	
15		3		1.13932	1.14693	0.00761	
16		4		1.14103	1.14814	0.00711	
XC 17	50%	1		1.13344	1.14188	0.00844	
18		2		1.12601	1.13317	0.00716	
19		3		1.11911	1.12608	0.00697	
20		4		1.12585	1.13374	0.00789	
XC 21	100%	1		1.15081	1.15657	0.00576	
22		2		1.12823	1.13516	0.00693	
23		3		1.13958	1.14700	0.00745	
24		4		1.15384	1.16197	0.00813	

QC:

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-MEI
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.280

CHRONIC FATHEAD MINNOW SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
BIOMASS	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
14-2624-8047	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	4.64%	1
00-5844-1981	Mean Dry Biomass-mg	Steel Many-One Rank Sum Test		100	>100	n/a	1	27.1%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
10-6761-1165	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	>100	n/a	n/a	<1	1
				EC10	>100	n/a	n/a	<1	
				EC15	>100	n/a	n/a	<1	
				EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
08-3736-1378	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	31.12	n/a	71.5	3.213	1
			✓	IC10	37.24	24.21	102	2.685	
			✓	IC15	43.36	27.56	n/a	2.306	
			✓	IC20	49.49	30.9	n/a	2.021	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
10-6761-1165	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
14-2624-8047	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
00-5844-1981	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
08-3736-1378	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
00-5844-1981	Mean Dry Biomass-mg	PMSD	0.2712	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
12.5		4	0.9667	0.9054	1.0000	0.9333	1.0000	0.0193	0.0385	3.98%	3.33%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
100		4	0.9667	0.9054	1.0000	0.9333	1.0000	0.0193	0.0385	3.98%	3.33%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.3827	0.4967	0.02576	0.05151	11.23%	0.00%
6.25		4	0.4498	0.419	0.4806	0.428	0.4707	0.009682	0.01936	4.30%	1.93%
12.5		4	0.4335	0.3674	0.4996	0.3827	0.484	0.02076	0.04152	9.58%	5.49%
25		4	0.5148	0.4355	0.5941	0.4487	0.5687	0.02492	0.04983	9.68%	-12.25%
50		4	0.3538	0.1036	0.6041	0.1187	0.4473	0.07863	0.1573	44.44%	22.86%
100		4	0.385	0.3701	0.3999	0.372	0.394	0.004686	0.009373	2.43%	16.06%

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.9333	1.0000	1.0000	1.0000
100		1.0000	0.9333	0.9333	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.428	0.4607	0.4707	0.44
12.5		0.438	0.484	0.3827	0.4293
25		0.514	0.528	0.5687	0.4487
50		0.432	0.4473	0.4173	0.1187
100		0.3887	0.3853	0.372	0.394

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		14/15	15/15	15/15	15/15
100		15/15	14/15	14/15	15/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-2624-8047	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	4.64%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		12.5	14	10	1	6	CDF	0.3451	Non-Significant Effect
		25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		50	16	10	1	6	CDF	0.6105	Non-Significant Effect
		100	14	10	1	6	CDF	0.3451	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0209573	0.0041915	5	1.582	0.2155	Non-Significant Effect
Error	0.047696	0.0026498	18			
Total	0.0686534		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	25	4.248	1.6E-07	Unequal Variances
	Mod Levene Equality of Variance Test	5.8	4.248	0.0023	Unequal Variances
Distribution	Anderson-Darling A2 Normality Test	1.697	3.878	9.6E-09	Non-Normal Distribution
	D'Agostino Kurtosis Test	0.03004	2.576	0.9760	Normal Distribution
	D'Agostino Skewness Test	0.9512	2.576	0.3415	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.9057	9.21	0.6358	Normal Distribution
	Kolmogorov-Smirnov D Test	0.2917	0.2056	1.2E-05	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.8693	0.884	0.0051	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	0.9667	0.9054	1.0000	0.9667	0.9333	1.0000	0.0192	3.98%	3.33%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	0.9833	0.9303	1.0000	1.0000	0.9333	1.0000	0.0167	3.39%	1.67%
100		4	0.9667	0.9054	1.0000	0.9667	0.9333	1.0000	0.0192	3.98%	3.33%

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 14-2624-8047 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.5
Analyzed: 17 Dec-19 7:44 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
6.25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
12.5		4	1.375	1.254	1.496	1.375	1.31	1.441	0.03802	5.53%	4.57%
25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
50		4	1.408	1.304	1.513	1.441	1.31	1.441	0.03292	4.68%	2.28%
100		4	1.375	1.254	1.496	1.375	1.31	1.441	0.03802	5.53%	4.57%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.9333	1.0000	1.0000	1.0000
100		1.0000	0.9333	0.9333	1.0000

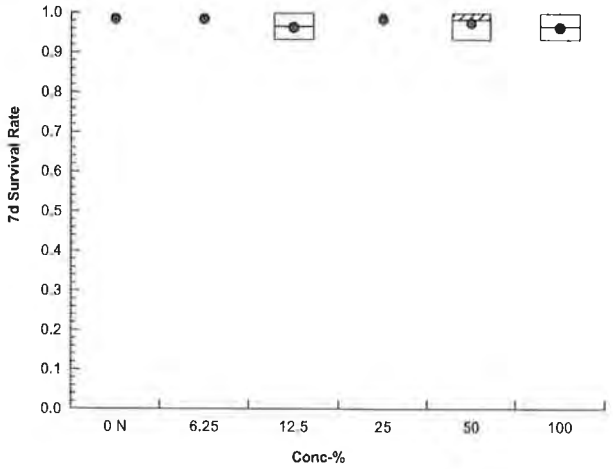
Angular (Corrected) Transformed Detail

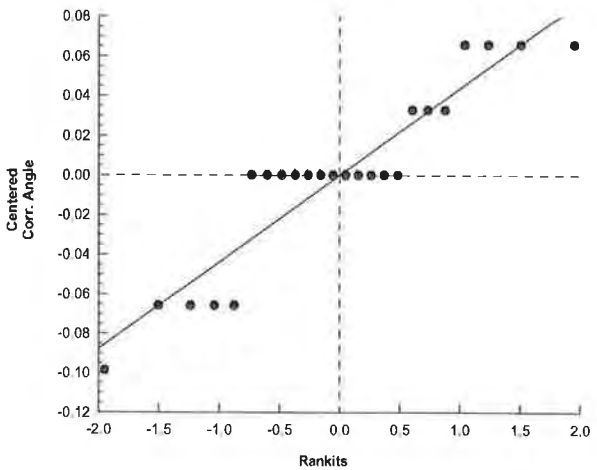
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
6.25		1.441	1.441	1.441	1.441
12.5		1.31	1.441	1.31	1.441
25		1.441	1.441	1.441	1.441
50		1.31	1.441	1.441	1.441
100		1.441	1.31	1.31	1.441

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		14/15	15/15	15/15	15/15
100		15/15	14/15	14/15	15/15

Graphics





Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-5844-1981	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	27.12%

Steel Many-One Rank Sum Test

Control vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	14	10	0	6	CDF	0.3451	Non-Significant Effect
	12.5	15.5	10	1	6	CDF	0.5438	Non-Significant Effect
	25	23	10	0	6	CDF	0.9966	Non-Significant Effect
	50	13	10	0	6	CDF	0.2311	Non-Significant Effect
	100	13	10	0	6	CDF	0.2311	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
PMSD	0.2712	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0648381	0.0129676	5	2.427	0.0754	Non-Significant Effect
Error	0.0961582	0.0053421	18			
Total	0.160996		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	20.79	15.09	8.9E-04	Unequal Variances
	Levene Equality of Variance Test	4.325	4.248	0.0092	Unequal Variances
	Mod Levene Equality of Variance Test	0.726	4.248	0.6128	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.388	3.878	7.8E-04	Non-Normal Distribution
	D'Agostino Kurtosis Test	3.412	2.576	6.4E-04	Non-Normal Distribution
	D'Agostino Skewness Test	3.66	2.576	2.5E-04	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	25.04	9.21	3.7E-06	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.212	0.2056	0.0067	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.8172	0.884	5.7E-04	Non-Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.4777	0.3827	0.4967	0.02576	11.23%	0.00%
6.25		4	0.4498	0.419	0.4806	0.4503	0.428	0.4707	0.009681	4.30%	1.93%
12.5		4	0.4335	0.3674	0.4996	0.4337	0.3827	0.484	0.02076	9.58%	5.49%
25		4	0.5148	0.4355	0.5941	0.521	0.4487	0.5687	0.02492	9.68%	-12.25%
50		4	0.3538	0.1036	0.6041	0.4247	0.1187	0.4473	0.07863	44.44%	22.86%
100		4	0.385	0.3701	0.3999	0.387	0.372	0.394	0.004686	2.43%	16.06%

Analyst: _____ QA: _____

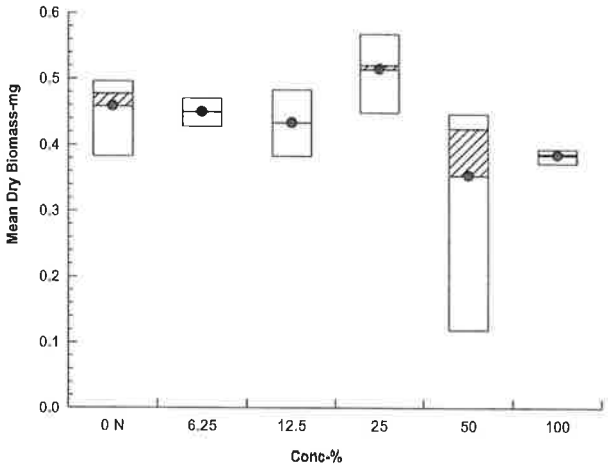
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

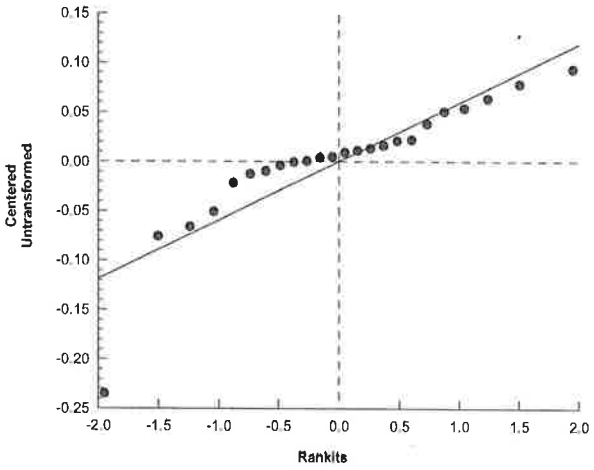
Analysis ID:	00-5844-1981	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.428	0.4607	0.4707	0.44
12.5		0.438	0.484	0.3827	0.4293
25		0.514	0.528	0.5687	0.4487
50		0.432	0.4473	0.4173	0.1187
100		0.3887	0.3853	0.372	0.394

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-6761-1165	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
6.25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
12.5		4	0.9667	0.9333	1.0000	0.0385	3.98%	3.33%	58/60	0.9833	1.67%
25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.9833	1.67%
50		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9833	1.67%
100		4	0.9667	0.9333	1.0000	0.0385	3.98%	3.33%	58/60	0.9667	3.33%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.9333	1.0000	1.0000	1.0000
100		1.0000	0.9333	0.9333	1.0000

7d Survival Rate Binomials

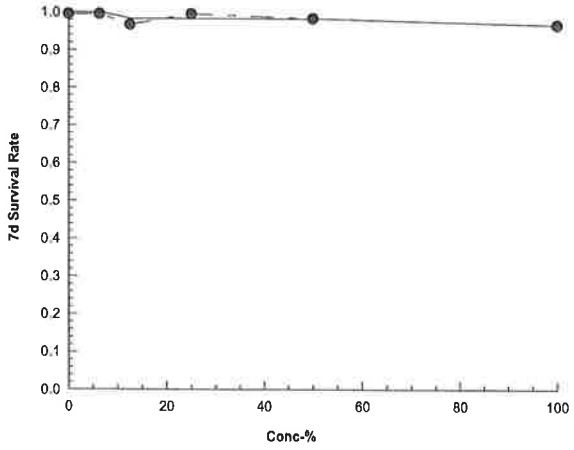
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		14/15	15/15	15/15	15/15
100		15/15	14/15	14/15	15/15

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-6761-1165	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-3736-1378	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	853267	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	31.12	n/a	71.5	3.213	1.399	n/a
IC10	37.24	24.21	102	2.685	0.9801	4.13
IC15	43.36	27.56	n/a	2.306	n/a	3.628
IC20	49.49	30.9	n/a	2.021	n/a	3.236
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	N	4	0.4587	0.3827	0.4967	0.05151	11.23%	0.0%	0.4642	0.0%
6.25		4	0.4498	0.428	0.4707	0.01936	4.30%	1.93%	0.4642	0.0%
12.5		4	0.4335	0.3827	0.484	0.04152	9.58%	5.49%	0.4642	0.0%
25		4	0.5148	0.4487	0.5687	0.04983	9.68%	-12.25%	0.4642	0.0%
50		4	0.3538	0.1187	0.4473	0.1573	44.44%	22.86%	0.3694	20.42%
100		4	0.385	0.372	0.394	0.009373	2.43%	16.06%	0.3694	20.42%

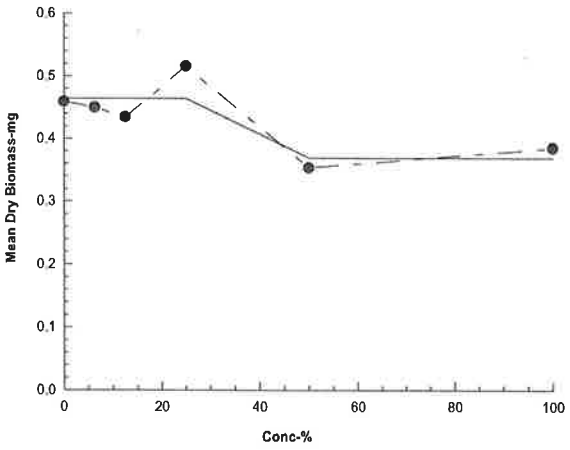
Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.428	0.4607	0.4707	0.44
12.5		0.438	0.484	0.3827	0.4293
25		0.514	0.528	0.5687	0.4487
50		0.432	0.4473	0.4173	0.1187
100		0.3887	0.3853	0.372	0.394

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-3736-1378	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:44	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-0025-0016	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:34	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:12	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	03-3939-3605	**Code:**	VCF1119.280fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	MO-MEI
Sample Age:	7h (8.8 °C)	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	43	43	43	43	43	0	0	0.0%	0
Overall		16	51.5	46.82	56.18	43	60	2.195	8.779	17.05%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	318.8	317	320.5	316	322	0.75	2.121	0.67%	0
12.5		8	311.1	309.8	312.4	309	314	0.5489	1.553	0.5%	0
25		8	287.2	286	288.5	285	289	0.5261	1.488	0.52%	0
50		8	240.9	239.4	242.4	238	243	0.6391	1.808	0.75%	0
100		8	144.5	142.1	146.9	141	149	1.035	2.928	2.03%	0
Overall		48	274	254.7	293.4	141	360	9.633	66.74	24.35%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.613	7.374	7.851	7.2	8	0.1008	0.285	3.74%	0
12.5		8	7.337	6.852	7.823	6.4	8	0.2052	0.5805	7.91%	0
25		8	6.875	6.056	7.694	5.7	7.8	0.3463	0.9794	14.25%	0
50		8	6.338	5.174	7.501	4.3	7.8	0.4921	1.392	21.96%	0
100		8	5.912	4.369	7.456	4	8.9	0.6526	1.846	31.22%	0
Overall		48	6.979	6.625	7.333	4	8.9	0.1759	1.218	17.46%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	44	44	44	44	44	0	0	0.0%	0
Overall		16	69.75	55.58	83.92	44	96	6.649	26.6	38.13%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.45	7.35	7.55	7.2	7.6	0.04226	0.1195	1.6%	0
12.5		8	7.45	7.332	7.568	7.2	7.6	0.05	0.1414	1.9%	0
25		8	7.425	7.285	7.565	7.2	7.6	0.05901	0.1669	2.25%	0
50		8	7.362	7.222	7.503	7.1	7.5	0.05957	0.1685	2.29%	0
100		8	7.137	6.923	7.352	6.7	7.5	0.09051	0.256	3.59%	0
Overall		48	7.437	7.358	7.517	6.7	8.3	0.03968	0.2749	3.70%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
6.25		8	24.09	24.02	24.16	24	24.2	0.02947	0.08336	0.35%	0
12.5		8	24.16	24.04	24.29	24	24.4	0.05324	0.1506	0.62%	0
25		8	24.16	24.03	24.3	24	24.4	0.0565	0.1598	0.66%	0
50		8	24.26	24.1	24.42	24	24.5	0.06797	0.1922	0.79%	0
100		8	24.2	24.07	24.33	24	24.4	0.05669	0.1603	0.66%	0
Overall		48	24.15	24.1	24.19	24	24.5	0.02267	0.157	0.65%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				43					
0	N	2		60					
100				43					
0	N	3		60					
100				43					
0	N	4		60					
100				43					
0	N	5		60					
100				43					
0	N	6		60					
100				43					
0	N	7		60					
100				43					
0	N	8		60					
100				43					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				319					
12.5				312					
25				288					
50				243					
100				147					
0	N	2		332					
6.25				319					
12.5				314					
25				288					
50				243					
100				145					
0	N	3		331					
6.25				321					
12.5				310					
25				289					
50				242					
100				149					
0	N	4		339					
6.25				322					
12.5				311					
25				287					
50				238					
100				141					
0	N	5		335					
6.25				316					
12.5				309					
25				286					
50				240					
100				142					
0	N	6		330					
6.25				319					
12.5				310					
25				285					
50				241					
100				142					
0	N	7		360					
6.25				318					
12.5				311					
25				286					
50				239					
100				143					
0	N	8		360					
6.25				316					
12.5				312					
25				289					
50				241					
100				147					

Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.9					
12.5				7.7					
25				7.7					
50				7.8					
100				8.9					
0	N	2		8					
6.25				7.5					
12.5				7.4					
25				7					
50				6					
100				4.5					
0	N	3		7.3					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.5					
100				7.4					
0	N	4		7.7					
6.25				8					
12.5				8					
25				7.8					
50				7.8					
100				7.2					
0	N	5		7.6					
6.25				7.8					
12.5				7.9					
25				7.8					
50				7.1					
100				6.6					
0	N	6		7.9					
6.25				7.3					
12.5				7					
25				5.8					
50				5					
100				4.5					
0	N	7		7.7					
6.25				7.2					
12.5				6.7					
25				5.7					
50				4.3					
100				4					
0	N	8		8.3					
6.25				7.7					
12.5				6.4					
25				5.7					
50				5.2					
100				4.2					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				44					
0	N	2		96					
100				44					
0	N	3		96					
100				44					
0	N	4		96					
100				44					
0	N	5		95					
100				44					
0	N	6		95					
100				44					
0	N	7		95					
100				44					
0	N	8		95					
100				44					

Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.2					
0	N	2		7.7					
6.25				7.4					
12.5				7.4					
25				7.3					
50				7.2					
100				6.7					
0	N	3		7.5					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.5					
0	N	4		7.6					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.5					
100				7.3					
0	N	5		7.8					
6.25				7.5					
12.5				7.5					
25				7.6					
50				7.5					
100				7.3					
0	N	6		7.5					
6.25				7.4					
12.5				7.3					
25				7.2					
50				7.1					
100				6.9					
0	N	7		8.3					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.4					
100				7.2					
0	N	8		7.8					
6.25				7.2					
12.5				7.2					
25				7.2					
50				7.2					
100				7					

Fathead Minnow 7-d Larval Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24					
12.5				24.2					
25				24.3					
50				24.5					
100				24.2					
0	N	2		24					
6.25				24.1					
12.5				24.2					
25				24.1					
50				24.1					
100				24					
0	N	3		24					
6.25				24.2					
12.5				24.3					
25				24.3					
50				24.4					
100				24.4					
0	N	4		24					
6.25				24.1					
12.5				24.2					
25				24.2					
50				24.3					
100				24.4					
0	N	5		24					
6.25				24					
12.5				24					
25				24					
50				24.2					
100				24.3					
0	N	6		24					
6.25				24.2					
12.5				24.4					
25				24.4					
50				24.5					
100				24.2					
0	N	7		24					
6.25				24.1					
12.5				24					
25				24					
50				24.1					
100				24.1					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

Analyst: QA:

CHEMICAL ANALYSIS DATA SHEET

VCF 3

Start Date: 11/27/19 1534

Lab # : VCF 11 19.280

End Date: 12/4/19 1512

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 1044	1224 M	1130 M	1041 M	TD 1113	TD 1157	

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.9	6.9	7.5	6.7	7.5	8.0	8.0	8.1	7.8	6.8	7.3	6.8	7.3	7.7
12.5%	7.7	6.9	7.4	6.7	7.6	7.8	8.0	7.9	7.9	6.2	7.0	6.4	6.7	6.4
25%	7.7	7.0	7.0	6.6	7.5	7.0	7.8	7.9	7.8	6.1	5.6	5.3	6.7	5.7
50%	7.8	7.0	6.0	6.5	7.5	7.0	7.8	7.2	7.1	6.0	5.0	5.2	4.3	5.2
100%	8.9	7.1	4.5	4.5	7.4	6.2	1.0/7.2	4.2	6.6	5.0	4.5	4.4	4.0	4.2

TEMPERATURE (°C)

Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.0	24.0	24.1	24.0	24.2	24.0	24.1	24.0	24.0	24.0	24.2	24.0	24.1	24.0
12.5%	24.2	24.0	24.2	24.0	24.3	24.0	24.1	24.0	24.0	24.0	24.4	24.0	24.0	24.0
25%	24.3	24.0	24.1	24.0	24.3	24.0	24.2	24.0	24.0	24.0	24.4	24.0	24.0	24.0
50%	24.5	24.0	24.1	24.0	24.4	24.0	24.3	24.0	24.2	24.0	24.5	24.0	24.1	24.0
100%	24.2	24.0	24.0	24.0	24.4	24.0	24.4	24.0	24.3	24.0	24.2	24.0	24.1	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.6	7.6	7.8	7.5	8.3	8.3	7.8
6.25%	7.5	7.7	7.4	7.7	7.5	7.6	7.6	7.5	7.5	7.8	7.4	7.4	7.5	7.2
12.5%	7.5	7.7	7.4	7.5	7.5	7.6	7.6	7.6	7.5	7.5	7.3	7.4	7.6	7.2
25%	7.5	7.6	7.3	7.4	7.5	7.6	7.6	7.6	7.6	7.4	7.2	7.4	7.5	7.2
50%	7.5	7.5	7.2	7.2	7.5	7.6	7.5	7.5	7.5	7.5	7.1	7.4	7.4	7.2
100%	7.2	7.4	6.7	7.1	7.5	7.6	7.3	7.1	7.3	7.4	6.9	7.1	7.2	7.0

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	300	300
6.25%	319	319	321	322	316	319	318	316
12.5%	312	314	310	311	309	310	311	312
25%	288	288	289	287	286	285	286	289
50%	243	243	242	238	240	241	239	241
100%	147	145	149	141	142	142	143	147

ALKALINITY

Control	60	60	60	60	60	60	60	60
100%	43	43	43	43	43	43	43	43

HARDNESS

Control	96	96	96	96	95	95	95	95
100%	44	44	44	44	44	44	44	44

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

Oppt

LM pass

Chronic juvenile Fathead minnow (*Pimephales promelas*) toxicity test - Survival

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: VCF 3 Lab #: VCF 11 19. 280

Sample I.D.:

Date & Time Start: 11/27/19 1554 Date & Time End: 12/4/19 1512

Conc.	Rep.#	INITIAL	1	2	3	4	5 TD	6 TD	FINAL
CONTROL	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
6.25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
12.5%	1	15	14	14	14	14	14	14	14
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	14	14 e
	4	15	15	15	15	15	15	15	15
25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
50%	1	15	15	15	15	15	15	15	14
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
100%	1	15	15	15	15	15	15	15	15
	2	15	15	15	14	14	14	14	14
	3	15	15	15	15	15	TD 1415	14	14
	4	15	15	15	15	15	15	15	15

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
XD 1	CONTROL	1		1.14159	1.14871	0.00712	
2		2		1.13223	1.13968	0.00745	
3		3		1.14795	1.15369	0.00574	
4		4		1.14195	1.14916	0.00721	
XD 5	6.25%	1		1.13902	1.14544	0.00642	
6		2		1.14792	1.15483	0.00691	
7		3		1.14985	1.15691	0.00706	
8		4		1.12662	1.13322	0.00660	
XD 9	12.5%	1		1.13696	1.14353	0.00657	
10		2		1.14322	1.15048	0.00726	
11		3		1.13408	1.13982	0.00574	
12		4		1.13063	1.13707	0.00644	
XD 13	25%	1		1.13780	1.14558	0.00771	
14		2		1.14407	1.15199	0.00792	
15		3		1.12219	1.13072	0.00853	
16		4		1.12813	1.13486	0.00673	
XD 17	50%	1		1.13187	1.13835	0.00648	
18		2		1.13652	1.14323	0.00671	
19		3		1.13032	1.13658	0.00626	
20		4		1.12521	1.12699	0.00178	
XD 21	100%	1		1.13893	1.14476	0.00583	
22		2		1.13359	1.13937	0.00578	
23		3		1.14110	1.14668	0.00558	
24		4		1.13696	1.13701	0.00005	

QC:

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-SPA
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.282

CHRONIC FATHEAD MINNOW SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
BIOMASS	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA		
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
09-8272-8495	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	4.29%	1
11-7851-6211	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	10.2%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
15-0964-8269	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
17-5338-5055	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	74	n/a	95.89	1.351	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
09-8272-8495	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
15-0964-8269	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
11-7851-6211	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
17-5338-5055	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
11-7851-6211	Mean Dry Biomass-mg	PMSD	0.102	0.12	0.3	Yes	Below Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
25		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
50		4	0.9833	0.9303	1.0000	0.9333	1.0000	0.0167	0.0333	3.39%	1.67%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.3827	0.4967	0.02576	0.05151	11.23%	0.00%
6.25		4	0.4685	0.4397	0.4973	0.456	0.4947	0.009057	0.01811	3.87%	-2.14%
12.5		4	0.4845	0.4443	0.5247	0.4487	0.5047	0.01262	0.02524	5.21%	-5.63%
25		4	0.4627	0.4387	0.4866	0.4413	0.4767	0.007528	0.01506	3.25%	-0.87%
50		4	0.4745	0.4417	0.5073	0.4493	0.4913	0.0103	0.02059	4.34%	-3.45%
100		4	0.4237	0.3978	0.4496	0.3993	0.4327	0.008135	0.01627	3.84%	7.63%

Analyst: _____ QA: Pass

Fathead Minnow 7-d Larval Survival and Growth Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.9333	1.0000
50		1.0000	0.9333	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.4567	0.456	0.4947	0.4667
12.5		0.4993	0.4487	0.4853	0.5047
25		0.4673	0.4767	0.4413	0.4653
50		0.4913	0.466	0.4913	0.4493
100		0.43	0.4327	0.3993	0.4327

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	14/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	14/15	15/15
50		15/15	14/15	15/15	15/15
100		15/15	15/15	15/15	15/15

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-8272-8495	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:54	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	4.29%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	16	10	1	6	CDF	0.6105	Non-Significant Effect
		12.5	18	10	1	6	CDF	0.8333	Non-Significant Effect
		25	16	10	1	6	CDF	0.6105	Non-Significant Effect
		50	16	10	1	6	CDF	0.6105	Non-Significant Effect
		100	18	10	1	6	CDF	0.8333	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006504	0.0013008	5	0.6	0.7006	Non-Significant Effect
Error	0.039024	0.002168	18			
Total	0.045528		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	5.4	4.248	0.0033	Unequal Variances
	Mod Levene Equality of Variance Test	0.6	4.248	0.7006	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	3.596	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Kurtosis Test	1.995	2.576	0.0460	Normal Distribution
	D'Agostino Skewness Test	3.217	2.576	0.0013	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	14.33	9.21	7.7E-04	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.375	0.2056	1.3E-09	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6694	0.884	4.1E-06	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	0.9833	0.9303	1.0000	1.0000	0.9333	1.0000	0.0167	3.39%	1.67%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	0.9833	0.9303	1.0000	1.0000	0.9333	1.0000	0.0167	3.39%	1.67%
50		4	0.9833	0.9303	1.0000	1.0000	0.9333	1.0000	0.0167	3.39%	1.67%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 09-8272-8495 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.5
Analyzed: 17 Dec-19 7:54 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
6.25		4	1.408	1.304	1.513	1.441	1.31	1.441	0.03292	4.68%	2.28%
12.5		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
25		4	1.408	1.304	1.513	1.441	1.31	1.441	0.03292	4.68%	2.28%
50		4	1.408	1.304	1.513	1.441	1.31	1.441	0.03292	4.68%	2.28%
100		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.9333	1.0000
50		1.0000	0.9333	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

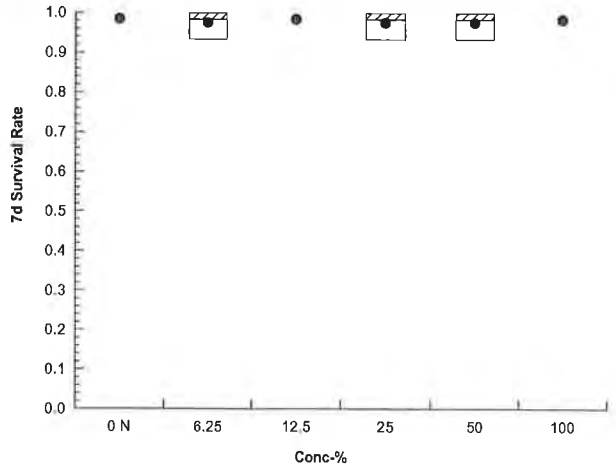
Angular (Corrected) Transformed Detail

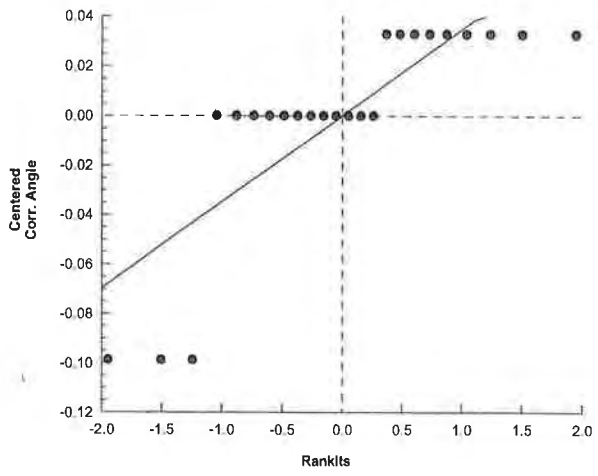
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
6.25		1.441	1.31	1.441	1.441
12.5		1.441	1.441	1.441	1.441
25		1.441	1.441	1.31	1.441
50		1.441	1.31	1.441	1.441
100		1.441	1.441	1.441	1.441

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	14/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	14/15	15/15
50		15/15	14/15	15/15	15/15
100		15/15	15/15	15/15	15/15

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-7851-6211	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:54	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	10.20%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	-0.5059	2.407	0.047	6	CDF	0.9404	Non-Significant Effect
		12.5	-1.329	2.407	0.047	6	CDF	0.9932	Non-Significant Effect
		25	-0.2058	2.407	0.047	6	CDF	0.8867	Non-Significant Effect
		50	-0.8145	2.407	0.047	6	CDF	0.9719	Non-Significant Effect
		100	1.801	2.407	0.047	6	CDF	0.1450	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
PMSD	0.102	0.12	0.3	Yes	Below Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0087428	0.0017486	5	2.314	0.0865	Non-Significant Effect
Error	0.0136023	0.0007557	18			
Total	0.0223452		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	6.851	15.09	0.2320	Equal Variances
	Levene Equality of Variance Test	2.01	4.248	0.1258	Equal Variances
	Mod Levene Equality of Variance Test	0.513	4.248	0.7630	Equal Variances
Distribution	Anderson-Darling A2 Normallty Test	0.7586	3.878	0.0482	Normal Distribution
	D'Agostino Kurtosis Test	2.235	2.576	0.0254	Normal Distribution
	D'Agostino Skewness Test	2.685	2.576	0.0073	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	12.21	9.21	0.0022	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.1387	0.2056	0.2686	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9054	0.884	0.0281	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.4777	0.3827	0.4967	0.02576	11.23%	0.00%
6.25		4	0.4685	0.4397	0.4973	0.4617	0.456	0.4947	0.009057	3.87%	-2.14%
12.5		4	0.4845	0.4443	0.5247	0.4923	0.4487	0.5047	0.01262	5.21%	-5.63%
25		4	0.4627	0.4387	0.4866	0.4663	0.4413	0.4767	0.007528	3.25%	-0.87%
50		4	0.4745	0.4417	0.5073	0.4787	0.4493	0.4913	0.0103	4.34%	-3.45%
100		4	0.4237	0.3978	0.4496	0.4313	0.3993	0.4327	0.008135	3.84%	7.63%

Analyst: _____ QA: _____

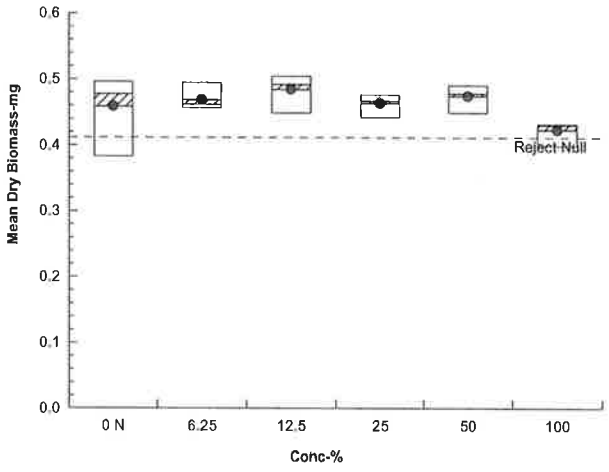
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

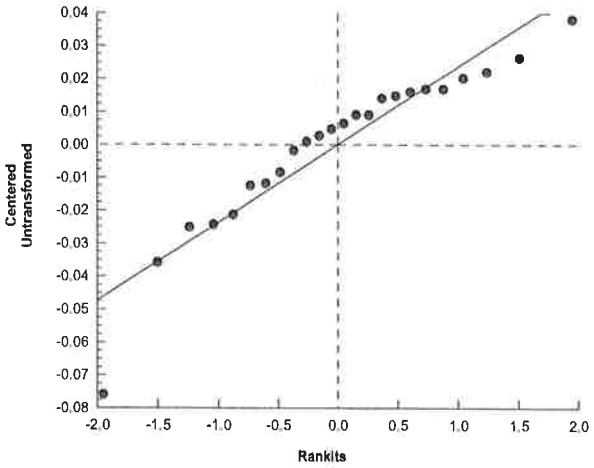
Analysis ID:	11-7851-6211	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:54	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.4567	0.456	0.4947	0.4667
12.5		0.4993	0.4487	0.4853	0.5047
25		0.4673	0.4767	0.4413	0.4653
50		0.4913	0.466	0.4913	0.4493
100		0.43	0.4327	0.3993	0.4327

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-0964-8269	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:54	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
6.25		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9917	0.83%
12.5		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.9917	0.83%
25		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9889	1.11%
50		4	0.9833	0.9333	1.0000	0.0333	3.39%	1.67%	59/60	0.9889	1.11%
100		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.9889	1.11%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	0.9333	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.9333	1.0000
50		1.0000	0.9333	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

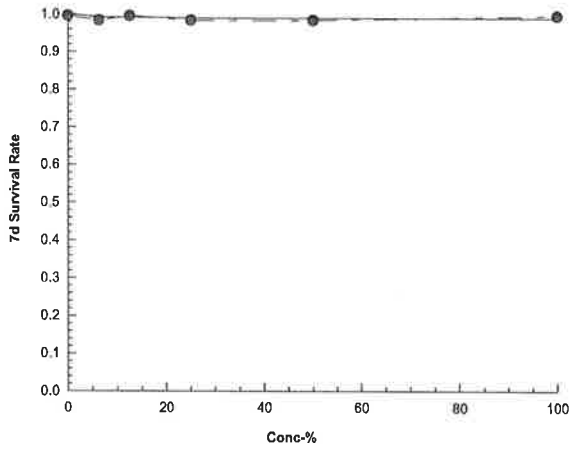
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	14/15	15/15	15/15
12.5		15/15	15/15	15/15	15/15
25		15/15	15/15	14/15	15/15
50		15/15	14/15	15/15	15/15
100		15/15	15/15	15/15	15/15

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-0964-8269	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:54	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	17-5338-5055	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:55	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	74	n/a	95.89	1.351	1.043	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	0.4587	0.3827	0.4967	0.05151	11.23%	0.0%	0.4706	0.0%
6.25		4	0.4685	0.456	0.4947	0.01811	3.87%	-2.14%	0.4706	0.0%
12.5		4	0.4845	0.4487	0.5047	0.02524	5.21%	-5.63%	0.4706	0.0%
25		4	0.4627	0.4413	0.4767	0.01506	3.25%	-0.87%	0.4686	0.42%
50		4	0.4745	0.4493	0.4913	0.02059	4.34%	-3.45%	0.4686	0.42%
100		4	0.4237	0.3993	0.4327	0.01627	3.84%	7.63%	0.4237	9.97%

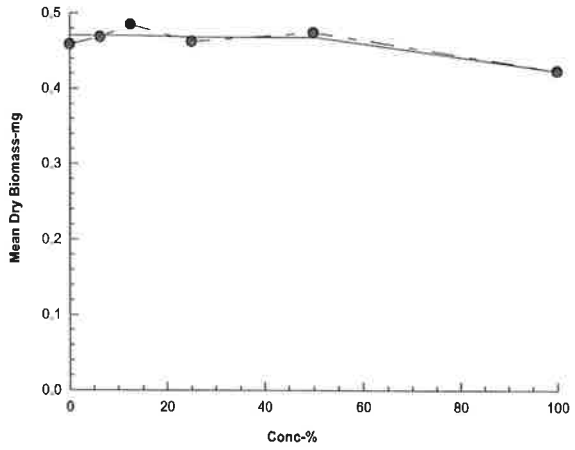
Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.4567	0.456	0.4947	0.4667
12.5		0.4993	0.4487	0.4853	0.5047
25		0.4673	0.4767	0.4413	0.4653
50		0.4913	0.466	0.4913	0.4493
100		0.43	0.4327	0.3993	0.4327

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-5338-5055	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Dec-19 7:55	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	11-1389-4949	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:44	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:28	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	07-8687-4763	**Code:**	VCF1119.282fml	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-SPA
Sample Age:	9h (7.3 °C)	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	36	36	36	36	36	0	0	0.0%	0
Overall		16	48	41.4	54.6	36	60	3.098	12.39	25.82%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	319.4	315.3	323.5	315	331	1.731	4.897	1.53%	0
12.5		8	310.2	309.3	311.2	308	312	0.4119	1.165	0.38%	0
25		8	284.1	283.3	285	283	286	0.3504	0.991	0.35%	0
50		8	232.6	231.1	234.2	230	235	0.6529	1.847	0.79%	0
100		8	128.5	124.2	132.8	121	135	1.803	5.099	3.97%	0
Overall		48	269.4	248.3	290.5	121	360	10.49	72.65	26.96%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.438	7.125	7.75	6.8	7.9	0.1322	0.3739	5.03%	0
12.5		8	7.188	6.453	7.922	5.5	8	0.3108	0.879	12.23%	0
25		8	7.038	6.158	7.917	5.1	7.9	0.3717	1.051	14.94%	0
50		8	6.888	5.935	7.84	5	8.1	0.4029	1.139	16.54%	0
100		8	6.587	5.164	8.011	4.3	9.4	0.6019	1.702	25.84%	0
Overall		48	7.156	6.853	7.46	4.3	9.4	0.1509	1.045	14.61%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	50	50	50	50	50	0	0	0.0%	0
Overall		16	72.75	60.23	85.27	50	96	5.875	23.5	32.30%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.45	7.26	7.64	7.2	7.8	0.08018	0.2268	3.04%	0
12.5		8	7.45	7.309	7.591	7.2	7.6	0.05976	0.169	2.27%	0
25		8	7.462	7.315	7.61	7.2	7.7	0.0625	0.1768	2.37%	0
50		8	7.4	7.274	7.526	7.2	7.6	0.05345	0.1512	2.04%	0
100		8	7.225	7.037	7.413	6.9	7.6	0.07962	0.2252	3.12%	0
Overall		48	7.465	7.387	7.542	6.9	8.3	0.03842	0.2662	3.57%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
6.25		8	24.15	24.01	24.29	24	24.5	0.05975	0.169	0.7%	0
12.5		8	24.24	24.06	24.41	24	24.5	0.07303	0.2066	0.85%	0
25		8	24.21	24.08	24.34	24	24.5	0.05489	0.1552	0.64%	0
50		8	24.2	24.02	24.38	24	24.6	0.07792	0.2204	0.91%	0
100		8	24.1	23.97	24.23	24	24.4	0.0567	0.1604	0.67%	0
Overall		48	24.15	24.1	24.2	24	24.6	0.02579	0.1786	0.74%	0 (0%)

Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				36					
0	N	2		60					
100				36					
0	N	3		60					
100				36					
0	N	4		60					
100				36					
0	N	5		60					
100				36					
0	N	6		60					
100				36					
0	N	7		60					
100				36					
0	N	8		60					
100				36					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				318					
12.5				310					
25				283					
50				232					
100				125					
0	N	2		332					
6.25				318					
12.5				308					
25				283					
50				230					
100				121					
0	N	3		331					
6.25				331					
12.5				312					
25				286					
50				231					
100				124					
0	N	4		339					
6.25				320					
12.5				310					
25				284					
50				235					
100				128					
0	N	5		335					
6.25				315					
12.5				310					
25				284					
50				235					
100				128					
0	N	6		330					
6.25				317					
12.5				310					
25				284					
50				234					
100				133					
0	N	7		360					
6.25				318					
12.5				311					
25				284					
50				232					
100				135					
0	N	8		360					
6.25				318					
12.5				311					
25				285					
50				232					
100				134					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.7					
12.5				7.8					
25				7.9					
50				8.1					
100				9.4					
0	N	2		8					
6.25				7.4					
12.5				7.5					
25				7.1					
50				6.8					
100				5					
0	N	3		7.3					
6.25				7.6					
12.5				7.5					
25				7.5					
50				7.3					
100				7.7					
0	N	4		7.7					
6.25				7.9					
12.5				7.9					
25				7.9					
50				7.8					
100				7.5					
0	N	5		7.6					
6.25				7.7					
12.5				8					
25				7.9					
50				7.8					
100				7.4					
0	N	6		7.9					
6.25				7.4					
12.5				7					
25				7.1					
50				6.9					
100				6.1					
0	N	7		7.7					
6.25				7					
12.5				6.3					
25				5.8					
50				5.4					
100				5.3					
0	N	8		8.3					
6.25				6.8					
12.5				5.5					
25				5.1					
50				5					
100				4.3					

Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				50					
0	N	2		96					
100				50					
0	N	3		96					
100				50					
0	N	4		96					
100				50					
0	N	5		95					
100				50					
0	N	6		95					
100				50					
0	N	7		95					
100				50					
0	N	8		95					
100				50					

Analyst: QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.2					
0	N	2		7.7					
6.25				7.2					
12.5				7.4					
25				7.3					
50				7.3					
100				6.9					
0	N	3		7.5					
6.25				7.8					
12.5				7.6					
25				7.7					
50				7.6					
100				7.6					
0	N	4		7.6					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.5					
100				7.4					
0	N	5		7.8					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.5					
100				7.3					
0	N	6		7.5					
6.25				7.2					
12.5				7.2					
25				7.2					
50				7.2					
100				7					
0	N	7		8.3					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.4					
100				7.3					
0	N	8		7.8					
6.25				7.2					
12.5				7.2					
25				7.3					
50				7.2					
100				7.1					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.2					
12.5				24.4					
25				24.2					
50				24.2					
100				24					
0	N	2		24					
6.25				24.5					
12.5				24.5					
25				24.2					
50				24					
100				24					
0	N	3		24					
6.25				24					
12.5				24					
25				24.1					
50				24.1					
100				24.1					
0	N	4		24					
6.25				24.1					
12.5				24.2					
25				24.3					
50				24.3					
100				24.4					
0	N	5		24					
6.25				24					
12.5				24.2					
25				24.3					
50				24.4					
100				24.3					
0	N	6		24					
6.25				24.2					
12.5				24.5					
25				24.5					
50				24.6					
100				24					
0	N	7		24					
6.25				24.2					
12.5				24.1					
25				24.1					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

CHEMICAL ANALYSIS DATA SHEET
VCF 4

Start Date: 11/27/19 1544 | Lab #: VCF 11 19. 282

End Date: 12/4/19 1528 | Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B | B | B | B | B | B | B

DAY	11/27 0	11/28 1		11/29 2		11/30 3		12/1 4		12/2 5		12/3 6		12/4 7
Initials	TD	TD	1047	1839	NR	1140	NR	1055	NR	TD	1131	TD	1228	
DISSOLVED OXYGEN (mg/L)														
Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.7	7.1	7.4	6.7	7.6	8.1	7.9	8.1	7.7	7.1	7.4	6.6	7.0	6.8
12.5%	7.8	7.1	7.5	6.7	7.5	8.0	7.9	8.0	8.0	7.1	7.0	5.3	6.3	5.5
25%	7.9	7.2	7.1	6.9	7.5	7.7	7.9	7.9	7.9	7.1	7.1	5.2	5.8	5.1
50%	8.1	7.2	6.8	6.5	7.3	7.6	7.8	7.7	7.8	7.1	6.9	5.5	5.4	5.0
100%	9.4	7.3	5.0	6.0	7.7	6.4	3.8/7.5	7.2	7.4	7.0	6.1	4.7	5.3	4.3
TEMPERATURE (°C)														
Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.2	24.0	24.5	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.2	24.0	24.2	24.0
12.5%	24.4	24.0	24.5	24.0	24.0	24.0	24.2	24.0	24.2	24.0	24.5	24.0	24.1	24.0
25%	24.2	24.0	24.2	24.0	24.1	24.0	24.3	24.0	24.3	24.0	24.5	24.0	24.1	24.0
50%	24.2	24.0	24.0	24.0	24.1	24.0	24.3	24.0	24.4	24.0	24.6	24.0	24.0	24.0
100%	24.0	24.0	24.0	24.0	24.1	24.0	24.4	24.0	24.3	24.0	24.0	24.0	24.0	24.0
pH														
Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
6.25%	7.5	7.4	7.2	7.8	7.8	7.7	7.6	7.4	7.6	7.5	7.2	7.4	7.5	7.2
12.5%	7.5	7.4	7.4	7.3	7.6	7.7	7.6	7.5	7.6	7.4	7.2	7.3	7.5	7.2
25%	7.5	7.4	7.3	7.4	7.7	7.6	7.6	7.5	7.6	7.5	7.2	7.3	7.5	7.3
50%	7.5	7.3	7.3	7.4	7.6	7.6	7.5	7.5	7.5	7.5	7.2	7.2	7.4	7.2
100%	7.2	7.3	6.9	7.1	7.6	7.5	7.4	7.3	7.3	7.5	7.0	7.1	7.3	7.1

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
CONDUCTIVITY (uS/cm)								
Control	347	332	331	339	335	330	360	360
6.25%	318	314	331	320	315	317	318	318
12.5%	310	304	312	310	310	310	311	311
25%	283	283	286	284	284	284	284	285
50%	232	230	231	235	235	234	232	232
100%	125	121	124	129	128	133	135	134
ALKALINITY								
Control	60	60	60	60	60	60	60	60
100%	36	36	36	36	36	36	36	36
HARDNESS								
Control	96	96	96	96	95	95	95	95
100%	50	50	50	50	50	50	50	50

Residual Chlorine 0 ppt   1st Sample: <0.1   2nd Sample: N/A   3rd Sample: N/A

QC Pass

Chronic juvenile Fathead minnow (*Pimephales promelas*) toxicity test - Survival

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: VCF 4 Lab #: VCF 11 19.282

Sample I.D.:

Date & Time Start: 11/27/19 1544 Date & Time End: 12/4/19 1520

Conc.	Rep.#	INITIAL	1	2	3	4	5 TD	6 TD	FINAL
USE CONTROL of VCF1119.282	1								
	2								
	3								
	4								
6.25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	14
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
12.5%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	14	14	14	14
	4	15	15	15	15	15	15	15	15
50%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	14	14	14	14
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
100%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
	CONTROL	1					
		2					
		3					
		4					
XE 1	6.25%	1		1.14202	1.14887	0.00685	
2		2		1.12777	1.13461	0.00684	
3		3		1.13891	1.14633	0.00742	
4		4		1.13435	1.14135	0.00700	
XE 5	12.5%	1		1.13335	1.14084	0.00749	
6		2		1.12889	1.13562	0.00673	
7		3		1.12275	1.13003	0.00728	
8		4		1.13875	1.14632	0.00757	
XE 9	25%	1		1.12725	1.13426	0.00701	
10		2		1.14427	1.15142	0.00715	
11		3		1.14214	1.14876	0.00662	
12		4		1.14534	1.15232	0.00698	
XE 13	50%	1		1.14359	1.15096	0.00737	
14		2		1.13563	1.14262	0.00699	
15		3		1.13169	1.13906	0.00737	
16		4		1.13986	1.14660	0.00674	
XE 17	100%	1		1.13183	1.13828	0.00645	
18		2		1.13162	1.13811	0.00649	
19		3		1.13698	1.14297	0.00599	
20		4		1.12587	1.13236	0.00649	

QC:

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-CAM
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.287

CHRONIC FATHEAD MINNOW SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
BIOMASS	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

M. Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM		
Sample Age:	9h	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
19-8518-2408	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	5.06%	1
13-6313-0722	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	18.1%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
04-6893-8414	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
06-8070-7394	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
04-6893-8414	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
19-8518-2408	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
06-8070-7394	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
13-6313-0722	Mean Dry Biomass-mg	Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
13-6313-0722	Mean Dry Biomass-mg	PMSD	0.1807	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
12.5		4	0.9667	0.9054	1.0000	0.9333	1.0000	0.0193	0.0385	3.98%	3.33%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		4	0.9500	0.8484	1.0000	0.8667	1.0000	0.0319	0.0638	6.72%	5.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.3827	0.4967	0.02576	0.05151	11.23%	0.00%
6.25		4	0.5032	0.4383	0.568	0.4593	0.5427	0.02038	0.04076	8.10%	-9.70%
12.5		4	0.5092	0.4389	0.5794	0.474	0.5733	0.02207	0.04415	8.67%	-11.01%
25		4	0.5185	0.4255	0.6115	0.4367	0.5753	0.02921	0.05843	11.27%	-13.05%
50		4	0.493	0.4287	0.5573	0.4533	0.5447	0.02019	0.04039	8.19%	-7.49%
100		4	0.4753	0.3893	0.5614	0.4327	0.5533	0.02703	0.05407	11.38%	-3.63%

Analyst: _____ QA: Pass

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.8667	1.0000	0.9333	1.0000
100		1.0000	1.0000	1.0000	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5427	0.478	0.4593	0.5327
12.5		0.5733	0.4887	0.5007	0.474
25		0.5753	0.53	0.532	0.4367
50		0.47	0.504	0.4533	0.5447
100		0.5533	0.4467	0.4327	0.4687

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		13/15	15/15	14/15	15/15
100		15/15	15/15	15/15	15/15

Analyst: _____ QA: _____

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-8518-2408	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM
Sample Age:	9h	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	5.06%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		12.5	14	10	1	6	CDF	0.3451	Non-Significant Effect
		25	18	10	1	6	CDF	0.8333	Non-Significant Effect
		50	14	10	1	6	CDF	0.3451	Non-Significant Effect
		100	18	10	1	6	CDF	0.8333	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0356575	0.0071315	5	2.174	0.1027	Non-Significant Effect
Error	0.0590366	0.0032798	18			
Total	0.094694		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	20.24	4.248	8.1E-07	Unequal Variances
	Mod Levene Equality of Variance Test	13.49	4.248	1.5E-05	Unequal Variances
Distribution	Anderson-Darling A2 Normality Test	3.035	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Kurtosis Test	2.249	2.576	0.0245	Normal Distribution
	D'Agostino Skewness Test	1.412	2.576	0.1580	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	7.05	9.21	0.0294	Normal Distribution
	Kolmogorov-Smirnov D Test	0.3333	0.2056	1.8E-07	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.7841	0.884	1.6E-04	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	0.9667	0.9054	1.0000	0.9667	0.9333	1.0000	0.0192	3.98%	3.33%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	0.9500	0.8484	1.0000	0.9667	0.8667	1.0000	0.0319	6.72%	5.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-8518-2408	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
6.25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
12.5		4	1.375	1.254	1.496	1.375	1.31	1.441	0.03802	5.53%	4.57%
25		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
50		4	1.347	1.16	1.535	1.375	1.197	1.441	0.05894	8.75%	6.52%
100		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.8667	1.0000	0.9333	1.0000
100		1.0000	1.0000	1.0000	1.0000

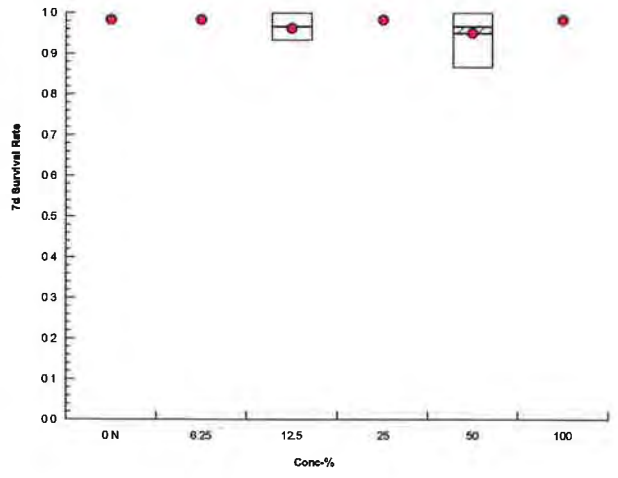
Angular (Corrected) Transformed Detail

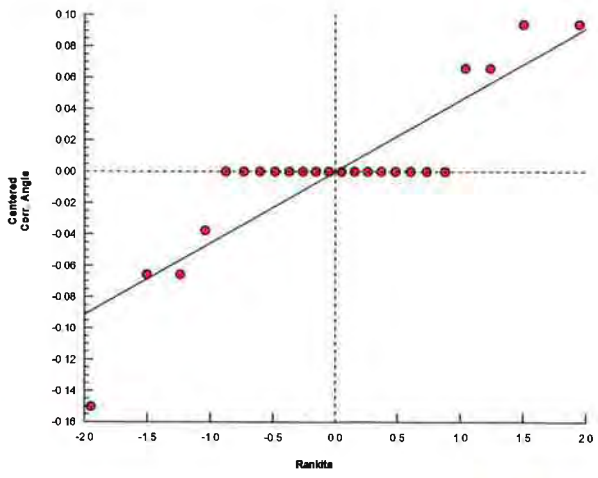
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
6.25		1.441	1.441	1.441	1.441
12.5		1.31	1.441	1.31	1.441
25		1.441	1.441	1.441	1.441
50		1.197	1.441	1.31	1.441
100		1.441	1.441	1.441	1.441

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		13/15	15/15	14/15	15/15
100		15/15	15/15	15/15	15/15

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	13-6313-0722	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM
Sample Age:	9h	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	18.07%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	-1.292	2.407	0.083	6	CDF	0.9924	Non-Significant Effect
		12.5	-1.466	2.407	0.083	6	CDF	0.9954	Non-Significant Effect
		25	-1.737	2.407	0.083	6	CDF	0.9980	Non-Significant Effect
		50	-0.9969	2.407	0.083	6	CDF	0.9826	Non-Significant Effect
		100	-0.484	2.407	0.083	6	CDF	0.9374	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria
PMSD	0.1807	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0100234	0.0020047	5	0.8451	0.5355	Non-Significant Effect
Error	0.0426966	0.0023720	18			
Total	0.05272		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	0.6421	15.09	0.9860	Equal Variances
	Levene Equality of Variance Test	0.09724	4.248	0.9914	Equal Variances
	Mod Levene Equality of Variance Test	0.03366	4.248	0.9993	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2288	3.878	0.8412	Normal Distribution
	D'Agostino Kurtosis Test	0.7714	2.576	0.4405	Normal Distribution
	D'Agostino Skewness Test	0.1248	2.576	0.9007	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.6106	9.21	0.7369	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1008	0.2056	0.8207	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9769	0.884	0.8333	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.4587	0.3767	0.5406	0.4777	0.3827	0.4967	0.02576	11.23%	0.00%
6.25		4	0.5032	0.4383	0.568	0.5053	0.4593	0.5427	0.02038	8.10%	-9.70%
12.5		4	0.5092	0.4389	0.5794	0.4947	0.474	0.5733	0.02207	8.67%	-11.01%
25		4	0.5185	0.4255	0.6115	0.531	0.4367	0.5753	0.02921	11.27%	-13.05%
50		4	0.493	0.4287	0.5573	0.487	0.4533	0.5447	0.02019	8.19%	-7.49%
100		4	0.4753	0.3893	0.5614	0.4577	0.4327	0.5533	0.02703	11.38%	-3.63%

Analyst: _____ QA: _____

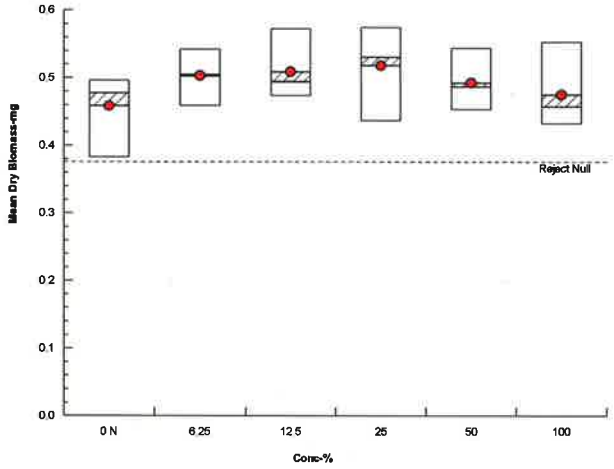
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

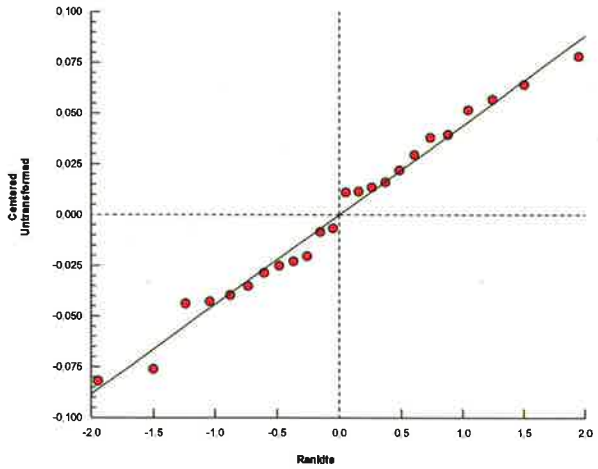
Analysis ID:	13-6313-0722	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5427	0.478	0.4593	0.5327
12.5		0.5733	0.4887	0.5007	0.474
25		0.5753	0.53	0.532	0.4367
50		0.47	0.504	0.4533	0.5447
100		0.5533	0.4467	0.4327	0.4687

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-6893-8414	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM
Sample Age:	9h	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
6.25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
12.5		4	0.9667	0.9333	1.0000	0.0385	3.98%	3.33%	58/60	0.9833	1.67%
25		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.9833	1.67%
50		4	0.9500	0.8667	1.0000	0.0638	6.72%	5.0%	57/60	0.975	2.5%
100		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	0.975	2.5%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		0.9333	1.0000	0.9333	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		0.8667	1.0000	0.9333	1.0000
100		1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

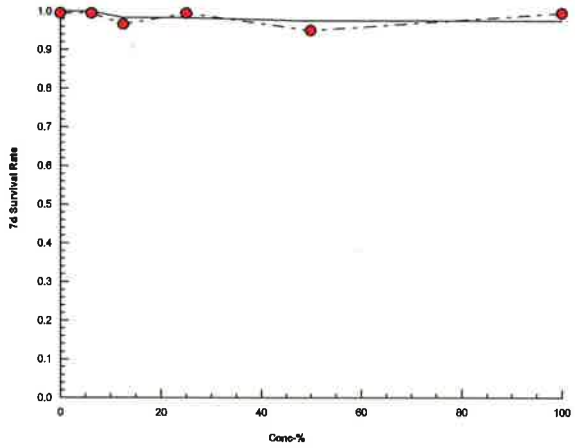
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
6.25		15/15	15/15	15/15	15/15
12.5		14/15	15/15	14/15	15/15
25		15/15	15/15	15/15	15/15
50		13/15	15/15	14/15	15/15
100		15/15	15/15	15/15	15/15

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survivál and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-6893-8414	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-8070-7394	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM
Sample Age:	9h	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.4587	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	0.4587	0.3827	0.4967	0.05151	11.23%	0.0%	0.4974	0.0%
6.25		4	0.5032	0.4593	0.5427	0.04076	8.10%	-9.7%	0.4974	0.0%
12.5		4	0.5092	0.474	0.5733	0.04415	8.67%	-11.01%	0.4974	0.0%
25		4	0.5185	0.4367	0.5753	0.05843	11.27%	-13.05%	0.4974	0.0%
50		4	0.493	0.4533	0.5447	0.04039	8.19%	-7.49%	0.493	0.88%
100		4	0.4753	0.4327	0.5533	0.05407	11.38%	-3.63%	0.4753	4.43%

Mean Dry Biomass-mg Detail

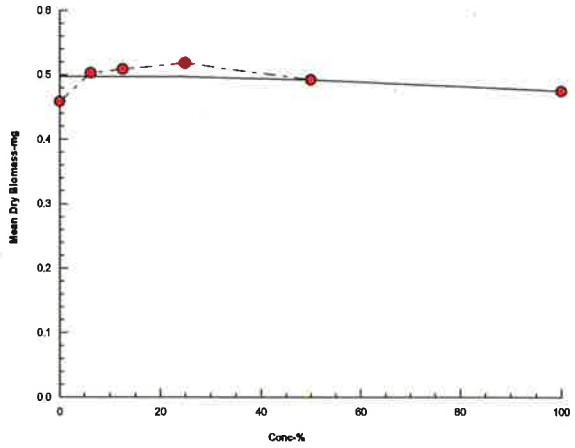
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4747	0.4967	0.3827	0.4807
6.25		0.5427	0.478	0.4593	0.5327
12.5		0.5733	0.4887	0.5007	0.474
25		0.5753	0.53	0.532	0.4367
50		0.47	0.504	0.4533	0.5447
100		0.5533	0.4467	0.4327	0.4687

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-8070-7394	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 8:47	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	10-0876-2736	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:48	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:39	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	08-9686-3885	**Code:**	VCF1119.287	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 06:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-CAM
Sample Age:	9h	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
Overall		16	40.5	29.77	51.23	21	60	5.035	20.14	49.73%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	316.8	312.1	321.4	312	329	1.962	5.548	1.75%	0
12.5		8	305.4	304.3	306.5	303	307	0.4605	1.302	0.43%	0
25		8	276.1	272.6	279.7	273	285	1.505	4.257	1.54%	0
50		8	214.1	211.7	216.6	211	219	1.043	2.949	1.38%	0
100		8	83	77.24	88.76	76	98	2.435	6.887	8.3%	0
Overall		48	256.2	230.5	281.8	76	360	12.74	88.29	34.46%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.575	7.221	7.929	6.8	8.2	0.1497	0.4234	5.59%	0
12.5		8	7.488	6.975	8	6.3	8.2	0.2167	0.6128	8.18%	0
25		8	7.338	6.687	7.988	5.9	8	0.2751	0.7782	10.61%	0
50		8	7.188	6.409	7.966	5.5	8	0.3292	0.9311	12.95%	0
100		8	6.937	5.892	7.983	5	8.9	0.442	1.25	18.02%	0
Overall		48	7.387	7.158	7.617	5	8.9	0.1142	0.7913	10.71%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	23	23	23	23	23	0	0	0.0%	0
Overall		16	59.25	39.3	79.2	23	96	9.36	37.44	63.19%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.488	7.383	7.592	7.3	7.7	0.04407	0.1246	1.67%	0
12.5		8	7.512	7.391	7.634	7.3	7.7	0.05154	0.1458	1.94%	0
25		8	7.487	7.358	7.617	7.2	7.6	0.05489	0.1553	2.07%	0
50		8	7.437	7.297	7.578	7.2	7.7	0.05957	0.1685	2.27%	0
100		8	7.362	7.179	7.546	7	7.7	0.07778	0.22	2.99%	0
Overall		48	7.515	7.448	7.582	7	8.3	0.03329	0.2306	3.07%	0 (0%)

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
6.25		8	24.13	23.98	24.27	24	24.5	0.06195	0.1752	0.73%	0
12.5		8	24.14	24.01	24.26	24	24.4	0.05324	0.1506	0.62%	0
25		8	24.1	23.98	24.22	24	24.4	0.04999	0.1414	0.59%	0
50		8	24.1	23.95	24.25	24	24.5	0.06267	0.1773	0.74%	0
100		8	24.05	23.96	24.14	24	24.3	0.0378	0.1069	0.44%	0
Overall		48	24.09	24.04	24.13	24	24.5	0.02019	0.1399	0.58%	0 (0%)

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				21					
0	N	2		60					
100				21					
0	N	3		60					
100				21					
0	N	4		60					
100				21					
0	N	5		60					
100				21					
0	N	6		60					
100				21					
0	N	7		60					
100				21					
0	N	8		60					
100				21					

Analyst:_____ QA:_____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				319					
12.5				305					
25				273					
50				213					
100				76					
0	N	2		332					
6.25				329					
12.5				305					
25				280					
50				219					
100				77					
0	N	3		331					
6.25				312					
12.5				307					
25				285					
50				218					
100				81					
0	N	4		339					
6.25				318					
12.5				307					
25				275					
50				212					
100				80					
0	N	5		335					
6.25				312					
12.5				305					
25				275					
50				215					
100				82					
0	N	6		330					
6.25				314					
12.5				306					
25				273					
50				212					
100				85					
0	N	7		360					
6.25				315					
12.5				303					
25				273					
50				211					
100				85					
0	N	8		360					
6.25				315					
12.5				305					
25				275					
50				213					
100				98					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.6					
12.5				7.7					
25				7.8					
50				7.9					
100				8.9					
0	N	2		8					
6.25				7.7					
12.5				7.7					
25				7.7					
50				7.5					
100				7.3					
0	N	3		7.3					
6.25				7.4					
12.5				7.5					
25				7.6					
50				7.6					
100				7.6					
0	N	4		7.7					
6.25				8.2					
12.5				8.2					
25				8					
50				7.8					
100				6.6					
0	N	5		7.6					
6.25				8					
12.5				8.1					
25				8					
50				8					
100				7.9					
0	N	6		7.9					
6.25				7.5					
12.5				7.4					
25				7.3					
50				7.2					
100				6.5					
0	N	7		7.7					
6.25				7.4					
12.5				7					
25				6.4					
50				6					
100				5.7					
0	N	8		8.3					
6.25				6.8					
12.5				6.3					
25				5.9					
50				5.5					
100				5					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				23					
0	N	2		96					
100				23					
0	N	3		96					
100				23					
0	N	4		96					
100				23					
0	N	5		95					
100				23					
0	N	6		95					
100				23					
0	N	7		95					
100				23					
0	N	8		95					
100				23					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.5					
100				7.4					
0	N	2		7.7					
6.25				7.7					
12.5				7.7					
25				7.6					
50				7.5					
100				7.5					
0	N	3		7.5					
6.25				7.4					
12.5				7.5					
25				7.5					
50				7.7					
100				7.7					
0	N	4		7.6					
6.25				7.5					
12.5				7.6					
25				7.6					
50				7.4					
100				7.2					
0	N	5		7.8					
6.25				7.5					
12.5				7.6					
25				7.6					
50				7.5					
100				7.4					
0	N	6		7.5					
6.25				7.3					
12.5				7.3					
25				7.3					
50				7.2					
100				7					
0	N	7		8.3					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.5					
0	N	8		7.8					
6.25				7.4					
12.5				7.3					
25				7.2					
50				7.2					
100				7.2					

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.5					
12.5				24.3					
25				24.2					
50				24.2					
100				24					
0	N	2		24					
6.25				24.2					
12.5				24.2					
25				24.1					
50				24					
100				24					
0	N	3		24					
6.25				24					
12.5				24.1					
25				24.1					
50				24.1					
100				24.1					
0	N	4		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					
0	N	5		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					
0	N	6		24					
6.25				24.2					
12.5				24.4					
25				24.4					
50				24.5					
100				24.3					
0	N	7		24					
6.25				24.1					
12.5				24.1					
25				24					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

CHEMICAL ANALYSIS DATA SHEET

VCF 5

Start Date: 11/27/19 1545

End Date: 12/4/19 1535

Lab # : VCF 11 19.287

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 1058	[illegible]	1020 JZ	1111 JZ	TD 1147	TD 1247	L

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.6	7.1	7.7	6.7	7.4	8.3	8.2	8.3	8.0	7.2	7.5	6.5	7.4	6.8
12.5%	7.7	7.1	7.5	6.7	7.5	8.2	8.2	8.2	8.1	7.2	7.4	6.4	7.0	6.3
25%	7.8	7.1	7.7	6.7	7.6	8.0	8.0	8.1	8.0	7.1	7.3	5.9	6.4	5.9
50%	7.9	7.1	7.5	6.7	7.6	7.9	7.8	8.1	8.0	7.1	7.2	5.7	6.0	5.5
100%	8.9	7.1	7.5	6.7	7.6	7.6	7.6	7.5	7.9	7.1	6.5	4.4	5.7	5.0

TEMPERATURE (°C)

Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.5	24.0	24.2	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.2	24.0	24.1	24.0
12.5%	24.3	24.0	24.2	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.4	24.0	24.1	24.0
25%	24.2	24.0	24.1	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.4	24.0	24.0	24.0
50%	24.2	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.5	24.0	24.0	24.0
100%	24.0	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.3	24.0	24.0	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.6	7.8	7.5	8.3	8.3	7.8
6.25%	7.6	7.8	7.7	7.9	7.4	7.6	7.5	7.5	7.5	7.5	7.3	7.4	7.5	7.4
12.5%	7.6	7.7	7.7	8.0	7.5	7.7	7.6	7.6	7.6	7.4	7.3	7.4	7.5	7.3
25%	7.6	7.6	7.6	8.0	7.5	7.7	7.6	7.6	7.6	7.5	7.3	7.4	7.5	7.2
50%	7.5	7.5	7.5	8.0	7.7	7.7	7.4	7.6	7.5	7.5	7.2	7.4	7.5	7.2
100%	7.4	7.4	7.5	7.9	7.7	7.7	7.2	7.4	7.4	7.6	7.0	7.1	7.5	7.2

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	360	360
6.25%	319	329	312	318	312	314	315	315
12.5%	305	305	307	307	305	306	303	305
25%	273	280	285	275	275	273	273	275
50%	213	219	218	212	215	213	215	213
100%	76	77	81	80	82	85	85	98

ALKALINITY

Control	60	60	60	60	60	60	60	60
100%	21	21	21	21	21	21	21	21

HARDNESS

Control	96	96	96	96	95	95	95	95
100%	23	23	23	23	23	23	23	23

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

Oppt

QC: LM Pass

Chronic juvenile Fathead minnow (*Pimephales promelas*) toxicity test - Survival

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: VCF 5 Lab #: VCF 11 19. 287

Sample I.D.:

Date & Time Start: 11/27/19 1548 Date & Time End: 12/4/19 1539

Conc.	Rep.#	INITIAL	1	2	3	4	5 TD	6 TD	FINAL
USE CONTROL of VF 1119.38V	1								
	2								
	3								
	4								
6.25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	14	14	14	14	15	15	15
	4	15	15	15	15	15	15	15	15
12.5%	1	15	15	15	15	15	14	14	14
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	13/14e
	4	15	15	15	15	15	15	15	15
25%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	15	15	15	15	15	15	15
50%	1	15	14	14	14	14	14	14	13
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	14
	4	15	15	15	15	15	15	15	15
100%	1	15	15	15	15	15	15	15	15
	2	15	15	15	15	15	15	15	15
	3	15	15	15	15	15	15	15	15
	4	15	14	14	15	15	15	15	15

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
XF	CONTROL	1					
		2					
		3					
		4		1.13876 @			
XF 1	6.25%	1		~~1.13376~~	1.14190	0.00814	
2		2		1.14336	1.15053	0.00717	
3		3		1.14042	1.14731	0.00689	
4		4		1.13142	1.13941	0.00799	
XF 5	12.5%	1		1.13646	1.14506	0.00860	
6		2		1.14177	1.14910	0.00733	
7		3		1.14144	1.14895	0.00751	
8		4		1.13366	1.14077	0.00711	
XF 9	25%	1		1.13914	1.14777	0.00863	
10		2		1.13226	1.14021	0.00795	
11		3		1.14808	1.15606	0.00798	
12		4		1.13529	1.14184	0.00655	
XF 13	50%	1		1.13727	1.14432	0.00705	
14		2		1.14483	1.15239	0.00756	
15		3		1.12428	1.13108	0.00680	
16		4		1.15416	1.16233	0.00817	
XF 17	100%	1		1.14258	1.15088	0.00830	
18		2		1.14208	1.14878	0.00670	
19		3		1.13903	1.14552	0.00649	
20		4		1.12641	1.13344	0.00703	

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-HUE
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.275

CHRONIC CERIODAPHNIA SURVIVAL & REPRODUCTION BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
REPRODUCTION	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	74.87 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas	
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable	
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**
Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)	
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE	
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD			

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
00-2461-3443	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		100	>100	n/a	1	n/a	1
07-2106-4075	Reproduction	Dunnett Multiple Comparison Test		100	>100	n/a	1	40.3%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
17-4682-0347	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	62.5	56.25	n/a	1.6	1
				EC10	75	62.5	n/a	1.333	
				EC15	87.5	68.75	n/a	1.143	
				EC20	100	75	n/a	1	
				EC25	>100	n/a	n/a	<1	
				EC40	>100	n/a	n/a	<1	
				EC50	>100	n/a	n/a	<1	
15-6044-1939	Reproduction	Linear Interpolation (ICPIN)	✓	IC5	54.97	39.61	58.43	1.819	1
			✓	IC10	59.95	52.13	66.86	1.668	
			✓	IC15	64.92	57.72	75.29	1.54	
			✓	IC20	69.89	62.99	83.72	1.431	
			✓	IC25	74.87	66.78	92.15	1.336	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
00-2461-3443	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
17-4682-0347	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
07-2106-4075	Reproduction	Control Resp	23	15	>>	Yes	Passes Criteria
15-6044-1939	Reproduction	Control Resp	23	15	>>	Yes	Passes Criteria
07-2106-4075	Reproduction	PMSD	0.4027	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
12.5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
100		10	0.8000	0.4984	1.0000	0.0000	1.0000	0.1333	0.4216	52.70%	20.00%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	23	16.39	29.61	5	35	2.921	9.238	40.16%	0.00%
6.25		10	34.2	27.7	40.7	16	44	2.874	9.09	26.58%	-48.70%
12.5		10	35.5	29.98	41.02	19	46	2.442	7.721	21.75%	-54.35%
25		10	37.2	31.96	42.44	28	51	2.318	7.33	19.71%	-61.74%
50		10	36	29.5	42.5	22	49	2.871	9.08	25.22%	-56.52%
100		10	16.5	8.426	24.57	0	32	3.569	11.29	68.40%	28.26%

Ceriodaphnia 7-d Survival and Reproduction Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	23	22	26	12	34	27	19	35	27	5
6.25		44	43	30	26	41	27	38	40	16	37
12.5		36	38	26	42	38	19	35	37	46	38
25		38	51	43	44	37	28	35	37	28	31
50		49	26	35	37	39	30	31	49	42	22
100		2	23	20	11	15	26	7	0	32	29

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		0/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-2106-4075	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:17	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	40.27%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	-2.768	2.289	9.262	18	CDF	1.0000	Non-Significant Effect
		12.5	-3.089	2.289	9.262	18	CDF	1.0000	Non-Significant Effect
		25	-3.51	2.289	9.262	18	CDF	1.0000	Non-Significant Effect
		50	-3.213	2.289	9.262	18	CDF	1.0000	Non-Significant Effect
		100	1.606	2.289	9.262	18	CDF	0.1837	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	23	15	>>	Yes	Passes Criteria
PMSD	0.4027	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3660.2	732.04	5	8.943	3.1E-06	Significant Effect
Error	4420.2	81.8556	54			
Total	8080.4		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	2.05	15.09	0.8421	Equal Variances
	Levene Equality of Variance Test	0.9303	3.377	0.4688	Equal Variances
	Mod Levene Equality of Variance Test	0.8312	3.377	0.5333	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4773	3.878	0.2413	Normal Distribution
	D'Agostino Kurtosis Test	1.095	2.576	0.2734	Normal Distribution
	D'Agostino Skewness Test	1.127	2.576	0.2598	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	2.469	9.21	0.2909	Normal Distribution
	Kolmogorov-Smirnov D Test	0.08734	0.1331	0.2855	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9706	0.9459	0.1566	Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	23	16.39	29.61		5	35	2.921	40.16%	0.00%
6.25		10	34.2	27.7	40.7		16	44	2.874	26.58%	-48.70%
12.5		10	35.5	29.98	41.02		19	46	2.442	21.75%	-54.35%
25		10	37.2	31.96	42.44		28	51	2.318	19.71%	-61.74%
50		10	36	29.5	42.5		22	49	2.871	25.22%	-56.52%
100		10	16.5	8.426	24.57		0	32	3.569	68.40%	28.26%

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 07-2106-4075 **Endpoint:** Reproduction **CETIS Version:** CETISv1.9.5
Analyzed: 16 Dec-19 13:17 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	23	22	26	12	34	27	19	35	27	5
6.25		44	43	30	26	41	27	38	40	16	37
12.5		36	38	26	42	38	19	35	37	46	38
25		38	51	43	44	37	28	35	37	28	31
50		49	26	35	37	39	30	31	49	42	22
100		2	23	20	11	15	26	7	0	32	29

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-2461-3443	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:18	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	1.0000	Exact	1.0000	Non-Significant Effect
		12.5	1.0000	Exact	1.0000	Non-Significant Effect
		25	1.0000	Exact	1.0000	Non-Significant Effect
		50	1.0000	Exact	1.0000	Non-Significant Effect
		100	0.2368	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	10	0	10	1	0	0.0%
6.25		10	0	10	1	0	0.0%
12.5		10	0	10	1	0	0.0%
25		10	0	10	1	0	0.0%
50		10	0	10	1	0	0.0%
100		8	2	10	0.8	0.2	20.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000

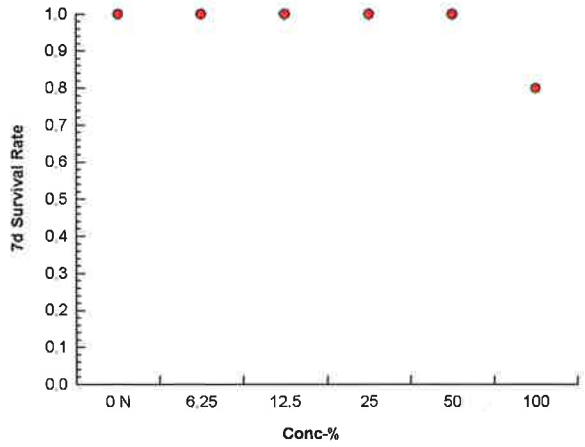
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		0/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-2461-3443	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:18	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4682-0347	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:18	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	62.5	56.25	n/a	1.6	n/a	1.778
EC10	75	62.5	n/a	1.333	n/a	1.6
EC15	87.5	68.75	n/a	1.143	n/a	1.455
EC20	100	75	n/a	1	n/a	1.333
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
6.25		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
12.5		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
25		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
50		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
100		10	0.8000	0.0000	1.0000	0.4216	52.70%	20.0%	8/10	0.8	20.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000

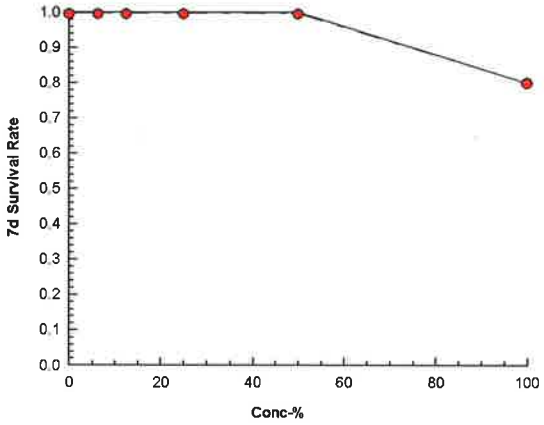
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		0/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4682-0347	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:18	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-6044-1939	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1036891	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	23	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	54.97	39.61	58.43	1.819	1.711	2.525
IC10	59.95	52.13	66.86	1.668	1.496	1.918
IC15	64.92	57.72	75.29	1.54	1.328	1.732
IC20	69.89	62.99	83.72	1.431	1.194	1.588
IC25	74.87	66.78	92.15	1.336	1.085	1.497
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	10	23	5	35	9.238	40.16%	0.0%	33.18	0.0%
6.25		10	34.2	16	44	9.09	26.58%	-48.7%	33.18	0.0%
12.5		10	35.5	19	46	7.721	21.75%	-54.35%	33.18	0.0%
25		10	37.2	28	51	7.33	19.71%	-61.74%	33.18	0.0%
50		10	36	22	49	9.08	25.22%	-56.52%	33.18	0.0%
100		10	16.5	0	32	11.29	68.40%	28.26%	16.5	50.27%

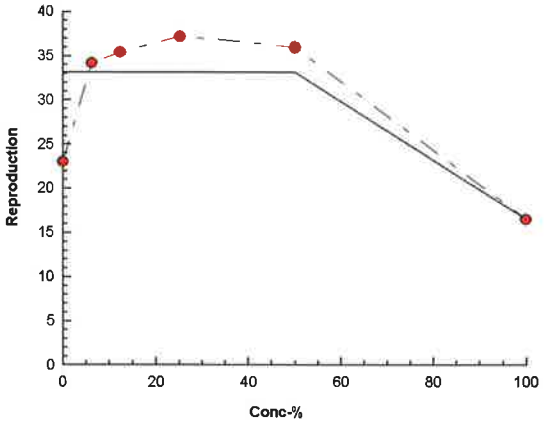
Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	23	22	26	12	34	27	19	35	27	5
6.25		44	43	30	26	41	27	38	40	16	37
12.5		36	38	26	42	38	19	35	37	46	38
25		38	51	43	44	37	28	35	37	28	31
50		49	26	35	37	39	30	31	49	42	22
100		2	23	20	11	15	26	7	0	32	29

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-6044-1939	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 13:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	04-0308-1362	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Joe Freas		
Start Date:	27 Nov-19 15:20	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 15:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	08-8021-0136	**Code:**	VCF1119.275cer	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 08:45	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-HUE		
Sample Age:	7h (9.8 °C)	**Client:**	VCWPD				

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	152	152	152	152	152	0	0	0.0%	0
Overall		16	106	80.68	131.3	60	152	11.88	47.51	44.82%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	527.4	505.7	549.1	499	583	9.171	25.94	4.92%	0
12.5		8	724.2	709.1	739.4	705	761	6.402	18.11	2.5%	0
25		8	1155	1132	1178	1116	1195	9.758	27.6	2.39%	0
50		8	1987	1972	2003	1952	2014	6.593	18.65	0.94%	0
100		8	3516	3498	3534	3490	3545	7.571	21.41	0.61%	0
Overall		48	1375	1053	1697	330	3545	160	1109	80.61%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.863	7.618	8.107	7.4	8.3	0.1034	0.2925	3.72%	0
12.5		8	7.588	6.969	8.206	5.9	8.3	0.2615	0.7396	9.75%	0
25		8	7.412	6.565	8.26	5	8.2	0.3583	1.013	13.67%	0
50		8	7.175	6.353	7.997	5.2	8.1	0.3478	0.9838	13.71%	0
100		8	6.8	5.677	7.923	4.7	8	0.4747	1.343	19.75%	0
Overall		48	7.44	7.178	7.701	4.7	8.3	0.13	0.9005	12.10%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	600	600	600	600	600	0	0	0.0%	0
Overall		16	347.8	208.9	486.6	95	600	65.13	260.5	74.92%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.55	7.409	7.691	7.3	7.9	0.05976	0.169	2.24%	0
12.5		8	7.488	7.366	7.609	7.3	7.7	0.05154	0.1458	1.95%	0
25		8	7.463	7.337	7.588	7.3	7.7	0.05324	0.1506	2.02%	0
50		8	7.413	7.283	7.542	7.2	7.7	0.05489	0.1553	2.1%	0
100		8	7.387	7.25	7.525	7.2	7.7	0.05806	0.1642	2.22%	0
Overall		48	7.517	7.451	7.582	7.2	8.3	0.03266	0.2263	3.01%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.01	23.98	24.04	24	24.1	0.01249	0.03531	0.15%	0
6.25		8	24.15	23.94	24.36	24	24.6	0.08864	0.2507	1.04%	0
12.5		8	24.19	23.99	24.38	24	24.6	0.08331	0.2356	0.97%	0
25		8	24.21	24.01	24.42	24	24.6	0.0875	0.2475	1.02%	0
50		8	24.19	24.02	24.35	24	24.5	0.06927	0.1959	0.81%	0
100		8	24.2	23.98	24.42	24	24.6	0.09449	0.2673	1.1%	0
Overall		48	24.16	24.09	24.22	24	24.6	0.03163	0.2191	0.91%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				152					
0	N	2		60					
100				152					
0	N	3		60					
100				152					
0	N	4		60					
100				152					
0	N	5		60					
100				152					
0	N	6		60					
100				152					
0	N	7		60					
100				152					
0	N	8		60					
100				152					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				521					
12.5				705					
25				1127					
50				1990					
100				3490					
0	N	2		332					
6.25				523					
12.5				714					
25				1190					
50				2004					
100				3540					
0	N	3		331					
6.25				519					
12.5				741					
25				1116					
50				1994					
100				3495					
0	N	4		339					
6.25				532					
12.5				761					
25				1163					
50				1984					
100				3545					
0	N	5		335					
6.25				538					
12.5				724					
25				1148					
50				1985					
100				3518					
0	N	6		330					
6.25				583					
12.5				717					
25				1195					
50				2014					
100				3534					
0	N	7		360					
6.25				504					
12.5				716					
25				1152					
50				1976					
100				3511					
0	N	8		360					
6.25				499					
12.5				716					
25				1146					
50				1952					
100				3498					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.9					
12.5				8					
25				7.9					
50				7.9					
100				8					
0	N	2		8					
6.25				7.9					
12.5				7.5					
25				7.6					
50				6.4					
100				4.9					
0	N	3		7.3					
6.25				7.9					
12.5				7.8					
25				7.6					
50				7.2					
100				6.9					
0	N	4		7.7					
6.25				8.1					
12.5				8					
25				8					
50				8					
100				7.9					
0	N	5		7.6					
6.25				8.3					
12.5				8.3					
25				8.2					
50				8.1					
100				7.9					
0	N	6		7.9					
6.25				7.4					
12.5				7.4					
25				7.3					
50				7					
100				6.5					
0	N	7		7.7					
6.25				7.5					
12.5				7.8					
25				7.7					
50				7.6					
100				7.6					
0	N	8		8.3					
6.25				7.9					
12.5				5.9					
25				5					
50				5.2					
100				4.7					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				600					
0	N	2		96					
100				600					
0	N	3		96					
100				600					
0	N	4		96					
100				600					
0	N	5		95					
100				600					
0	N	6		95					
100				600					
0	N	7		95					
100				600					
0	N	8		95					
100				600					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.6					
12.5				7.5					
25				7.5					
50				7.4					
100				7.4					
0	N	2		7.7					
6.25				7.9					
12.5				7.7					
25				7.6					
50				7.5					
100				7.4					
0	N	3		7.5					
6.25				7.5					
12.5				7.4					
25				7.3					
50				7.2					
100				7.2					
0	N	4		7.6					
6.25				7.6					
12.5				7.6					
25				7.5					
50				7.4					
100				7.3					
0	N	5		7.8					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.4					
0	N	6		7.5					
6.25				7.3					
12.5				7.3					
25				7.3					
50				7.3					
100				7.2					
0	N	7		8.3					
6.25				7.5					
12.5				7.6					
25				7.7					
50				7.7					
100				7.7					
0	N	8		7.8					
6.25				7.5					
12.5				7.3					
25				7.3					
50				7.3					
100				7.5					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24					
12.5				24.2					
25				24.5					
50				24.4					
100				24.6					
0	N	2		24					
6.25				24					
12.5				24					
25				24					
50				24.2					
100				24					
0	N	3		24					
6.25				24.5					
12.5				24.6					
25				24.6					
50				24.5					
100				24.3					
0	N	4		24.1					
6.25				24.1					
12.5				24.1					
25				24.1					
50				24.1					
100				24.1					
0	N	5		24					
6.25				24					
12.5				24.1					
25				24.1					
50				24.3					
100				24.6					
0	N	6		24					
6.25				24.6					
12.5				24.5					
25				24.4					
50				24					
100				24					
0	N	7		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

CHEMICAL ANALYSIS DATA SHEET

VCF 6

Start Date: 11/27/19 1520

Lab # : VCF 11 19.275

End Date: 12/4/19 1515

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 0810	TD 1002	1015	1000	TD 1431	TD 1520	

DISSOLVED OXYGEN (mg/L)

Control	7.9	2.0	8.0	6.9	7.3	8.6	7.7	8.6	7.6	7.3	7.9	7.8	7.9	8.3
6.25%	7.9	6.9	7.9	6.7	7.9	7.8	8.1	8.0	8.3	7.2	7.4	8.3	7.5	7.9
12.5%	8.0	6.8	7.6	6.7	7.8	7.9	8.0	8.1	8.3	7.1	7.4	7.0	7.X	6.9
25%	7.9	6.7	7.6	6.7	7.6	7.6	8.0	7.9	8.2	7.1	7.3	6.8	7.7	5.0
50%	7.9	6.7	6.4	6.7	7.2	7.2	8.0	7.9	8.1	7.1	7.0	5.7	7.6	5.2
100%	8.0	6.7	4.9	6.7	6.9	7.2	7.9	7.3	7.9	7.1	6.5	5.1	7.6	4.7

TEMPERATURE (°C)

Control	24.0	21.0	24.0	21.0	24.0	24.0	24.1	24.0	24.0	21.0	24.0	24.0	24.0	24.0
6.25%	24.0	21.0	24.0	21.0	24.5	24.0	24.1	24.0	24.0	21.0	24.6	24.0	24.0	24.0
12.5%	24.2	21.0	24.0	21.0	24.6	24.0	24.1	24.0	24.1	21.0	24.6	24.0	24.0	24.0
25%	24.5	21.0	24.0	21.0	24.6	24.0	24.1	24.0	24.1	21.0	24.4	24.0	24.0	24.0
50%	24.4	21.0	24.2	21.0	24.5	24.0	24.1	24.0	24.3	21.0	24.0	24.0	24.0	24.0
100%	24.6	21.0	24.0	21.0	24.3	24.0	24.1	24.0	24.6	21.0	24.0	24.0	24.0	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.6	7.6	7.8	7.5	8.3	8.3	7.8
6.25%	7.6	7.7	7.9	7.7	7.5	7.7	7.6	7.5	7.5	7.9	7.3	8.3	7.5	7.5
12.5%	7.5	7.6	7.7	7.6	7.4	7.7	7.6	7.5	7.5	7.9	7.3	8.2	7.6	7.3
25%	7.5	7.5	7.6	7.6	7.3	7.6	7.5	7.6	7.5	7.8	7.3	8.2	7.7	7.3
50%	7.4	7.4	7.5	7.5	7.2	7.6	7.4	7.5	7.5	7.6	7.3	8.1	7.7	7.3
100%	7.4	7.4	7.4	7.5	7.2	7.6	7.3	7.6	7.4	7.7	7.2	8.1	7.7	7.5

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	360	360
6.25%	521	523	519	532	536	583	504	499
12.5%	705	714	741	761	724	717	716	716
25%	1127	1190	1116	1163	1146	1195	1152	1146
50%	1990	2004	1994	1984	1995	2014	1976	1952
100%	3490	3540	3495	3545	3516	3534	3511	3498

ALKALINITY

Control	60	60	60	60	60	60	60	60
100%	152	152	152	152	152	152	152	152

HARDNESS

Control	96	96	96	96	95	95	95	95
100%	600	600	600	600	600	600	600	600

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

1 ppt

QC: Pass

Chronic *Ceriodaphnia dubia* survival and reproduction - VCF 6

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11 / 27 /19

End Date: 12 / 4 /19

Lab #: VCF 11 19. 275

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
CON	3		1	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4		4	✓	4	✓	8	4	6	7	✓	✓
	5		✓	8	✓	7	8	✓	✓	✓	1	✓
	6		8	13	9	5	10	13	7	12	10	5
	7		10	1	13	✓	8	10	6	16	16	✓
	Total	TD	23	22	26	12	34	27	19	35	27	5
6.25%	3	-	3	1	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	✓	7	5	6	5	4	9	4	✓
	5	-	9	10	9	✓	✓	✓	13	12	✓	1
	6	-	14	12	2	6	15	3	1	✓	✓	13
	7	-	18	20	12	15	20	19	20	19	12	23
		-										
	Total	-	44	43	30	26	41	27	38	40	16	37
12.5%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	✓	8	7	4	7	5	6	8	3
	5	-	1	8	9	✓	✓	✓	9	9	16	✓
	6	-	17	12	✓	15	14	12	✓	✓	1	13
	7	-	18	18	9	20	20	✓	21	22	21	22
		-										
	Total	-	36	38	26	42	38	19	35	37	46	38
25%	3	-	1	2	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	3	1	8	9	9	7	5	7	6	6
	5	-	✓	11	13	1	12	✓	13	11	8	✓
	6	-	13	14	✓	11	✓	2	✓	✓	✓	13
	7	-	21	23	22	23	16	19	17	19	14	12
		-										
	Total	-	38	51	43	44	37	28	35	37	28	31
50%	3	-	2	2	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	10	✓	5	4	9	9	5	6	6	10
	5	-	2	9	9	1	1	3	13	19	16	2
	6	-	19	15	✓	12	15	✓	✓	✓	4	✓
	7	-	16	✓	21	20	14	18	13	24	16	10
		-										
	Total	-	49	26	35	37	39	30	31	49	42	22
100%	3	-	✓	3	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	2	✓	✓	1	✓	✓	✓	✓	9	6
	5	-	✓	6	✓	✓	✓	✓	1	✓	6	✓
	6	-	✓	14	8	✓	✓	13	3	✓	2	19
	7	-	✓	✓	12	10	15	13	3	✓	15	4
		-	12/2							12/3		
	Total	-	2	23	20	11	15	26	7	0	32	29

Neonates Data (see back)

QC:

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-VEN
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.277

CHRONIC CERIODAPHNIA SURVIVAL & REPRODUCTION BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
REPRODUCTION	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**	
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
14-6912-6734	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		100	>100	n/a	1	n/a	1
14-8066-6574	Reproduction	Steel Many-One Rank Sum Test		100	>100	n/a	1	32.8%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
14-7554-0809	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	66.67	4.167	n/a	1.5	1
				EC10	100	60	n/a	1	
				EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
21-2078-0755	Reproduction	Linear Interpolation (ICPIN)	✓	IC5	64.74	10.36	n/a	1.545	1
			✓	IC10	79.48	46.48	n/a	1.258	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
14-6912-6734	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
14-7554-0809	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
14-8066-6574	Reproduction	Control Resp	31.6	15	>>	Yes	Passes Criteria
21-2078-0755	Reproduction	Control Resp	31.6	15	>>	Yes	Passes Criteria
14-8066-6574	Reproduction	PMSD	0.3277	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	10.00%
12.5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
100		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	10.00%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	31.6	27.72	35.48	25	38	1.714	5.42	17.15%	0.00%
6.25		10	32.3	24.55	40.05	5	43	3.426	10.83	33.54%	-2.22%
12.5		10	33.5	22.34	44.66	5	49	4.931	15.59	46.55%	-6.01%
25		10	36.4	30.86	41.94	27	48	2.45	7.749	21.29%	-15.19%
50		10	35.4	29.49	41.31	21	45	2.613	8.262	23.34%	-12.03%
100		10	28.1	21.1	35.1	3	39	3.093	9.78	34.81%	11.08%

Analyst: LM QA: Pass

Ceriodaphnia 7-d Survival and Reproduction Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	38	26	35	27	38	37	32	25	33	25
6.25		5	27	37	39	35	36	27	43	39	35
12.5		49	48	44	33	43	38	7	35	33	5
25		47	27	48	43	30	28	30	35	37	39
50		45	21	39	36	38	35	21	44	36	39
100		34	25	33	34	26	28	3	30	29	39

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-8066-6574	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**	
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	32.77%

Steel Many-One Rank Sum Test

Control vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	119.5	75	3	18	CDF	0.9889	Non-Significant Effect
	12.5	121.5	75	4	18	CDF	0.9933	Non-Significant Effect
	25	124.5	75	3	18	CDF	0.9970	Non-Significant Effect
	50	124.5	75	3	18	CDF	0.9970	Non-Significant Effect
	100	98	75	3	18	CDF	0.6322	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	31.6	15	>>	Yes	Passes Criteria
PMSD	0.3277	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	439.483	87.8967	5	0.8591	0.5145	Non-Significant Effect
Error	5524.7	102.309	54			
Total	5964.18		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	10.78	15.09	0.0559	Equal Variances
	Levene Equality of Variance Test	1.187	3.377	0.3277	Equal Variances
	Mod Levene Equality of Variance Test	0.901	3.377	0.4872	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	2.074	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Kurtosis Test	2.334	2.576	0.0196	Normal Distribution
	D'Agostino Skewness Test	3.713	2.576	2.1E-04	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	19.23	9.21	6.7E-05	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.1627	0.1331	4.2E-04	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.8863	0.9459	4.3E-05	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	31.6	27.72	35.48		25	38	1.714	17.15%	0.00%
6.25		10	32.3	24.55	40.05		5	43	3.426	33.54%	-2.22%
12.5		10	33.5	22.34	44.66		5	49	4.931	46.55%	-6.01%
25		10	36.4	30.86	41.94		27	48	2.45	21.29%	-15.19%
50		10	35.4	29.49	41.31		21	45	2.613	23.34%	-12.03%
100		10	28.1	21.1	35.1		3	39	3.093	34.81%	11.08%

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 14-8066-6574 **Endpoint:** Reproduction **CETIS Version:** CETISv1.9.5
Analyzed: 16 Dec-19 15:41 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	38	26	35	27	38	37	32	25	33	25
6.25		5	27	37	39	35	36	27	43	39	35
12.5		49	48	44	33	43	38	7	35	33	5
25		47	27	48	43	30	28	30	35	37	39
50		45	21	39	36	38	35	21	44	36	39
100		34	25	33	34	26	28	3	30	29	39

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-6912-6734	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**	
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	0.5000	Exact	1.0000	Non-Significant Effect
		12.5	1.0000	Exact	1.0000	Non-Significant Effect
		25	1.0000	Exact	1.0000	Non-Significant Effect
		50	1.0000	Exact	1.0000	Non-Significant Effect
		100	0.5000	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	10	0	10	1	0	0.0%
6.25		9	1	10	0.9	0.1	10.0%
12.5		10	0	10	1	0	0.0%
25		10	0	10	1	0	0.0%
50		10	0	10	1	0	0.0%
100		9	1	10	0.9	0.1	10.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

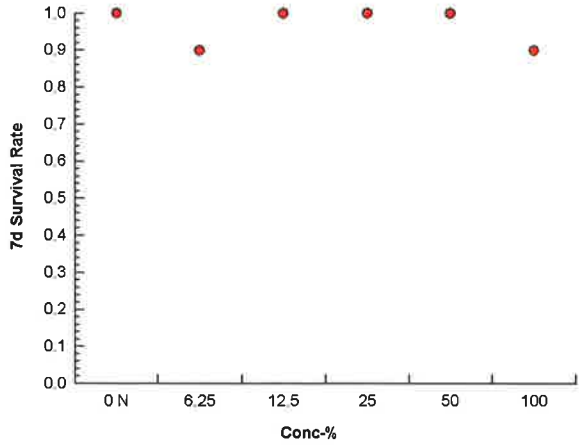
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-6912-6734	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-7554-0809	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**	
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	66.67	4.167	n/a	1.5	n/a	24
EC10	100	60	n/a	1	n/a	1.667
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
6.25		10	0.9000	0.0000	1.0000	0.3162	35.14%	10.0%	9/10	0.975	2.5%
12.5		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	0.975	2.5%
25		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	0.975	2.5%
50		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	0.975	2.5%
100		10	0.9000	0.0000	1.0000	0.3162	35.14%	10.0%	9/10	0.9	10.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

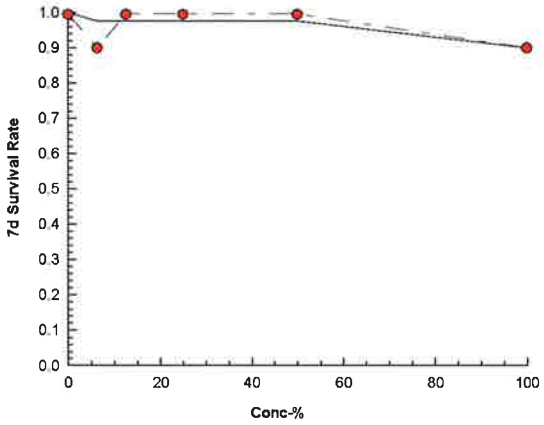
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-7554-0809	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-2078-0755	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**	
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	954193	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	31.6	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	64.74	10.36	n/a	1.545	n/a	9.648
IC10	79.48	46.48	n/a	1.258	n/a	2.151
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	10	31.6	25	38	5.42	17.15%	0.0%	33.84	0.0%
6.25		10	32.3	5	43	10.83	33.54%	-2.22%	33.84	0.0%
12.5		10	33.5	5	49	15.59	46.55%	-6.01%	33.84	0.0%
25		10	36.4	27	48	7.749	21.29%	-15.19%	33.84	0.0%
50		10	35.4	21	45	8.262	23.34%	-12.03%	33.84	0.0%
100		10	28.1	3	39	9.78	34.81%	11.08%	28.1	16.96%

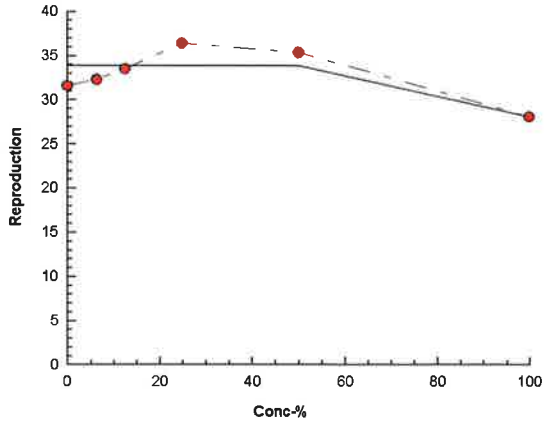
Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	38	26	35	27	38	37	32	25	33	25
6.25		5	27	37	39	35	36	27	43	39	35
12.5		49	48	44	33	43	38	7	35	33	5
25		47	27	48	43	30	28	30	35	37	39
50		45	21	39	36	38	35	21	44	36	39
100		34	25	33	34	26	28	3	30	29	39

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-2078-0755	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-7932-4906	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:21	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 15:35	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable	
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	15-9752-6659	**Code:**	VCF1119.277cer	**Project:**		
Sample Date:	27 Nov-19 06:20	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	MO-VEN	
Sample Age:	9h (8.8 °C)	**Client:**	VCWPD			

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
Overall		16	40.5	29.77	51.23	21	60	5.035	20.14	49.73%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	368.2	335	401.5	317	426	14.04	39.71	10.78%	0
12.5		8	309.9	305.2	314.6	300	319	1.995	5.643	1.82%	0
25		8	283.9	271.8	295.9	275	319	5.094	14.41	5.08%	0
50		8	232.4	208.6	256.2	215	300	10.06	28.46	12.25%	0
100		8	99	93.75	104.2	92	108	2.22	6.279	6.34%	0
Overall		48	272.5	245.8	299.2	92	426	13.27	91.95	33.74%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.625	7.192	8.058	6.6	8.2	0.183	0.5175	6.79%	0
12.5		8	7.525	6.96	8.09	6	8.1	0.2389	0.6756	8.98%	0
25		8	7.488	6.877	8.098	5.8	8	0.258	0.7298	9.75%	0
50		8	7.288	6.429	8.146	5	8.3	0.3632	1.027	14.1%	0
100		8	7.138	6.048	8.227	4.9	9	0.4606	1.303	18.25%	0
Overall		48	7.477	7.242	7.713	4.9	9	0.1171	0.8112	10.85%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	28	28	28	28	28	0	0	0.0%	0
Overall		16	61.75	43.18	80.32	28	96	8.715	34.86	56.45%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.762	7.674	7.851	7.6	7.9	0.0375	0.1061	1.37%	0
12.5		8	7.663	7.537	7.788	7.4	7.8	0.05324	0.1506	1.97%	0
25		8	7.575	7.435	7.715	7.3	7.8	0.05901	0.1669	2.2%	0
50		8	7.5	7.359	7.641	7.2	7.7	0.05976	0.169	2.25%	0
100		8	7.338	7.138	7.537	7	7.6	0.08438	0.2387	3.25%	0
Overall		48	7.606	7.535	7.678	7	8.3	0.03566	0.247	3.25%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.01	23.98	24.04	24	24.1	0.01249	0.03531	0.15%	0
6.25		8	24.2	24.02	24.38	24	24.6	0.07792	0.2204	0.91%	0
12.5		8	24.25	24.06	24.44	24	24.6	0.08018	0.2268	0.94%	0
25		8	24.2	24.08	24.32	24	24.4	0.05	0.1414	0.58%	0
50		8	24.15	24.04	24.26	24	24.3	0.04629	0.1309	0.54%	0
100		8	24.03	23.99	24.06	24	24.1	0.01634	0.04623	0.19%	0
Overall		48	24.14	24.09	24.19	24	24.6	0.02469	0.171	0.71%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				21					
0	N	2		60					
100				21					
0	N	3		60					
100				21					
0	N	4		60					
100				21					
0	N	5		60					
100				21					
0	N	6		60					
100				21					
0	N	7		60					
100				21					
0	N	8		60					
100				21					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				317					
12.5				310					
25				319					
50				240					
100				95					
0	N	2		332					
6.25				339					
12.5				310					
25				279					
50				215					
100				92					
0	N	3		331					
6.25				426					
12.5				319					
25				281					
50				222					
100				95					
0	N	4		339					
6.25				346					
12.5				309					
25				276					
50				216					
100				95					
0	N	5		335					
6.25				333					
12.5				306					
25				275					
50				217					
100				96					
0	N	6		330					
6.25				410					
12.5				300					
25				281					
50				224					
100				104					
0	N	7		360					
6.25				387					
12.5				310					
25				278					
50				225					
100				107					
0	N	8		360					
6.25				388					
12.5				315					
25				282					
50				300					
100				108					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.7					
12.5				7.8					
25				8					
50				8.3					
100				9					
0	N	2		8					
6.25				7.9					
12.5				7.8					
25				7.7					
50				7.2					
100				6.4					
0	N	3		7.3					
6.25				7.5					
12.5				7.6					
25				7.6					
50				7.5					
100				7.3					
0	N	4		7.7					
6.25				8.2					
12.5				8.1					
25				8					
50				8					
100				8					
0	N	5		7.6					
6.25				8					
12.5				8.1					
25				8					
50				7.9					
100				7.9					
0	N	6		7.9					
6.25				7.2					
12.5				7.3					
25				7.3					
50				6.9					
100				6					
0	N	7		7.7					
6.25				7.9					
12.5				7.5					
25				7.5					
50				7.5					
100				7.6					
0	N	8		8.3					
6.25				6.6					
12.5				6					
25				5.8					
50				5					
100				4.9					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				28					
0	N	2		96					
100				28					
0	N	3		96					
100				28					
0	N	4		96					
100				28					
0	N	5		95					
100				28					
0	N	6		95					
100				28					
0	N	7		95					
100				28					
0	N	8		95					
100				28					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.6					
12.5				7.6					
25				7.5					
50				7.5					
100				7.3					
0	N	2		7.7					
6.25				7.7					
12.5				7.8					
25				7.7					
50				7.6					
100				7.4					
0	N	3		7.5					
6.25				7.8					
12.5				7.7					
25				7.6					
50				7.6					
100				7.6					
0	N	4		7.6					
6.25				7.8					
12.5				7.7					
25				7.6					
50				7.5					
100				7.3					
0	N	5		7.8					
6.25				7.9					
12.5				7.8					
25				7.8					
50				7.7					
100				7.5					
0	N	6		7.5					
6.25				7.7					
12.5				7.5					
25				7.4					
50				7.2					
100				7					
0	N	7		8.3					
6.25				7.9					
12.5				7.8					
25				7.7					
50				7.6					
100				7.6					
0	N	8		7.8					
6.25				7.7					
12.5				7.4					
25				7.3					
50				7.3					
100				7					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.3					
12.5				24.4					
25				24.2					
50				24.2					
100				24					
0	N	2		24					
6.25				24.2					
12.5				24.1					
25				24.2					
50				24					
100				24					
0	N	3		24					
6.25				24.4					
12.5				24.4					
25				24.3					
50				24.3					
100				24					
0	N	4		24.1					
6.25				24.1					
12.5				24.1					
25				24.2					
50				24.2					
100				24.1					
0	N	5		24					
6.25				24					
12.5				24.4					
25				24.3					
50				24.2					
100				24.1					
0	N	6		24					
6.25				24.6					
12.5				24.6					
25				24.4					
50				24.3					
100				24					
0	N	7		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

Analyst:_____ QA:_____

CHEMICAL ANALYSIS DATA SHEET

VCF ~~6~~ 7 (R)

Start Date: 11/27/19 1521

Lab # : VCF 11 19. 277

End Date: 12/4/19 1535

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1		11/29 2		11/30 3		12/1 4		12/2 5		12/3 6		12/4 7
Initials	TD	TD	0822	TD	1030	[illegible]	1045	[illegible]	1040	TD	1448	TD	1648	[illegible]
DISSOLVED OXYGEN (mg/L)														
Control	7.9	7.0	8.0	6.9	7.3	8.8	7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.7	6.9	7.9	6.8	7.5	8.1	8.2	8.2	8.0	7.2	7.2	7.4	7.9	6.6
12.5%	7.8	6.5	7.6	6.7	7.6	8.2	8.1	8.1	8.1	7.1	7.3	6.5	7.5	6.0
25%	8.0	7.0	7.7	6.7	7.6	7.6	8.0	8.1	8.0	7.1	7.3	6.0	7.5	5.8
50%	8.3	7.1	7.2	6.7	7.5	7.6	8.0	8.1	7.9	7.1	6.9	5.2	7.5	5.0
100%	9.0	7.1	6.4	6.7	7.3	7.2	8.0	7.3	7.9	7.1	6.0	4.8	7.6	4.9
TEMPERATURE (°C)														
Control	24.0	24.0	24.0	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6.25%	24.3	24.0	24.2	24.0	24.4	24.0	24.1	24.0	24.0	24.0	24.6	24.0	24.0	24.0
12.5%	24.4	24.0	24.1	24.0	24.4	24.0	24.1	24.0	24.4	24.0	24.6	24.0	24.0	24.0
25%	24.2	24.0	24.2	24.0	24.3	24.0	24.2	24.0	24.3	24.0	24.4	24.0	24.0	24.0
50%	24.2	24.0	24.0	24.0	24.3	24.0	24.2	24.0	24.2	24.0	24.3	24.0	24.0	24.0
100%	24.0	24.0	24.0	24.0	24.0	24.0	24.1	24.0	24.1	24.0	24.0	24.0	24.0	24.0
pH														
Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
6.25%	7.6	7.8	7.7	7.7	7.8	8.1	7.8	7.9	7.9	7.9	7.7	8.3	7.9	7.7
12.5%	7.6	7.7	7.8	8.0	7.7	8.0	7.7	7.8	7.8	8.0	7.5	8.1	7.8	7.4
25%	7.5	7.6	7.7	8.1	7.6	7.9	7.6	7.7	7.8	8.0	7.4	8.0	7.7	7.3
50%	7.5	7.5	7.6	8.0	7.6	7.6	7.5	7.7	7.7	8.0	7.2	7.9	7.6	7.3
100%	7.3	7.5	7.4	8.1	7.6	7.7	7.3	7.6	7.5	7.9	7.0	7.7	7.6	7.0

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
CONDUCTIVITY (uS/cm)								
Control	347	332	331	339	335	330	366	360
6.25%	317	339	426	346	333	410	387	388
12.5%	310	310	319	309	306	300	310	315
25%	319	279	281	276	275	281	278	282
50%	240	215	222	216	217	224	235	300
100%	95	92	95	95	96	104	109	108
ALKALINITY								
Control	60	60	60	60	60	60	60	60
100%	21	21	21	21	21	21	21	21
HARDNESS								
Control	96	96	96	96	95	95	95	95
100%	28	28	28	28	28	28	28	28

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

0ppt

QC: [illegible]

Chronic *Ceriodaphnia dubia* survival and reproduction - VCF 7

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11/27/19

End Date: 12/4/19

Lab #: VCF 11 19. 277

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
CON	3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4		✓	✓	10	✓	10	8	4	6	7	✓
	5		10	11	✓	8	✓	✓	✓	✓	✓	12
	6		15	13	13	8	17	14	16	4	13	15
	7		13	2	12	11	11	15	12	15	13	1
	Total	TD	38	26	35	27	38	37	32	25	33	28
6.25%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	✓	6	✓	6	6	6	6	6	✓
	5	-	4	9	9	5	✓	✓	9	19	14	8
	6	-	✓	16	13	15	13	13	✓	✓	1	15
	7	-	X 12/4	2	17	19	16	17	12	18	18	12
		-										
	Total	-	5	27	37	39	35	36	27	43	39	35
12.5%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	6	✓	6	6	7	6	✓	7	6	✓
	5	-	9	10	12	✓	✓	13	✓	12	11	✓
	6	-	17	16	6	11	16	✓	✓	13	✓	✓
	7	-	23	22	20	16	20	17	7	3	16	3
		-										
	Total	-	49	48	44	33	43	38	7	35	33	5
25%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	✓	6	6	4	6	6	6	9	✓
	5	-	14	10	14	✓	✓	10	10	11	10	7
	6	-	15	14	8	16	16	✓	✓	✓	✓	16
	7	-	18	3	20	21	10	12	14	18	18	16
		-										
	Total	-	47	27	48	43	30	28	30	35	37	39
50%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	1	✓
	4	-	1	7	5	2	5	6	✓	9	5	3
	5	-	9	8	11	✓	✓	3	7	17	12	✓
	6	-	17	6	1	13	15	9	✓	3	✓	18
	7	-	18	✓	22	21	18	17	14	16	18	18
		-										
	Total	-	45	21	39	36	38	35	21	44	36	39
100%	3	-	1	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	9	1	5	9	8	5	1	5	3	5
	5	-	✓	9	16	✓	3	9	✓	8	14	✓
	6	-	9	15	2	13	2	1	2	2	✓	15
	7	-	16	X 12/3	10	12	13	13	✓	15	12	19
		-										
	Total	-	34	26	33	34	26	28	3	30	29	39

Neonates Data (see back)

QC: LP

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-FIL
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.281

CHRONIC CERIODAPHNIA SURVIVAL & REPRODUCTION BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
REPRODUCTION	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable	
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**
Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**		
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL	
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD			

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
07-0146-0670	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		100	>100	n/a	1	n/a	1
09-6058-9519	Reproduction	Steel Many-One Rank Sum Test		100	>100	n/a	1	34.2%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
10-5453-4366	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	37.50	33.33	n/a	1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
03-1216-2790	Reproduction	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
07-0146-0670	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
10-5453-4366	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
03-1216-2790	Reproduction	Control Resp	27.7	15	>>	Yes	Passes Criteria
09-6058-9519	Reproduction	Control Resp	27.7	15	>>	Yes	Passes Criteria
09-6058-9519	Reproduction	PMSD	0.3423	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
6.25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
12.5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	10.00%
100		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	27.7	24.1	31.3	22	39	1.592	5.034	18.17%	0.00%
6.25		10	27.4	23.09	31.71	17	37	1.904	6.022	21.98%	1.08%
12.5		10	34.8	30.34	39.26	22	43	1.971	6.233	17.91%	-25.63%
25		10	36.2	31.36	41.04	27	47	2.139	6.763	18.68%	-30.69%
50		10	34.2	23.46	44.94	0	51	4.746	15.01	43.89%	-23.47%
100		10	30	21.41	38.59	15	54	3.798	12.01	40.03%	-8.30%

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	22	27	29	39	26	29	22	32	26	25
6.25		31	26	23	37	24	17	25	27	28	36
12.5		37	22	37	35	35	33	27	43	40	39
25		39	27	47	43	32	38	27	31	37	41
50		0	28	30	51	49	46	31	26	39	42
100		35	21	35	54	15	41	15	30	26	28

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-6058-9519	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**	
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	34.23%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	103	75	3	18	CDF	0.7843	Non-Significant Effect
		12.5	136	75	3	18	CDF	0.9999	Non-Significant Effect
		25	140.5	75	3	18	CDF	1.0000	Non-Significant Effect
		50	130.5	75	2	18	CDF	0.9995	Non-Significant Effect
		100	111	75	1	18	CDF	0.9347	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	27.7	15	>>	Yes	Passes Criteria
PMSD	0.3423	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	743.933	148.787	5	1.735	0.1424	Non-Significant Effect
Error	4631.8	85.7741	54			
Total	5375.73		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	17.59	15.09	0.0035	Unequal Variances
	Levene Equality of Variance Test	2.841	3.377	0.0238	Equal Variances
	Mod Levene Equality of Variance Test	2.773	3.377	0.0266	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.5583	3.878	0.1529	Normal Distribution
	D'Agostino Kurtosis Test	2.976	2.576	0.0029	Non-Normal Distribution
	D'Agostino Skewness Test	1.89	2.576	0.0588	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	12.43	9.21	0.0020	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.09307	0.1331	0.2075	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9547	0.9459	0.0260	Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	27.7	24.1	31.3		22	39	1.592	18.17%	0.00%
6.25		10	27.4	23.09	31.71		17	37	1.904	21.98%	1.08%
12.5		10	34.8	30.34	39.26		22	43	1.971	17.91%	-25.63%
25		10	36.3	31.52	41.08		27	47	2.114	18.41%	-31.05%
50		10	34.2	23.46	44.94		0	51	4.746	43.89%	-23.47%
100		10	30	21.41	38.59		15	54	3.798	40.03%	-8.30%

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-6058-9519	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	22	27	29	39	26	29	22	32	26	25
6.25		31	26	23	37	24	17	25	27	28	36
12.5		37	22	37	35	35	33	27	43	40	39
25		39	27	47	43	32	38	27	32	37	41
50		0	28	30	51	49	46	31	26	39	42
100		35	21	35	54	15	41	15	30	26	28

Ceriodaphnia 7-d Survival and Reproduction Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	07-0146-0670	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**	
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	1.0000	Exact	1.0000	Non-Significant Effect
		12.5	1.0000	Exact	1.0000	Non-Significant Effect
		25	1.0000	Exact	1.0000	Non-Significant Effect
		50	0.5000	Exact	1.0000	Non-Significant Effect
		100	1.0000	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	10	0	10	1	0	0.0%
6.25		10	0	10	1	0	0.0%
12.5		10	0	10	1	0	0.0%
25		10	0	10	1	0	0.0%
50		9	1	10	0.9	0.1	10.0%
100		10	0	10	1	0	0.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

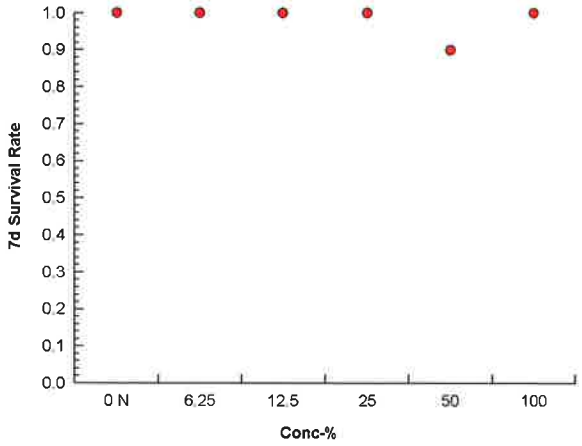
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-0146-0670	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	10-5453-4366	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**	
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	37.50	33.33	n/a	1	n/a	3
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
6.25		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
12.5		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
25		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
50		10	0.9000	0.0000	1.0000	0.3162	35.14%	10.0%	9/10	0.95	5.0%
100		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	0.95	5.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

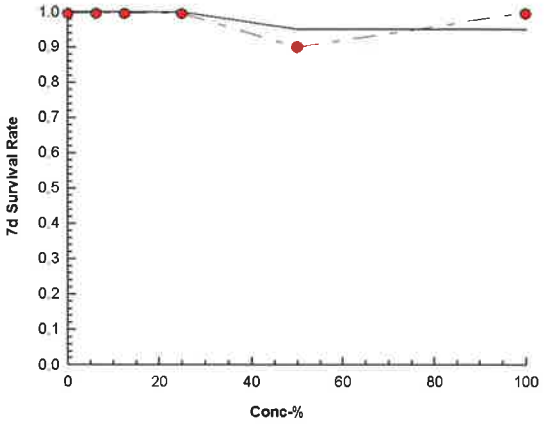
7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-5453-4366	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-1216-2790	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**	
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	27.7	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	10	27.7	22	39	5.034	18.17%	0.0%	32.08	0.0%
6.25		10	27.4	17	37	6.022	21.98%	1.08%	32.08	0.0%
12.5		10	34.8	22	43	6.233	17.91%	-25.63%	32.08	0.0%
25		10	36.3	27	47	6.684	18.41%	-31.05%	32.08	0.0%
50		10	34.2	0	51	15.01	43.89%	-23.47%	32.08	0.0%
100		10	30	15	54	12.01	40.03%	-8.3%	30	6.48%

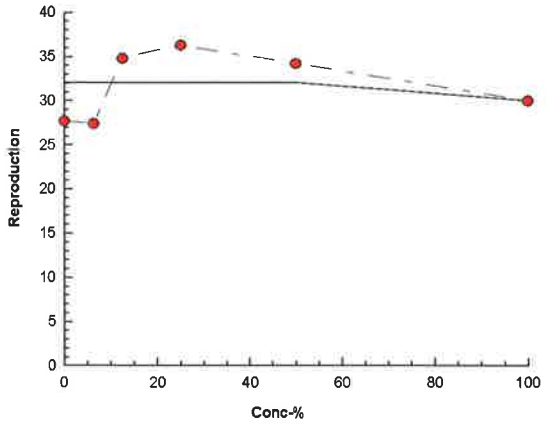
Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	22	27	29	39	26	29	22	32	26	25
6.25		31	26	23	37	24	17	25	27	28	36
12.5		37	22	37	35	35	33	27	43	40	39
25		39	27	47	43	32	38	27	32	37	41
50		0	28	30	51	49	46	31	26	39	42
100		35	21	35	54	15	41	15	30	26	28

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-1216-2790	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:50	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	19-6728-6000	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:22	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 15:47	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable	
Test Length:	7d 0h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	12-7401-3179	**Code:**	VEN1119.281cer	**Project:**		
Sample Date:	27 Nov-19 07:30	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	MO-FIL	
Sample Age:	8h (7.8 °C)	**Client:**	VCWPD			

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	29	29	29	29	29	0	0	0.0%	0
Overall		16	44.5	35.97	53.03	29	60	4.002	16.01	35.97%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	317.2	316.3	318.2	315	318	0.4119	1.165	0.37%	0
12.5		8	312.4	311.9	312.8	312	313	0.183	0.5175	0.17%	0
25		8	288.9	288	289.7	287	290	0.3504	0.991	0.34%	0
50		8	244.1	242.5	245.7	242	248	0.6665	1.885	0.77%	0
100		8	152.9	147.6	158.1	145	162	2.224	6.289	4.11%	0
Overall		48	276.2	257.7	294.7	145	360	9.2	63.74	23.08%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.45	6.879	8.021	5.9	8.1	0.2413	0.6824	9.16%	0
12.5		8	7.438	6.818	8.057	5.7	8	0.2618	0.7405	9.96%	0
25		8	7.35	6.548	8.152	5.1	8	0.3391	0.9592	13.05%	0
50		8	7.15	6.262	8.038	4.8	8.2	0.3756	1.062	14.86%	0
100		8	6.9	5.511	8.289	4.3	8.9	0.5874	1.661	24.08%	0
Overall		48	7.348	7.064	7.632	4.3	8.9	0.1414	0.9794	13.33%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	52	52	52	52	52	0	0	0.0%	0
Overall		16	73.75	61.78	85.72	52	96	5.617	22.47	30.46%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.475	7.378	7.572	7.3	7.6	0.04119	0.1165	1.56%	0
12.5		8	7.5	7.382	7.618	7.2	7.6	0.05	0.1414	1.89%	0
25		8	7.487	7.374	7.601	7.2	7.6	0.04795	0.1356	1.81%	0
50		8	7.375	7.251	7.499	7.1	7.6	0.05261	0.1488	2.02%	0
100		8	7.275	7.103	7.447	7	7.6	0.07258	0.2053	2.82%	0
Overall		48	7.485	7.416	7.555	7	8.3	0.03459	0.2397	3.20%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.12	23.93	24.32	24	24.6	0.08399	0.2376	0.98%	0
6.25		8	24.26	24.09	24.44	24	24.6	0.07304	0.2066	0.85%	0
12.5		8	24.29	24.09	24.49	24	24.5	0.08544	0.2416	0.99%	0
25		8	24.24	24.07	24.4	24	24.5	0.07055	0.1996	0.82%	0
50		8	24.21	24.02	24.4	24	24.6	0.08114	0.2295	0.95%	0
100		8	24.12	23.98	24.27	24	24.4	0.06196	0.1752	0.73%	0
Overall		48	24.21	24.15	24.27	24	24.6	0.03092	0.2142	0.88%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				29					
0	N	2		60					
100				29					
0	N	3		60					
100				29					
0	N	4		60					
100				29					
0	N	5		60					
100				29					
0	N	6		60					
100				29					
0	N	7		60					
100				29					
0	N	8		60					
100				29					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				318					
12.5				313					
25				289					
50				243					
100				150					
0	N	2		332					
6.25				318					
12.5				312					
25				289					
50				244					
100				147					
0	N	3		331					
6.25				317					
12.5				312					
25				290					
50				245					
100				145					
0	N	4		339					
6.25				318					
12.5				312					
25				288					
50				243					
100				151					
0	N	5		335					
6.25				318					
12.5				312					
25				287					
50				242					
100				150					
0	N	6		330					
6.25				318					
12.5				312					
25				289					
50				245					
100				158					
0	N	7		360					
6.25				316					
12.5				313					
25				290					
50				248					
100				162					
0	N	8		360					
6.25				315					
12.5				313					
25				289					
50				243					
100				160					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.8					
12.5				7.8					
25				8					
50				8.2					
100				8.9					
0	N	2		8					
6.25				7.6					
12.5				7.6					
25				7.2					
50				6.5					
100				4.4					
0	N	3		7.3					
6.25				7.5					
12.5				7.4					
25				7.4					
50				7.3					
100				7					
0	N	4		7.7					
6.25				8.1					
12.5				8					
25				8					
50				7.7					
100				7.6					
0	N	5		7.6					
6.25				7.9					
12.5				8					
25				8					
50				7.6					
100				7.5					
0	N	6		7.9					
6.25				7.2					
12.5				7.4					
25				7.5					
50				7.5					
100				7.7					
0	N	7		7.7					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.6					
100				7.8					
0	N	8		8.3					
6.25				5.9					
12.5				5.7					
25				5.1					
50				4.8					
100				4.3					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				52					
0	N	2		96					
100				52					
0	N	3		96					
100				52					
0	N	4		96					
100				52					
0	N	5		95					
100				52					
0	N	6		95					
100				52					
0	N	7		95					
100				52					
0	N	8		95					
100				52					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.4					
0	N	2		7.7					
6.25				7.5					
12.5				7.6					
25				7.6					
50				7.4					
100				7					
0	N	3		7.5					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.4					
100				7.4					
0	N	4		7.6					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.4					
100				7.3					
0	N	5		7.8					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.3					
100				7.3					
0	N	6		7.5					
6.25				7.3					
12.5				7.4					
25				7.4					
50				7.3					
100				7.2					
0	N	7		8.3					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.6					
100				7.6					
0	N	8		7.8					
6.25				7.3					
12.5				7.2					
25				7.2					
50				7.1					
100				7					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.2					
12.5				24.5					
25				24.5					
50				24.6					
100				24.4					
0	N	2		24					
6.25				24.2					
12.5				24					
25				24.2					
50				24.1					
100				24					
0	N	3		24					
6.25				24.4					
12.5				24.5					
25				24.5					
50				24.5					
100				24.4					
0	N	4		24.6					
6.25				24.4					
12.5				24.4					
25				24.3					
50				24.3					
100				24.1					
0	N	5		24.4					
6.25				24.3					
12.5				24.4					
25				24.1					
50				24.1					
100				24.1					
0	N	6		24					
6.25				24.6					
12.5				24.5					
25				24.3					
50				24.1					
100				24					
0	N	7		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

Analyst: _____ QA: _____

CHEMICAL ANALYSIS DATA SHEET

VCF 8

Start Date: 11/27/19 1522

Lab # : VCF 11 19.281

End Date: 12/4/19 1547

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 0842	TD 1048	L 1053	L 1100	TD 1500	TD 1710	L
DISSOLVED OXYGEN (mg/L)								
Control	24.6	7.0 8.0	6.9 7.3	8.8 7.7	8.6 7.6	7.3 7.9	7.8 7.7	8.3
6.25%	7.8	7.0 7.6	6.8 7.5	7.7 8.1	7.9 7.9	7.2 7.2	6.9 7.6	7.9
12.5%	7.8	6.9 7.6	6.7 7.4	7.8 8.0	8.0 8.0	7.1 7.4	6.7 7.6	5.7
25%	8.0	7.1 7.2	6.7 7.4	7.7 8.0	8.2 8.0	7.1 7.5	5.4 7.6	5.1
50%	8.2	7.1 6.5	6.7 7.3	7.8 7.7	7.9 7.6	7.1 7.5	5.1 7.6	4.8
100%	8.9	6.7 4.4	6.7 35/7.0	6.6 7.6	6.9 7.5	7.0 7.7	4.8 7.8	4.3
TEMPERATURE (°C)								
Control	24.0	24.0 24.0	24.0 24.0	24.0 24.6	24.0 24.4	24.0 24.0	24.0 24.0	24.0
6.25%	24.2	24.0 24.2	24.0 24.4	24.0 24.4	24.0 24.3	24.0 24.6	24.0 24.0	24.0
12.5%	24.5	24.0 24.0	24.0 24.5	24.0 24.4	24.0 24.4	24.0 24.5	24.0 24.0	24.0
25%	24.5	24.0 24.2	24.0 24.5	24.0 24.3	24.0 24.1	24.0 24.3	24.0 24.0	24.0
50%	24.6	24.0 24.1	24.0 24.5	24.0 24.3	24.0 24.1	24.0 24.1	24.0 24.0	24.0
100%	24.4	24.0 24.0	24.0 24.4	24.0 24.1	24.0 24.1	24.0 24.0	24.0 24.0	24.0
pH								
Control	8.2	7.5 7.7	7.8 7.8	7.9 7.6	7.6 7.6	7.8 7.5	8.3 8.3	7.8
6.25%	7.5	7.5 7.5	7.7 7.6	7.6 7.5	7.6 7.6	7.7 7.3	7.9 7.6	7.3
12.5%	7.5	7.5 7.6	7.7 7.5	7.6 7.6	7.6 7.6	7.7 7.4	7.9 7.6	7.2
25%	7.5	7.5 7.6	7.8 7.5	7.7 7.5	7.6 7.6	7.7 7.4	7.9 7.6	7.2
50%	7.5	7.5 7.4	7.8 7.4	7.6 7.4	7.5 7.3	7.5 7.3	7.8 7.6	7.1
100%	7.4	7.5 7.0	7.7 7.4	7.4 7.3	7.4 7.3	7.5 7.2	7.6 7.6	7.0
CONDUCTIVITY (uS/cm)								
Control	347	332	331	339	335	330	360	360
6.25%	318	316	317	318	318	318	316	315
12.5%	313	312	312	312	312	312	313	313
25%	289	289	290	288	287	289	290	289
50%	243	244	245	243	242	245	248	243
100%	150	147	145	151	150	158	162	160
ALKALINITY								
Control	60	60	60	60	60	60	60	60
100%	29	29	29	29	29	29	29	29
HARDNESS								
Control	96	96	96	96	95	98	95	95
100%	52	52	52	52	52	52	52	52

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

Oppt

QC:

Chronic *Ceriodaphnia dubia* survival and reproduction - VCF 8

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11 / 27 /19

End Date: 12 / 4 /19

Lab #: VCF 11 19.281

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
CON	3	LP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	LP	✓	5	2	✓	5	6	4	7	3	✓
	5	LP	8	6	✓	6	✓	✓	5	11	9	✓
	6	LP	13	✓	11	15	10	12	12	1	✓	12
	7	LP	1	16	16	18	11	11	1	13	14	13
	Total	TD	22	27	29	39	26	29	22	32	26	25
6.25%	3	-	2	2	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	✓	3	3	6	4	3	3	5	6
	5	-	9	11	3	✓	✓	✓	7	10	7	✓
	6	-	7	13	✓	13	12	✓	2	1	✓	14
	7	-	13	✓	17	21	6	13	13	13	16	16
		-										
	Total	-	31	26	23	37	24	17	25	27	28	36
12.5%	3	-	1	✓	✓	✓	✓	✓	✓	6	✓	✓
	4	-	✓	2	9	6	8	6	5	10	8	6
	5	-	11	8	11	✓	✓	✓	10	8	13	✓
	6	-	4	12	✓	13	13	13	✓	2	✓	15
	7	-	21	✓	17	16	14	14	12	17	19	18
		-										
	Total	-	37	22	37	35	35	33	27	43	40	39
25%	3	-	2	3	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	6	2	6	3	3	7	6	3	9	4
	5	-	✓	✓	16	✓	11	13	7	✓	16	✓
	6	-	15	13	2	17	✓	3	✓	13	✓	17
	7	-	16	11	23	23	18	15	14	15	12	20
		-										
	Total	-	39	27	47	43	32	38	27	31	37	41
50%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-		✓	6	8	11	4	2	7	6	3
	5	-		10	✓	✓	✓	✓	8	10	12	✓
	6	-		18	8	20	18	19	3	3	2	16
	7	-		✓	16	23	20	23	18	6	19	23
		-	12/1									
	Total	-	0	28	30	51	49	46	31	26	39	42
100%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	✓	6	9	10	✓	5	6	2	5	✓
	5	-	8	✓	✓	3	✓	✓	✓	10	9	6
	6	-	17	✓	9	22	6	14	✓	✓	✓	13
	7	-	10	15	17	19	9	22	9	18	12	9
		-										
	Total	-	35	21	35	54	15	41	15	30	26	28

Neonates Data (see back)

QC: LP

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013.* Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-THO
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.284

CHRONIC CERIODAPHNIA SURVIVAL & REPRODUCTION BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
REPRODUCTION	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

m. Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	08-0802-5671	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	11-8024-6774	**Code:**	VCF1119.284cer	**Project:**			
Sample Date:	27 Nov-19 10:10	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-THO		
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
15-7869-7184	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		100	>100	n/a	1	n/a	1
08-8694-7451	Reproduction	Steel Many-One Rank Sum Test		100	>100	n/a	1	43.7%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
03-2541-2948	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
20-0413-4940	Reproduction	Linear Interpolation (ICPIN)		IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
03-2541-2948	7d Survival Rate	Control Resp	0.9	0.8	>>	Yes	Passes Criteria
15-7869-7184	7d Survival Rate	Control Resp	0.9	0.8	>>	Yes	Passes Criteria
08-8694-7451	Reproduction	Control Resp	24.1	15	>>	Yes	Passes Criteria
20-0413-4940	Reproduction	Control Resp	24.1	15	>>	Yes	Passes Criteria
08-8694-7451	Reproduction	PMSD	0.4371	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%
6.25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%
12.5		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%
25		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%
50		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%
100		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	24.1	18.51	29.69	11	33	2.47	7.81	32.40%	0.00%
6.25		10	28	25.39	30.61	21	33	1.155	3.651	13.04%	-16.18%
12.5		10	31.1	20.76	41.44	0	47	4.572	14.46	46.48%	-29.05%
25		10	33.6	26.72	40.48	17	49	3.041	9.617	28.62%	-39.42%
50		10	40.4	30.57	50.23	13	62	4.344	13.74	34.00%	-67.63%
100		10	31	24.98	37.02	19	46	2.662	8.42	27.16%	-28.63%

Analyst: LM QA: RSS

Ceriodaphnia 7-d Survival and Reproduction Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		28	29	33	21	25	32	29	27	25	31
12.5		46	39	28	47	31	24	20	0	31	45
25		39	35	32	33	25	46	34	17	26	49
50		32	38	36	13	38	57	62	35	46	47
100		26	46	19	32	33	38	32	37	19	28

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-8694-7451	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	08-0802-5671	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	11-8024-6774	**Code:**	VCF1119.284cer	**Project:**	
Sample Date:	27 Nov-19 10:10	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-THO
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	43.71%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	119.5	75	4	18	CDF	0.9889	Non-Significant Effect
		12.5	122.5	75	1	18	CDF	0.9948	Non-Significant Effect
		25	135.5	75	5	18	CDF	0.9999	Non-Significant Effect
		50	144.5	75	1	18	CDF	1.0000	Non-Significant Effect
		100	126.5	75	4	18	CDF	0.9983	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	24.1	15	>>	Yes	Passes Criteria
PMSD	0.4371	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1509.33	301.867	5	2.85	0.0235	Significant Effect
Error	5718.6	105.9	54			
Total	7227.93		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	16.42	15.09	0.0057	Unequal Variances
	Levene Equality of Variance Test	1.956	3.377	0.1002	Equal Variances
	Mod Levene Equality of Variance Test	1.691	3.377	0.1524	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.6935	3.878	0.0701	Normal Distribution
	D'Agostino Kurtosis Test	1.916	2.576	0.0554	Normal Distribution
	D'Agostino Skewness Test	1.758	2.576	0.0787	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	6.762	9.21	0.0340	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1098	0.1331	0.0695	Normal Distribution
	Shapiro-Wilk W Normality Test	0.962	0.9459	0.0591	Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	24.1	18.51	29.69	24.5	11	33	2.47	32.40%	0.00%
6.25		10	28	25.39	30.61	28.5	21	33	1.155	13.04%	-16.18%
12.5		10	31.1	20.76	41.44	31	0	47	4.572	46.48%	-29.05%
25		10	33.6	26.72	40.48	33.5	17	49	3.041	28.62%	-39.42%
50		10	40.4	30.57	50.23	38	13	62	4.344	34.00%	-67.63%
100		10	31	24.98	37.02	32	19	46	2.662	27.16%	-28.63%

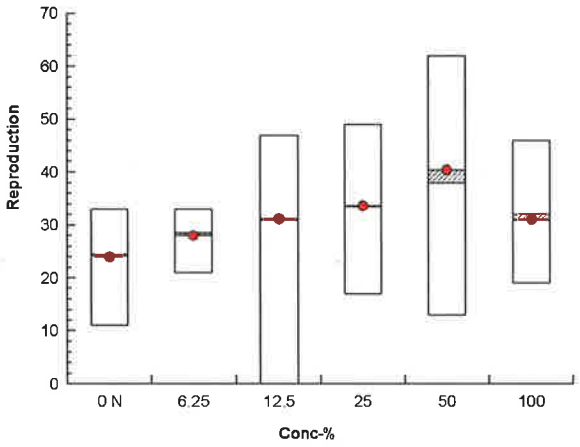
Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

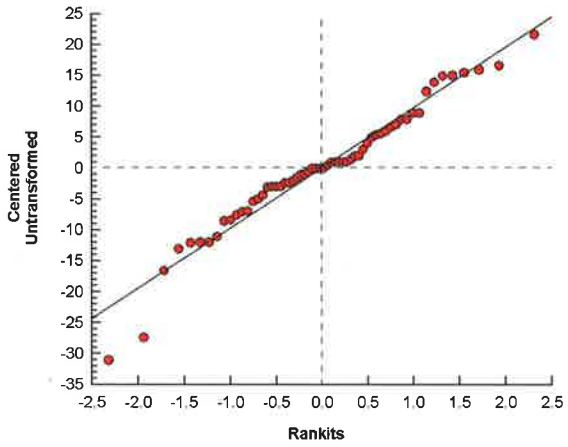
Analysis ID:	08-8694-7451	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		28	29	33	21	25	32	29	27	25	31
12.5		46	39	28	47	31	24	20	0	31	45
25		39	35	32	33	25	46	34	17	26	49
50		32	38	36	13	38	57	62	35	46	47
100		26	46	19	32	33	38	32	37	19	28

Graphics





CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-7869-7184	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:57	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	08-0802-5671	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	11-8024-6774	**Code:**	VCF1119.284cer	**Project:**	
Sample Date:	27 Nov-19 10:10	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-THO
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	1.0000	Exact	1.0000	Non-Significant Effect
		12.5	0.7632	Exact	1.0000	Non-Significant Effect
		25	0.7632	Exact	1.0000	Non-Significant Effect
		50	1.0000	Exact	1.0000	Non-Significant Effect
		100	0.7632	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	9	1	10	0.9	0.1	0.0%
6.25		10	0	10	1	0	-11.11%
12.5		9	1	10	0.9	0.1	0.0%
25		9	1	10	0.9	0.1	0.0%
50		10	0	10	1	0	-11.11%
100		9	1	10	0.9	0.1	0.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

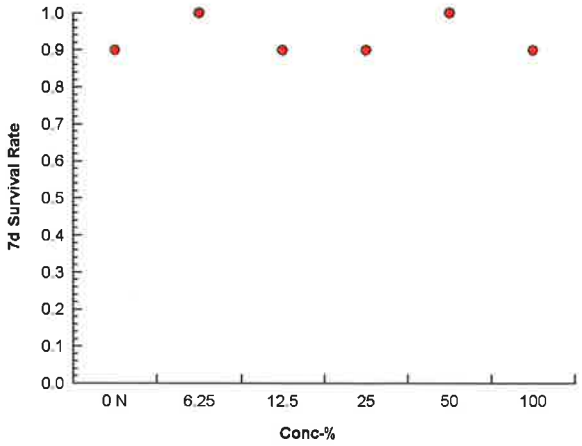
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-7869-7184	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:57	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-2541-2948	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	08-0802-5671	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	11-8024-6774	**Code:**	VCF1119.284cer	**Project:**	
Sample Date:	27 Nov-19 10:10	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-THO
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.95	0.0%
6.25		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.95	0.0%
12.5		10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.9333	1.75%
25		10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.9333	1.75%
50		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.9333	1.75%
100		10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.9	5.26%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

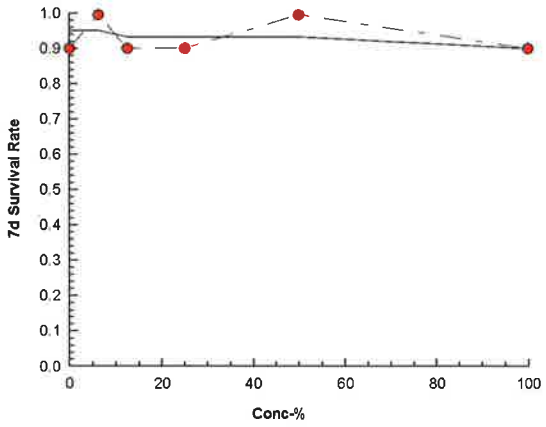
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	03-2541-2948	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-0413-4940	Endpoint:	Reproduction	CETIS Version:	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Batch ID:	08-0802-5671	Test Type:	Reproduction-Survival (7d)	Analyst:	
Start Date:	27 Nov-19 15:25	Protocol:	EPA/821/R-02-013 (2002)	Diluent:	Laboratory Water
Ending Date:	04 Dec-19 16:15	Species:	Ceriodaphnia dubia	Brine:	Not Applicable
Test Length:	7d 1h	Taxon:	Branchiopoda	Source:	Aquatic Biosystems, CO Age:
Sample ID:	11-8024-6774	Code:	VCF1119.284cer	Project:	
Sample Date:	27 Nov-19 10:10	Material:	Sample Water	Source:	Bioassay Report
Receipt Date:	27 Nov-19 11:36	CAS (PC):		Station:	MO-THO
Sample Age:	5h (12.3 °C)	Client:	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	24.1	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	N	10	24.1	11	33	7.81	32.40%	0.0%	31.44	0.0%
6.25		10	28	21	33	3.651	13.04%	-16.18%	31.44	0.0%
12.5		10	31.1	0	47	14.46	46.48%	-29.05%	31.44	0.0%
25		10	33.6	17	49	9.617	28.62%	-39.42%	31.44	0.0%
50		10	40.4	13	62	13.74	34.00%	-67.63%	31.44	0.0%
100		10	31	19	46	8.42	27.16%	-28.63%	31	1.4%

Reproduction Detail

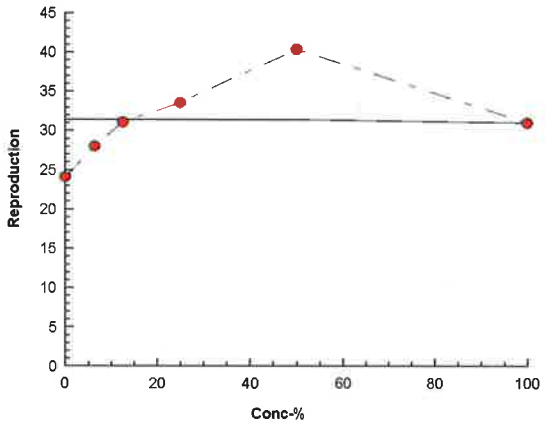
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		28	29	33	21	25	32	29	27	25	31
12.5		46	39	28	47	31	24	20	0	31	45
25		39	35	32	33	25	46	34	17	26	49
50		32	38	36	13	38	57	62	35	46	47
100		26	46	19	32	33	38	32	37	19	28

Analyst: QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0413-4940	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	08-0802-5671	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:25	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable	
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	11-8024-6774	**Code:**	VCF1119.284cer	**Project:**		
Sample Date:	27 Nov-19 10:10	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-THO	
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD			

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	97	97	97	97	97	0	0	0.0%	0
Overall		16	78.5	68.32	88.68	60	97	4.777	19.11	24.34%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	345.9	344.1	347.6	343	349	0.7425	2.1	0.61%	0
12.5		8	368.6	367.4	369.9	366	370	0.5324	1.506	0.41%	0
25		8	410.9	409.2	412.6	407	413	0.7181	2.031	0.49%	0
50		8	490.2	487.5	493	486	496	1.146	3.24	0.66%	0
100		8	645.9	628.1	663.6	595	661	7.511	21.24	3.29%	0
Overall		48	433.9	402.2	465.5	330	661	15.72	108.9	25.10%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.5	6.981	8.019	6.1	8.1	0.2196	0.6211	8.28%	0
12.5		8	7.5	6.905	8.095	5.8	8	0.2514	0.7111	9.48%	0
25		8	7.288	6.514	8.061	5.1	7.9	0.327	0.925	12.69%	0
50		8	6.875	5.929	7.821	4.7	7.8	0.3999	1.131	16.45%	0
100		8	6.5	5.411	7.589	4.3	8	0.4606	1.303	20.04%	0
Overall		48	7.244	6.967	7.521	4.3	8.3	0.1376	0.9536	13.16%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	220	220	220	220	220	0	0	0.0%	0
Overall		16	157.8	123.5	192	95	220	16.07	64.29	40.76%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.463	7.386	7.539	7.3	7.6	0.03239	0.09161	1.23%	0
12.5		8	7.475	7.368	7.582	7.2	7.6	0.04532	0.1282	1.72%	0
25		8	7.475	7.378	7.572	7.2	7.6	0.04119	0.1165	1.56%	0
50		8	7.438	7.361	7.514	7.3	7.6	0.03239	0.09161	1.23%	0
100		8	7.375	7.316	7.434	7.3	7.5	0.025	0.07071	0.96%	0
Overall		48	7.504	7.446	7.563	7.2	8.3	0.02901	0.201	2.68%	0 (0%)

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.09	23.91	24.26	24	24.6	0.07425	0.21	0.87%	0
6.25		8	24.24	24.08	24.39	24	24.6	0.06528	0.1846	0.76%	0
12.5		8	24.22	24.09	24.36	24	24.4	0.05902	0.1669	0.69%	0
25		8	24.36	23.92	24.8	24	25.6	0.1861	0.5263	2.16%	0
50		8	24.18	24.04	24.31	24	24.4	0.05589	0.1581	0.65%	0
100		8	24.14	23.99	24.29	24	24.4	0.06249	0.1768	0.73%	0
Overall		48	24.2	24.13	24.28	24	25.6	0.03904	0.2705	1.12%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				97					
0	N	2		60					
100				97					
0	N	3		60					
100				97					
0	N	4		60					
100				97					
0	N	5		60					
100				97					
0	N	6		60					
100				97					
0	N	7		60					
100				97					
0	N	8		60					
100				97					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				343					
12.5				370					
25				411					
50				486					
100				642					
0	N	2		332					
6.25				348					
12.5				369					
25				407					
50				487					
100				595					
0	N	3		331					
6.25				349					
12.5				366					
25				411					
50				490					
100				652					
0	N	4		339					
6.25				346					
12.5				368					
25				413					
50				488					
100				652					
0	N	5		335					
6.25				343					
12.5				369					
25				411					
50				492					
100				654					
0	N	6		330					
6.25				346					
12.5				370					
25				413					
50				496					
100				661					
0	N	7		360					
6.25				346					
12.5				367					
25				409					
50				491					
100				655					
0	N	8		360					
6.25				346					
12.5				370					
25				412					
50				492					
100				656					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.8					
12.5				7.8					
25				7.8					
50				7.8					
100				8					
0	N	2		8					
6.25				7.6					
12.5				7.5					
25				7.5					
50				5.7					
100				4.8					
0	N	3		7.3					
6.25				7.4					
12.5				7.6					
25				7.1					
50				6.6					
100				6.5					
0	N	4		7.7					
6.25				8.1					
12.5				8					
25				7.9					
50				7.5					
100				6.6					
0	N	5		7.6					
6.25				8					
12.5				8					
25				7.9					
50				7.8					
100				7					
0	N	6		7.9					
6.25				7.4					
12.5				7.6					
25				7.4					
50				7.4					
100				7.3					
0	N	7		7.7					
6.25				7.6					
12.5				7.7					
25				7.6					
50				7.5					
100				7.5					
0	N	8		8.3					
6.25				6.1					
12.5				5.8					
25				5.1					
50				4.7					
100				4.3					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				220					
0	N	2		96					
100				220					
0	N	3		96					
100				220					
0	N	4		96					
100				220					
0	N	5		95					
100				220					
0	N	6		95					
100				220					
0	N	7		95					
100				220					
0	N	8		95					
100				220					

Analyst: QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.4					
0	N	2		7.7					
6.25				7.4					
12.5				7.5					
25				7.5					
50				7.4					
100				7.3					
0	N	3		7.5					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.4					
100				7.3					
0	N	4		7.6					
6.25				7.5					
12.5				7.6					
25				7.5					
50				7.4					
100				7.3					
0	N	5		7.8					
6.25				7.5					
12.5				7.5					
25				7.5					
50				7.5					
100				7.4					
0	N	6		7.5					
6.25				7.4					
12.5				7.4					
25				7.5					
50				7.4					
100				7.4					
0	N	7		8.3					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.6					
100				7.5					
0	N	8		7.8					
6.25				7.3					
12.5				7.2					
25				7.2					
50				7.3					
100				7.4					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.2					
12.5				24.4					
25				25.6					
50				24.4					
100				24.4					
0	N	2		24					
6.25				24.2					
12.5				24					
25				24					
50				24					
100				24					
0	N	3		24					
6.25				24.2					
12.5				24.4					
25				24.2					
50				24.2					
100				24					
0	N	4		24.6					
6.25				24.6					
12.5				24.3					
25				24.3					
50				24.2					
100				24.2					
0	N	5		24.1					
6.25				24.1					
12.5				24.1					
25				24.1					
50				24.1					
100				24.1					
0	N	6		24					
6.25				24.4					
12.5				24.3					
25				24.2					
50				24.1					
100				24					
0	N	7		24					
6.25				24.2					
12.5				24.3					
25				24.5					
50				24.4					
100				24.4					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

Analyst: _____ QA: _____

CHEMICAL ANALYSIS DATA SHEET

VCF 9

Start Date: 11/27/19 1525

Lab # : VCF 11 19.284

End Date: 12/4/19 1615

Date Rec'd: 11/27/19

YSI Used:

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 0856	TD 1106	L 1105	L 1115	TD 1521	TD 1426	L

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.9	7.3	8.8	7.6 @7.7	8.6	7.6	7.3	7.9	7.8	7.7	8.3
6.25%	7.8	6.9	7.6	6.8	7.4	7.6	8.1	7.9	8.0	7.1	7.4	6.8	7.6	6.1
12.5%	7.8	6.9	7.5	6.7	7.6	7.9	8.0	8.1	8.0	7.1	7.6	6.3	7.7	5.8
25%	7.8	7.1	7.5	6.7	7.1	7.7	7.9	8.0	7.9	7.1	7.4	5.5	7.6	5.1
50%	7.8	7.1	5.7	6.7	6.6	7.4	7.5	7.5	7.8	7.1	7.4	4.7	7.5	4.7
100%	8.0	7.2	4.9	6.7	3.7/6.5	6.0	7.6 @	6.2	7.0	7.1	7.3	4.4	7.5	4.3

TEMPERATURE (°C)

Control	24.0	24.0	24.0	24.0	24.0	24.0	24.6	24.0	24.1	24.0	24.0	24.0	24.0	24.0
6.25%	24.2	24.2	24.2	24.0	24.2	24.0	24.6	24.0	24.1	24.0	24.4	24.0	24.2	24.0
12.5%	24.4	24.0	24.0	24.0	24.4	24.0	24.3	24.0	24.1	24.0	24.3	24.0	24.3	24.0
25%	25.6	24.0	24.0	24.0	24.2	24.0	24.3	24.0	24.1	24.0	24.2	24.0	24.5	24.0
50%	24.4	24.0	24.0	24.0	24.2	24.0	24.2	24.0	24.1	24.0	24.1	24.0	24.4	24.0
100%	24.4	24.0	24.0	24.0	24.0	24.0	24.2	24.0	24.1	24.0	24.0	24.0	24.4	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
6.25%	7.5	7.6	7.4	7.8	7.5	7.6	7.5	7.5	7.5	7.8	7.4	8.1	7.6	7.3
12.5%	7.5	7.4	7.5	7.7	7.5	7.6	7.6	7.5	7.5	7.5	7.4	7.8	7.6	7.2
25%	7.5	7.3	7.5	7.6	7.5	7.6	7.5	7.5	7.5	7.6	7.5	7.8	7.6	7.2
50%	7.5	7.3	7.4	7.5	7.4	7.6	7.4	7.5	7.5	7.6	7.4	7.7	7.6	7.3
100%	7.4	7.3	7.3	7.5	7.3	7.5	7.3	7.4	7.4	7.5	7.4	7.7	7.5	7.4

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	360	360
6.25%	343	348	349	346	343	346	346	346
12.5%	370	369	366	368	369	370	367	370
25%	411	407	411	413	411	413	409	412
50%	486	467	490	488	492	496	491	492
100%	642	595	652	652	654	661	655	656

ALKALINITY

Control	60	60	60	60	60	60	60	60
100%	97	97	97	97	97	97	97	97

HARDNESS

Control	96	96	96	96	95	95	95	95
100%	220	220	220	220	220	220	220	220

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

0.1 ppt

Chronic *Ceriodaphnia dubia* survival and reproduction - VCF 9

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11 / 27 /19

End Date: 12 / 4 /19

Lab #: VCF 11 19. 284

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
CON	3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4		5	5	5	✓	5	✓	4	✓	2	✓
	5		9	13	10	10	11	11	10	7	8	4
	6		10	13	17	12	1	14	12	14	1	7
	7		✓	2	✓	✓	16	✓	X	2	✓	1
	Total	TD	24	33	32	22	33	25	26	23	11	12
6.25%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	-	5	4	9	4	5	5	✓	4	4	1
	5	-	7	8	13	9	✓	10	12	11	8	3
	6	-	15	16	11	8	✓	15	16	12	11	16
	7	-	1	1	1	✓	20	2	1	✓	2	11
		-										
	Total	-	28	29	33	21	25	32	29	27	25	31
12.5%	3	-	✓	✓	✓	✓	✓	✓	✓	X	✓	3
	4	-	1	6	1	✓	5	✓	✓	X	6	6
	5	-	10	10	12	14	10	9	5	X	13	✓
	6	-	17	11	14	16	✓	13	15	X	12	17
	7	-	18	12	1	17	16	2	✓	11/30	✓	19
		-										
	Total	-	46	39	28	47	31	24	20	0	31	45
25%	3	-	✓	✓	✓	✓	✓	✓	3	✓	✓	2
	4	-	4	4	6	✓	8	7	1	4	3	8
	5	-	10	12	9	8	✓	12	14	13	10	✓
	6	-	17	19	17	23	17	27	16	✓	13	19
	7	-	8	✓	✓	3	X 12/4	✓	✓	✓	✓	20
		-										
	Total	-	39	35	32	33	25	46	34	17	26	49
50%	3	-	✓	✓	✓	✓	✓	✓	3	✓	✓	2
	4	-	3	8	7	2	4	✓	2	7	6	6
	5	-	5	14	8	9	10	9	15	7	15	15
	6	-	21	16	19	2	✓	25	16	21	19	✓
	7	-	3	✓	2	✓	24	23	26	✓	6	24
		-										
	Total	-	32	38	36	13	38	57	62	35	46	47
100%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	3
	4	-	✓	3	6	✓	8	6	6	3	4	8
	5	-	9	15	13	13	✓	10	16	10	15	✓
	6	-	2	27	✓	19	13	22	10	24	✓	17
	7	-	15	1	X 12/3	✓	12	✓	✓	✓	✓	✓
		-										
	Total	-	26	46	19	32	33	38	32	37	19	28

Neonates Data (see back)

QC: [illegible]

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013*. Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-SIM
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.286

CHRONIC CERIODAPHNIA SURVIVAL & REPRODUCTION BIOASSAY

SURVIVAL	NOEC =	100.00 %
	TUc =	1.00
	EC25 =	>100.00 %
	EC50 =	>100.00 %
REPRODUCTION	NOEC =	100.00 %
	TUc =	1.00
	IC25 =	>100.00 %
	IC50 =	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**			
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM		
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
17-8143-9003	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		100	>100	n/a	1	n/a	1
17-0210-9351	Reproduction	Steel Many-One Rank Sum Test		100	>100	n/a	1	43.8%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
08-5603-3482	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
15-0127-3426	Reproduction	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
08-5603-3482	7d Survival Rate	Control Resp	0.9	0.8	>>	Yes	Passes Criteria
17-8143-9003	7d Survival Rate	Control Resp	0.9	0.8	>>	Yes	Passes Criteria
15-0127-3426	Reproduction	Control Resp	24.1	15	>>	Yes	Passes Criteria
17-0210-9351	Reproduction	Control Resp	24.1	15	>>	Yes	Passes Criteria
17-0210-9351	Reproduction	PMSD	0.4381	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%
6.25		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%
12.5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%
25		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	0.00%
50		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%
100		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-11.11%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	24.1	18.51	29.69	11	33	2.47	7.81	32.40%	0.00%
6.25		10	24.2	17.47	30.93	0	31	2.977	9.414	38.90%	-0.41%
12.5		10	27.7	18.64	36.76	2	46	4.003	12.66	45.70%	-14.94%
25		10	40.3	31.53	49.07	14	55	3.876	12.26	30.41%	-67.22%
50		10	30.7	24.56	36.84	11	42	2.716	8.59	27.98%	-27.39%
100		10	33.6	26.3	40.9	18	48	3.229	10.21	30.39%	-39.42%

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		31	31	26	31	30	25	21	27	0	20
12.5		24	13	29	46	34	34	35	24	36	2
25		55	45	14	49	36	28	50	45	35	46
50		24	11	36	42	30	32	32	34	28	38
100		28	25	22	41	32	41	18	45	36	48

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-0210-9351	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**	
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	43.81%

Steel Many-One Rank Sum Test

Control vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	106	75	2	18	CDF	0.8549	Non-Significant Effect
	12.5	123	75	1	18	CDF	0.9955	Non-Significant Effect
	25	144	75	0	18	CDF	1.0000	Non-Significant Effect
	50	129	75	3	18	CDF	0.9992	Non-Significant Effect
	100	129.5	75	3	18	CDF	0.9993	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	24.1	15	>>	Yes	Passes Criteria
PMSD	0.4381	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1932.2	386.44	5	3.633	0.0066	Significant Effect
Error	5743.2	106.356	54			
Total	7675.4		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.181	15.09	0.6722	Equal Variances
	Levene Equality of Variance Test	0.879	3.377	0.5015	Equal Variances
	Mod Levene Equality of Variance Test	0.5724	3.377	0.7208	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.38	3.878	8.5E-04	Non-Normal Distribution
	D'Agostino Kurtosis Test	1.117	2.576	0.2639	Normal Distribution
	D'Agostino Skewness Test	2.762	2.576	0.0057	Non-Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	8.878	9.21	0.0118	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1156	0.1331	0.0446	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9346	0.9459	0.0031	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	24.1	18.51	29.69	24.5	11	33	2.47	32.40%	0.00%
6.25		10	24.2	17.47	30.93	26.5	0	31	2.977	38.90%	-0.41%
12.5		10	27.7	18.64	36.76	31.5	2	46	4.003	45.70%	-14.94%
25		10	40.3	31.53	49.07	45	14	55	3.876	30.41%	-67.22%
50		10	30.7	24.56	36.84	32	11	42	2.716	27.98%	-27.39%
100		10	33.6	26.3	40.9	34	18	48	3.229	30.39%	-39.42%

Analyst: _____ QA: _____

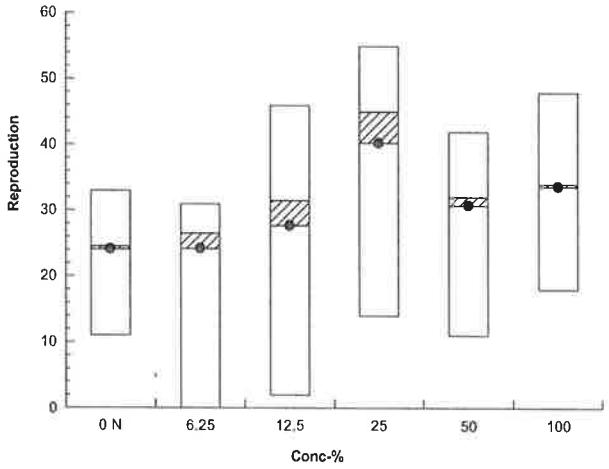
Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

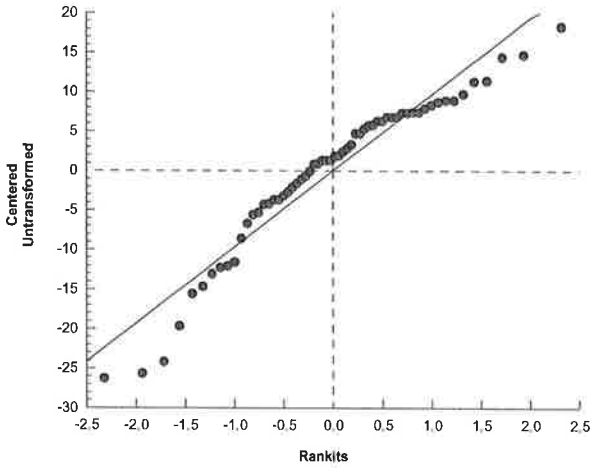
Analysis ID: 17-0210-9351 **Endpoint:** Reproduction **CETIS Version:** CETISv1.9.5
Analyzed: 16 Dec-19 16:10 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		31	31	26	31	30	25	21	27	0	20
12.5		24	13	29	46	34	34	35	24	36	2
25		55	45	14	49	36	28	50	45	35	46
50		24	11	36	42	30	32	32	34	28	38
100		28	25	22	41	32	41	18	45	36	48

Graphics





Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-5603-3482	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**	
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.9667	0.0%
6.25		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.9667	0.0%
12.5		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.9667	0.0%
25		10	0.9000	0.0000	1.0000	0.3162	35.14%	0.0%	9/10	0.9667	0.0%
50		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.9667	0.0%
100		10	1.0000	1.0000	1.0000	0.0000	0.00%	-11.11%	10/10	0.9667	0.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

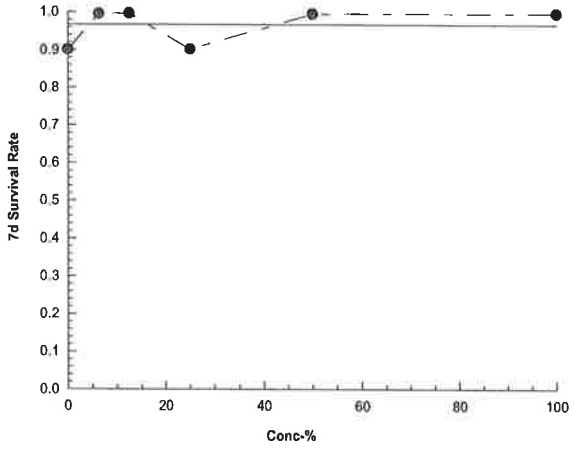
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-5603-3482	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst:_____ QA:_____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-0127-3426	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**	
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1365852	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	24.1	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	10	24.1	11	33	7.81	32.40%	0.0%	30.1	0.0%
6.25		10	24.2	0	31	9.414	38.90%	-0.41%	30.1	0.0%
12.5		10	27.7	2	46	12.66	45.70%	-14.94%	30.1	0.0%
25		10	40.3	14	55	12.26	30.41%	-67.22%	30.1	0.0%
50		10	30.7	11	42	8.59	27.98%	-27.39%	30.1	0.0%
100		10	33.6	18	48	10.21	30.39%	-39.42%	30.1	0.0%

Reproduction Detail

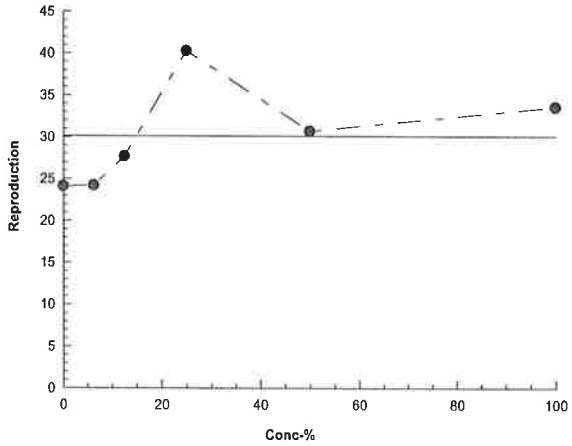
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	24	33	32	22	33	25	26	23	11	12
6.25		31	31	26	31	30	25	21	27	0	20
12.5		24	13	29	46	34	34	35	24	36	2
25		55	45	14	49	36	28	50	45	35	46
50		24	11	36	42	30	32	32	34	28	38
100		28	25	22	41	32	41	18	45	36	48

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-0127-3426	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-8143-9003	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**	
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	1.0000	Exact	1.0000	Non-Significant Effect
		12.5	1.0000	Exact	1.0000	Non-Significant Effect
		25	0.7632	Exact	1.0000	Non-Significant Effect
		50	1.0000	Exact	1.0000	Non-Significant Effect
		100	1.0000	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	9	1	10	0.9	0.1	0.0%
6.25		10	0	10	1	0	-11.11%
12.5		10	0	10	1	0	-11.11%
25		9	1	10	0.9	0.1	0.0%
50		10	0	10	1	0	-11.11%
100		10	0	10	1	0	-11.11%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

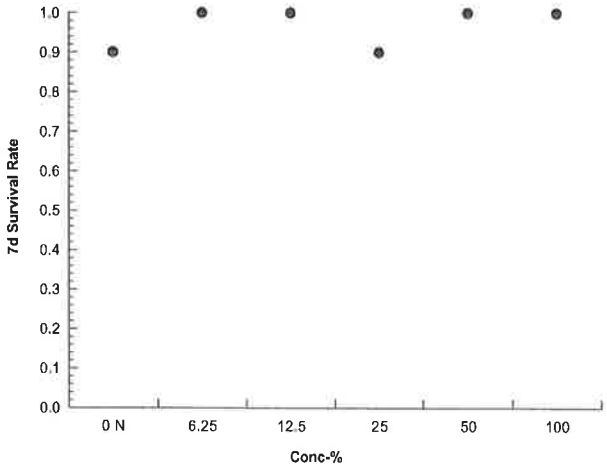
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-8143-9003	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:10	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	14-4193-3807	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:27	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 16:37	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	7d 1h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**

Sample ID:	07-7122-6399	**Code:**	VCF1119.286cer	**Project:**	
Sample Date:	27 Nov-19 09:00	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-SIM
Sample Age:	6h (11.3 °C)	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
100		8	90	90	90	90	90	0	0	0.0%	0
Overall		16	75	66.74	83.26	60	90	3.873	15.49	20.66%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
6.25		8	337.6	333.1	342.1	330	346	1.908	5.397	1.6%	0
12.5		8	330.8	329.5	332	329	334	0.5261	1.488	0.45%	0
25		8	329.1	326.4	331.8	323	333	1.141	3.227	0.98%	0
50		8	325.6	319.8	331.5	313	333	2.464	6.968	2.14%	0
100		8	322.5	309.6	335.4	287	334	5.454	15.43	4.78%	0
Overall		48	331.2	328.1	334.4	287	360	1.562	10.82	3.27%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
6.25		8	7.525	7.243	7.807	7	8	0.1191	0.337	4.48%	0
12.5		8	7.4	6.981	7.819	6.3	7.8	0.1773	0.5014	6.78%	0
25		8	7.1	6.35	7.85	5.1	7.8	0.3174	0.8976	12.64%	0
50		8	6.762	5.823	7.702	4.9	7.8	0.3973	1.124	16.62%	0
100		8	6.15	5.006	7.294	4.4	8.2	0.4837	1.368	22.24%	0
Overall		48	7.123	6.839	7.407	4.4	8.3	0.1411	0.9779	13.73%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
100		8	120	120	120	120	120	0	0	0.0%	0
Overall		16	107.8	101	114.5	95	120	3.164	12.66	11.75%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
6.25		8	7.612	7.508	7.717	7.4	7.8	0.04407	0.1246	1.64%	0
12.5		8	7.6	7.511	7.689	7.4	7.7	0.0378	0.1069	1.41%	0
25		8	7.525	7.385	7.665	7.2	7.7	0.05901	0.1669	2.22%	0
50		8	7.475	7.343	7.607	7.2	7.7	0.0559	0.1581	2.12%	0
100		8	7.362	7.215	7.51	7.2	7.6	0.0625	0.1768	2.4%	0
Overall		48	7.562	7.498	7.627	7.2	8.3	0.03188	0.2209	2.92%	0 (0%)

Analyst:_____ QA:_____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.05	23.96	24.14	24	24.3	0.0378	0.1069	0.44%	0
6.25		8	24.21	24.03	24.4	24	24.5	0.07891	0.2232	0.92%	0
12.5		8	24.25	24.1	24.4	24	24.5	0.06267	0.1773	0.73%	0
25		8	24.25	24.09	24.41	24	24.6	0.06814	0.1927	0.79%	0
50		8	24.11	24.02	24.21	24	24.3	0.0398	0.1126	0.47%	0
100		8	24.13	24.03	24.22	24	24.3	0.04117	0.1165	0.48%	0
Overall		48	24.17	24.12	24.22	24	24.6	0.02461	0.1705	0.71%	0 (0%)

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
100				90					
0	N	2		60					
100				90					
0	N	3		60					
100				90					
0	N	4		60					
100				90					
0	N	5		60					
100				90					
0	N	6		60					
100				90					
0	N	7		60					
100				90					
0	N	8		60					
100				90					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
6.25				330					
12.5				329					
25				323					
50				313					
100				287					
0	N	2		332					
6.25				338					
12.5				331					
25				330					
50				322					
100				316					
0	N	3		331					
6.25				341					
12.5				330					
25				329					
50				319					
100				323					
0	N	4		339					
6.25				331					
12.5				330					
25				332					
50				330					
100				330					
0	N	5		335					
6.25				335					
12.5				331					
25				330					
50				330					
100				328					
0	N	6		330					
6.25				339					
12.5				331					
25				330					
50				331					
100				331					
0	N	7		360					
6.25				341					
12.5				330					
25				326					
50				327					
100				331					
0	N	8		360					
6.25				346					
12.5				334					
25				333					
50				333					
100				334					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.7					
12.5				7.7					
25				7.7					
50				7.7					
100				8.2					
0	N	2		8					
6.25				7.5					
12.5				7.3					
25				6.7					
50				5.2					
100				4.4					
0	N	3		7.3					
6.25				7.3					
12.5				7.4					
25				7.2					
50				6.9					
100				6					
0	N	4		7.7					
6.25				8					
12.5				7.8					
25				7.7					
50				7.8					
100				7.3					
0	N	5		7.6					
6.25				7.8					
12.5				7.8					
25				7.8					
50				7.4					
100				7.3					
0	N	6		7.9					
6.25				7.2					
12.5				7.2					
25				7					
50				6.7					
100				5.5					
0	N	7		7.7					
6.25				7.7					
12.5				7.7					
25				7.6					
50				7.5					
100				6					
0	N	8		8.3					
6.25				7					
12.5				6.3					
25				5.1					
50				4.9					
100				4.5					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
100				120					
0	N	2		96					
100				120					
0	N	3		96					
100				120					
0	N	4		96					
100				120					
0	N	5		95					
100				120					
0	N	6		95					
100				120					
0	N	7		95					
100				120					
0	N	8		95					
100				120					

Analyst: _____ QA: _____

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
6.25				7.6					
12.5				7.6					
25				7.6					
50				7.6					
100				7.6					
0	N	2		7.7					
6.25				7.6					
12.5				7.6					
25				7.5					
50				7.4					
100				7.2					
0	N	3		7.5					
6.25				7.6					
12.5				7.6					
25				7.5					
50				7.4					
100				7.2					
0	N	4		7.6					
6.25				7.7					
12.5				7.7					
25				7.6					
50				7.5					
100				7.5					
0	N	5		7.8					
6.25				7.7					
12.5				7.7					
25				7.7					
50				7.6					
100				7.5					
0	N	6		7.5					
6.25				7.5					
12.5				7.5					
25				7.4					
50				7.4					
100				7.2					
0	N	7		8.3					
6.25				7.8					
12.5				7.7					
25				7.7					
50				7.7					
100				7.5					
0	N	8		7.8					
6.25				7.4					
12.5				7.4					
25				7.2					
50				7.2					
100				7.2					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
6.25				24.5					
12.5				24.4					
25				24.6					
50				24					
100				24.2					
0	N	2		24					
6.25				24					
12.5				24.1					
25				24.2					
50				24.2					
100				24.1					
0	N	3		24					
6.25				24.5					
12.5				24.5					
25				24.4					
50				24.1					
100				24					
0	N	4		24.1					
6.25				24					
12.5				24.1					
25				24.1					
50				24.1					
100				24.2					
0	N	5		24.3					
6.25				24.2					
12.5				24.2					
25				24.3					
50				24.3					
100				24.3					
0	N	6		24					
6.25				24.4					
12.5				24.3					
25				24.1					
50				24					
100				24					
0	N	7		24					
6.25				24.1					
12.5				24.4					
25				24.3					
50				24.2					
100				24.2					
0	N	8		24					
6.25				24					
12.5				24					
25				24					
50				24					
100				24					

Analyst: QA:

CHEMICAL ANALYSIS DATA SHEET

VCF 10

Start Date: 11/27/19 1527

End Date: 12/4/19 1637

Lab # : VCF 11 19.286

Date Rec'd: 11/27/19

YSI Used: B

Renewal Sample Used: B B B B B B B

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials	TD	TD 0923	TD 1121	L 1125	L 1130	TD 1533	TD 1734	L
DISSOLVED OXYGEN (mg/L)								
Control	7.9	7.0 8.0	6.9 7.3	8.8 7.7	8.6 7.6	7.3 7.9	7.8 7.7	8.3
6.25%	7.7	6.9 7.5	6.8 7.3	7.6 8.0	7.8 7.8	7.2 7.2	6.9 7.7	7.0
12.5%	7.7	7.0 7.3	6.7 7.4	7.8 7.8	7.9 7.8	7.1 7.2	6.9 7.7	6.3
25%	7.7	7.1 6.7	6.7 7.2	7.5 7.7	7.7 7.8	7.1 7.0	5.6 7.6	5.1
50%	7.7	7.1 5.2	6.7 6.9	5.3 7.8	6.2 7.4	7.1 6.7	4.6 7.5	4.9
100%	8.2	7.2 4.4	6.5 1.5/6.0	4.2 3.8/7.3	5.0 7.3	5.9 5.5	4.3 6.0	4.5
TEMPERATURE (°C)								
Control	24.0	24.0 24.0	24.0 24.0	24.0 24.1	24.0 24.3	24.0 24.0	24.0 24.0	24.0
6.25%	24.5	24.0 24.0	24.0 24.5	24.0 24.0	24.0 24.2	24.0 24.4	24.0 24.1	24.0
12.5%	24.4	24.0 24.1	24.0 24.5	24.0 24.1	24.0 24.2	24.0 24.3	24.0 24.4	24.0
25%	24.6	24.0 24.2	24.0 24.4	24.0 24.1	24.0 24.3	24.0 24.1	24.0 24.3	24.0
50%	24.0	24.0 24.2	24.0 24.1	24.0 24.1	24.0 24.3	24.0 24.0	24.0 24.2	24.0
100%	24.2	24.0 24.1	24.0 24.0	24.0 24.2	24.0 24.3	24.0 24.0	24.0 24.2	24.0
pH								
Control	8.2	7.9 7.7	7.8 7.5	7.9 7.6	7.6 7.8	7.8 7.5	8.3 8.3	7.8
6.25%	7.6	7.7 7.6	7.8 7.6	7.8 7.7	7.7 7.7	7.8 7.5	7.8 7.8	7.4
12.5%	7.6	7.7 7.6	7.7 7.6	7.7 7.7	7.6 7.7	7.8 7.5	7.7 7.7	7.4
25%	7.6	7.7 7.5	7.7 7.5	7.7 7.6	7.6 7.7	7.7 7.4	7.6 7.7	7.2
50%	7.6	7.5 7.4	7.6 7.4	7.5 7.5	7.5 7.6	7.6 7.4	7.5 7.7	7.2
100%	7.6	7.4 7.2	7.6 7.2	7.4 7.5	7.4 7.5	7.5 7.2	7.4 7.5	7.2
CONDUCTIVITY (uS/cm)								
Control	347	332	331	339	335	330	360	360
6.25%	330	334	341	331	335	339	341	346
12.5%	329	331	330	330	331	331	330	334
25%	323	330	329	332	330	330	326	333
50%	313	322	319	330	330	331	327	333
100%	287	316	323	330	324	331	331	334
ALKALINITY								
Control	60	60	60	60	60	60	60	60
100%	90	90	90	90	90	90	90	90
HARDNESS								
Control	96	96	96	96	95	95	95	95
100%	120	120	120	120	120	120	120	120

Residual Chlorine 1st Sample: <0.1 2nd Sample: N/A 3rd Sample: N/A

0 ppt

QC: LM RS

Chronic *Ceriodaphnia dubia* survival and reproduction - VCF 10

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11 / 27 /19

End Date: 12 / 4 /19

Lab #: VCF 11 19. 286

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
USE CON of VCF 119.284	3	[illegible]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	[illegible]	3	4	3	3	4	6	✓	3	2	✓
	5	[illegible]	8	8	7	10	10	13	5	10	5	5
	6	[illegible]	12	✓	7	✓	12	12	16	✓	1	12
	7	[illegible]	16	12	✓	9	✓	✓	✓	10	1	✓
	Total	TD	39	24	11	22	26	31	21	23	9	17
6.25%	3	-	2	✓	✓	4	✓	3	✓	✓	✓	1
	4	-	✓	4	4	2	9	✓	✓	9	✓	7
	5	-	12	9	12	15	6	10	8	11	✓	9
	6	-	12	17	10	10	✓	12	13	6	✓	2
	7	-	5	1	✓	✓	15	✓	✓	1	✓	1
		-										
	Total	-	31	31	26	31	30	25	21	27	0	20
12.5%	3	-	✓	✓	✓	3	✓	✓	2	✓	✓	✓
	4	-	3	2	5	2	6	3	✓	9	7	✓
	5	-	✓	11	14	12	13	15	16	✓	12	✓
	6	-	15	✓	10	13	✓	13	17	16	✓	2
	7	-	6	✓	✓	16	15	3	✓	✓	17	✓
		-										
	Total	-	24	13	29	46	34	34	35	24	36	2
25%	3	-	3	✓	✓	✓	✓	2	✓	✓	✓	2
	4	-	✓	6	✓	✓	3	✓	2	6	5	7
	5	-	13	13	11	10	13	2	10	17	12	9
	6	-	19	16	3	16	2	6	22	17	17	6
	7	-	20	18	12/5 X	23	18	18	16	5	1	22
		-										
	Total	-	55	45	14	49	36	28	50	45	35	46
50%	3	-	✓	✓	✓	1	✓	✓	✓	✓	✓	✓
	4	-	2	2	6	✓	7	2	✓	6	8	✓
	5	-	8	9	12	8	✓	10	12	14	5	10
	6	-	14	✓	12	20	10	19	20	14	✓	2
	7	-	✓	✓	6	13	13	1	✓	✓	15	26
		-										
	Total	-	24	11	36	42	30	32	32	34	28	38
100%	3	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
	4	-	7	1	1	5	✓	3	✓	3	7	7
	5	-	9	13	✓	13	12	15	✓	9	17	10
	6	-	13	1	11	23	20	23	18	16	✓	5
	7	-	✓	10	10	✓	✓	✓	✓	17	12	25
		-										
	Total	-	28	25	22	41	32	41	18	45	36	48

Neonates Data (see back)

QC: L - P

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms EPA-821-R-02-013* Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	MO-MPK
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.285

CHRONIC SELENASTRUM ALGAE GROWTH BIOASSAY

NOEC = 100.00 %
TUc = 1.00

IC25 = >100.00 %
IC50 = >100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	04-8962-7480	**Test Type:**	Cell Growth	**Analyst:**			
Start Date:	27 Nov-19 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable		
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	05-1367-7373	**Code:**	VCF1119.285sel	**Project:**			
Sample Date:	27 Nov-19 07:50	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-MPK		
Sample Age:	8h (8.3 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
13-3739-8537	Cell Density	Dunnett Multiple Comparison Test		100	>100	n/a	1	18.3%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
04-2606-2933	Cell Density	Linear Interpolation (ICPIN)		IC5	>100	n/a	n/a	<1	1
				IC10	>100	n/a	n/a	<1	
				IC15	>100	n/a	n/a	<1	
				IC20	>100	n/a	n/a	<1	
				IC25	>100	n/a	n/a	<1	
				IC40	>100	n/a	n/a	<1	
				IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
04-2606-2933	Cell Density	Control CV	0.06339	<<	0.2	Yes	Passes Criteria
13-3739-8537	Cell Density	Control CV	0.06339	<<	0.2	Yes	Passes Criteria
04-2606-2933	Cell Density	Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria
13-3739-8537	Cell Density	Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

Cell Density Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.440E+6	1.294E+6	1.585E+6	1.329E+6	1.551E+6	4.563E+4	9.125E+4	6.34%	0.00%
6.25		4	1.778E+6	1.526E+6	2.030E+6	1.633E+6	1.983E+6	7.932E+4	1.586E+5	8.92%	-23.52%
12.5		4	1.688E+6	1.401E+6	1.975E+6	1.551E+6	1.950E+6	9.023E+4	1.805E+5	10.69%	-17.28%
25		4	1.814E+6	1.750E+6	1.879E+6	1.757E+6	1.853E+6	2.039E+4	4.077E+4	2.25%	-26.05%
50		4	1.862E+6	1.473E+6	2.250E+6	1.678E+6	2.201E+6	1.221E+5	2.443E+5	13.12%	-29.33%
100		4	1.678E+6	1.479E+6	1.878E+6	1.540E+6	1.836E+6	6.268E+4	1.254E+5	7.47%	-16.59%

Cell Density Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
6.25		1.983E+6	1.675E+6	1.633E+6	1.821E+6
12.5		1.590E+6	1.662E+6	1.551E+6	1.950E+6
25		1.827E+6	1.757E+6	1.821E+6	1.853E+6
50		2.201E+6	1.678E+6	1.879E+6	1.689E+6
100		1.707E+6	1.540E+6	1.836E+6	1.630E+6

PASS

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	13-3739-8537	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	06 Dec-19 13:04	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	04-8962-7480	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	27 Nov-19 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	05-1367-7373	**Code:**	VCF1119.285sel	**Project:**	
Sample Date:	27 Nov-19 07:50	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-MPK
Sample Age:	8h (8.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	18.26%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	6.25	-3.1	2.407	3E+05	6	CDF	1.0000	Non-Significant Effect
	12.5	-2.278	2.407	3E+05	6	CDF	0.9996	Non-Significant Effect
	25	-3.434	2.407	3E+05	6	CDF	1.0000	Non-Significant Effect
	50	-3.867	2.407	3E+05	6	CDF	1.0000	Non-Significant Effect
	100	-2.186	2.407	3E+05	6	CDF	0.9995	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control CV	0.06339	<<	0.2	Yes	Passes Criteria
Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.529E+11	9.058E+10	5	3.798	0.0159	Significant Effect
Error	4.293E+11	2.385E+10	18			
Total	8.822E+11		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	7.571	15.09	0.1815	Equal Variances
	Levene Equality of Variance Test	1.718	4.248	0.1814	Equal Variances
	Mod Levene Equality of Variance Test	1.146	4.248	0.3725	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.6282	3.878	0.1024	Normal Distribution
	D'Agostino Kurtosis Test	0.7226	2.576	0.4699	Normal Distribution
	D'Agostino Skewness Test	1.866	2.576	0.0621	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	4.002	9.21	0.1352	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1681	0.2056	0.0776	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9292	0.884	0.0935	Normal Distribution

Cell Density Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.440E+6	1.294E+6	1.585E+6	1.439E+6	1.329E+6	1.551E+6	4.563E+4	6.34%	0.00%
6.25		4	1.778E+6	1.526E+6	2.030E+6	1.748E+6	1.633E+6	1.983E+6	7.932E+4	8.92%	-23.52%
12.5		4	1.688E+6	1.401E+6	1.975E+6	1.626E+6	1.551E+6	1.950E+6	9.023E+4	10.69%	-17.28%
25		4	1.814E+6	1.750E+6	1.879E+6	1.824E+6	1.757E+6	1.853E+6	2.039E+4	2.25%	-26.05%
50		4	1.862E+6	1.473E+6	2.250E+6	1.784E+6	1.678E+6	2.201E+6	1.221E+5	13.12%	-29.33%
100		4	1.678E+6	1.479E+6	1.878E+6	1.668E+6	1.540E+6	1.836E+6	6.268E+4	7.47%	-16.59%

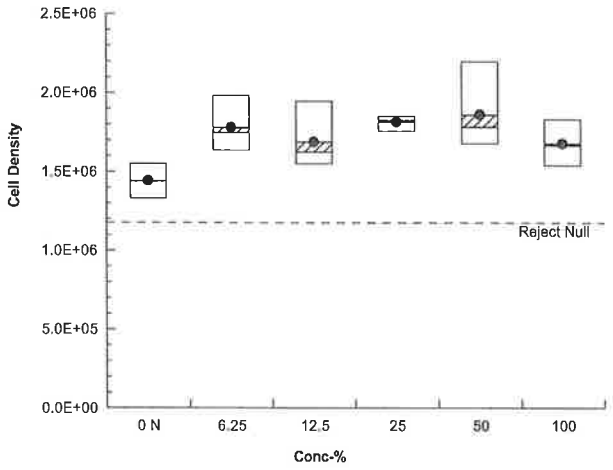
Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

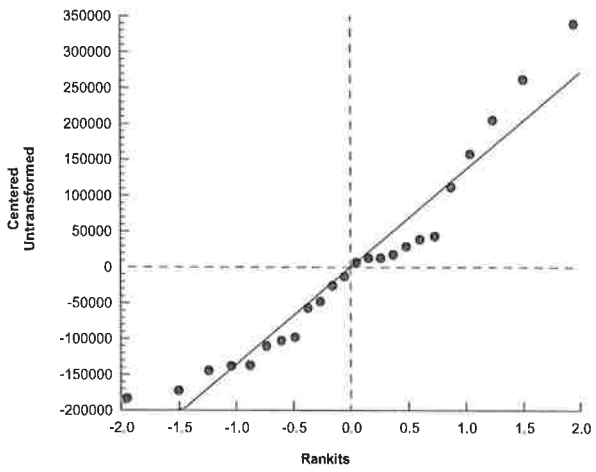
Analysis ID:	13-3739-8537	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	06 Dec-19 13:04	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Cell Density Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
6.25		1.983E+6	1.675E+6	1.633E+6	1.821E+6
12.5		1.590E+6	1.662E+6	1.551E+6	1.950E+6
25		1.827E+6	1.757E+6	1.821E+6	1.853E+6
50		2.201E+6	1.678E+6	1.879E+6	1.689E+6
100		1.707E+6	1.540E+6	1.836E+6	1.630E+6

Graphics





Analyst: _____ QA: _____

CETIS Analytical Report

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-2606-2933	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	06 Dec-19 13:04	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	04-8962-7480	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	27 Nov-19 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	05-1367-7373	**Code:**	VCF1119.285sel	**Project:**	
Sample Date:	27 Nov-19 07:50	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-MPK
Sample Age:	8h (8.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control CV	0.06339	<<	0.2	Yes	Passes Criteria
Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

Cell Density Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	1.440E+6	1.329E+6	1.551E+6	9.125E+4	6.34%	0.0%	1716000	0.0%
6.25		4	1.778E+6	1.633E+6	1.983E+6	1.586E+5	8.92%	-23.52%	1716000	0.0%
12.5		4	1.688E+6	1.551E+6	1.950E+6	1.805E+5	10.69%	-17.28%	1716000	0.0%
25		4	1.814E+6	1.757E+6	1.853E+6	4.077E+4	2.25%	-26.05%	1716000	0.0%
50		4	1.862E+6	1.678E+6	2.201E+6	2.443E+5	13.12%	-29.33%	1716000	0.0%
100		4	1.678E+6	1.540E+6	1.836E+6	1.254E+5	7.47%	-16.59%	1678000	2.22%

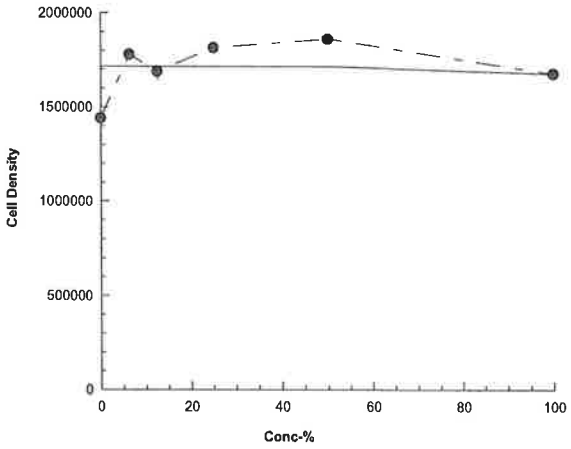
Cell Density Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
6.25		1.983E+6	1.675E+6	1.633E+6	1.821E+6
12.5		1.590E+6	1.662E+6	1.551E+6	1.950E+6
25		1.827E+6	1.757E+6	1.821E+6	1.853E+6
50		2.201E+6	1.678E+6	1.879E+6	1.689E+6
100		1.707E+6	1.540E+6	1.836E+6	1.630E+6

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-2606-2933	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	06 Dec-19 13:04	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	04-8962-7480	**Test Type:**	Cell Growth	**Analyst:**		
Start Date:	27 Nov-19 16:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable	
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	05-1367-7373	**Code:**	VCF1119.285sel	**Project:**	
Sample Date:	27 Nov-19 07:50	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:36	**CAS (PC):**		**Station:**	MO-MPK
Sample Age:	8h (8.3 °C)	**Client:**	VCWPD		

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	1	60			60	60	0	0	0.0%	0
6.25		1	50			50	50	0	0	0.0%	0
12.5		1	55			55	55	0	0	0.0%	0
25		1	59			59	59	0	0	0.0%	0
50		1	54			54	54	0	0	0.0%	0
100		1	44			44	44	0	0	0.0%	0
Overall		6	53.67	47.42	59.92	44	60	2.431	5.955	11.10%	0 (0%)

Conductivity-µmhos

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	436.6	418.7	454.5	425	456	6.431	14.38	3.29%	0
6.25		5	436	431.4	440.6	432	442	1.643	3.674	0.84%	0
12.5		5	426.6	424	429.2	424	429	0.9274	2.074	0.49%	0
25		5	430	428.8	431.2	429	431	0.4472	1	0.23%	0
50		5	442.8	438.7	446.9	439	447	1.463	3.271	0.74%	0
100		5	426.2	422.8	429.6	423	430	1.241	2.775	0.65%	0
Overall		30	433	429.9	436.2	423	456	1.534	8.401	1.94%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	1	117			117	117	0	0	0.0%	0
6.25		1	104			104	104	0	0	0.0%	0
12.5		1	111			111	111	0	0	0.0%	0
25		1	120			120	120	0	0	0.0%	0
50		1	118			118	118	0	0	0.0%	0
100		1	116			116	116	0	0	0.0%	0
Overall		6	114.3	108.2	120.5	104	120	2.404	5.888	5.15%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	7.7	7.612	7.788	7.6	7.8	0.03162	0.07071	0.92%	0
6.25		5	7.66	7.518	7.802	7.5	7.8	0.05099	0.114	1.49%	0
12.5		5	7.62	7.458	7.782	7.5	7.8	0.05831	0.1304	1.71%	0
25		5	7.58	7.476	7.684	7.5	7.7	0.03742	0.08367	1.1%	0
50		5	7.54	7.472	7.608	7.5	7.6	0.02449	0.05477	0.73%	0
100		5	7.5	7.348	7.652	7.4	7.7	0.05477	0.1225	1.63%	0
Overall		30	7.6	7.557	7.643	7.4	7.8	0.0209	0.1145	1.51%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
6.25		5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
12.5		5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
25		5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
50		5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
100		5	24.92	24.38	25.46	24.3	25.5	0.1934	0.4324	1.74%	0
Overall		30	24.92	24.77	25.07	24.3	25.5	0.07182	0.3934	1.58%	0 (0%)

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
6.25				50					
12.5				55					
25				59					
50				54					
100				44					

Conductivity-µmhos

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		426					
6.25				432					
12.5				425					
25				431					
50				444					
100				423					
0	N	2		425					
6.25				435					
12.5				428					
25				429					
50				440					
100				428					
0	N	3		428					
6.25				435					
12.5				429					
25				429					
50				439					
100				425					
0	N	4		448					
6.25				436					
12.5				424					
25				430					
50				444					
100				425					
0	N	5		456					
6.25				442					
12.5				427					
25				431					
50				447					
100				430					

Hardness (CaCO3)-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		117					
6.25				104					
12.5				111					
25				120					
50				118					
100				116					

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.6					
6.25				7.5					
12.5				7.5					
25				7.6					
50				7.6					
100				7.7					
0	N	2		7.7					
6.25				7.6					
12.5				7.5					
25				7.5					
50				7.5					
100				7.5					
0	N	3		7.7					
6.25				7.7					
12.5				7.6					
25				7.5					
50				7.5					
100				7.5					
0	N	4		7.8					
6.25				7.8					
12.5				7.8					
25				7.7					
50				7.6					
100				7.4					
0	N	5		7.7					
6.25				7.7					
12.5				7.7					
25				7.6					
50				7.5					
100				7.4					

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		25.5					
6.25				25.5					
12.5				25.5					
25				25.5					
50				25.5					
100				25.5					
0	N	2		25					
6.25				25					
12.5				25					
25				25					
50				25					
100				25					
0	N	3		25					
6.25				25					
12.5				25					
25				25					
50				25					
100				25					
0	N	4		24.3					
6.25				24.3					
12.5				24.3					
25				24.3					
50				24.3					
100				24.3					
0	N	5		24.8					
6.25				24.8					
12.5				24.8					
25				24.8					
50				24.8					
100				24.8					

Chemical Analysis Data Sheet - Selenastrum Growth

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: VCF Lab #: VCF1119-385

Start date and time: 11-27-19 1600 Sample ID:

End date and time: 12-1-19 1420 Date Rec'd: 11/27/19

YSI Used: B B B B B

Day	0 11/27	1 11/28	2 11/29	3 11/30	4 12-1
Analyst	W	M	W	L	L
Time	1600	1500	1500	1300	~~1420~~ 1420

Temperature (°C)

Control	25.5	25.0	25.0	24.3	24.6
6.25	25.5	25.0	25.0	24.3	24.6
12.5	25.5	25.0	25.0	24.3	24.6
25	25.5	25.0	25.0	24.3	24.6
50	25.5	25.0	25.0	24.3	24.6
WC	25.5	25.0	25.0	24.3	24.6

pH

Control	7.6	7.7	7.7	7.8	7.7
6.25	7.5	7.6	7.7	7.6	7.7
12.5	7.5	7.5	7.6	7.8	7.7
25	7.6	7.5	7.5	7.7	7.6
50	7.6	7.5	7.5	7.6	7.5
WC	7.6 7	7.5	7.5	7.4	7.4

Conductivity (uS/cm)

Control	426	425	428	448	456
6.25	432	435	425	438 D	442
12.5	425	428 AM	429	429	427
25	431	429	429	430	431
50	444	440	439	444	447
WC	423	424	425	425	430

QC: LM Pass

SELANASTRUM GROWTH TOXICITY TEST

COMPANY: VCF
SAMPLE I.D:
START DATE: 11-27-19
END DATE: 12-7-19

LAB NO. VCF1119-285
REC'D DATE: 11-27-19

TREATMENT	EFFLUENT CONCENTRATION						REMARKS
	CON	6.25	12.5	25	50	100	
Temp. °C.							
pH							
Alkalinity mg/L	60	50	55	59	54	44	
Hardness mg/L (CaCO3)	117	104	111	120	118	116	
Salinity (ppt)							
Chlorine mg/L							

Test Chamber Concentration		Cell Density Measurement Number of Cells Per mL Sample Replicate Per Test Chamber			Average Per Replicate
		1	2	3	
Control	1	1.480	1.439	1.437	1.452
Control	2	1.334	1.328	1.321	1.329
Control	3	1.483	1.422	1.403	1.436
Control	4	1.572	1.542	1.540	1.551
6.25	1	1.992	1.986	1.972	1.983
	2	1.687	1.666	1.677	1.677
	3	1.634	1.630	1.646	1.637
	4	1.838	1.811	1.825	1.824
12.5	1	1.622	1.618	1.580	1.607
	2	1.665	1.676	1.664	1.668
	3	1.564	1.545	1.524	1.544
	4	1.966	1.944	1.934	1.948
25	1	1.823	1.837	1.822	1.827
	2	1.774	1.764	1.733	1.757
	3	1.746	1.801	1.817	1.821
	4	1.892	1.872	1.854	1.873
50	1	2.045	2.011	2.006	2.020
	2	1.675	1.681	1.673	1.676
	3	1.869	1.875	1.892	1.879
	4	1.717	1.676	1.674	1.689
100	1	1.731	1.786	1.683	1.733
	2	1.550	1.558	1.576	1.561
	3	1.346	1.356	1.327	1.343
	4	1.653	1.624	1.617	1.631

Hemacytometer Conversion Formula: Selenastrum / mL - (Total Algae Counted) (4,000,000)
Number of Squares Counted

QC: RM Pass

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receving Waters to West Coast Estuarine Organisms, EPA/821/R-02-014.* Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	ME-CC
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.276

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

Survival	NOEC	=	100.00
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
Biomass	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable		
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC		
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
10-9391-2447	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	9.16%	1
16-7458-7162	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	16.5%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
17-2512-4555	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
04-4582-9331	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
10-9391-2447	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
17-2512-4555	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
04-4582-9331	Mean Dry Biomass-mg	Control Resp	1.648	0.85	>>	Yes	Passes Criteria
16-7458-7162	Mean Dry Biomass-mg	Control Resp	1.648	0.85	>>	Yes	Passes Criteria
10-9391-2447	7d Survival Rate	PMSD	0.09161	<<	0.25	No	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	4.00%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.648	1.445	1.852	1.43	1.802	0.0734	0.1641	9.96%	0.00%
50		5	1.718	1.46	1.976	1.562	1.976	0.09284	0.2076	12.08%	-4.22%
100		5	1.693	1.402	1.983	1.352	1.992	0.1046	0.2339	13.82%	-2.69%

Analyst: _____ QA: Pass

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	0.8000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.682	1.532	1.43	1.802	1.796
50		1.912	1.574	1.976	1.562	1.566
100		1.352	1.698	1.632	1.992	1.79

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	4/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	5/5

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-9391-2447	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	9.16%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		50	25	18	1	8	CDF	0.4442	Non-Significant Effect
		100	27.5	18	1	8	CDF	0.6667	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria
PMSD	0.09161	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0075611	0.0037805	2	1	0.3966	Non-Significant Effect
Error	0.0453663	0.0037805	12			
Total	0.0529274		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	7.111	6.927	0.0092	Unequal Variances
	Mod Levene Equality of Variance Test	1	8.022	0.4053	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	3.065	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	3.998	2.576	6.4E-05	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.4333	0.2542	2.1E-08	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.5586	0.8328	1.1E-05	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
100		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	0.8000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-9391-2447	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

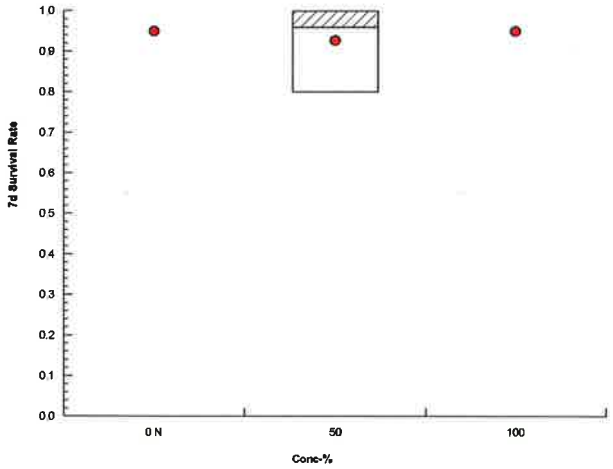
Angular (Corrected) Transformed Detail

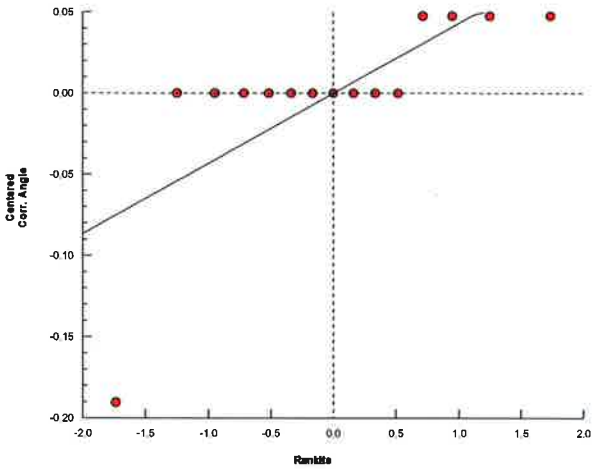
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.345	1.345	1.345	1.345	1.345
50		1.345	1.107	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345	1.345

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	4/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	5/5

Graphics





Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	16-7458-7162	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	16.49%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	50	-0.5397	2.108	0.272	8	CDF	0.8426	Non-Significant Effect
	100	-0.3443	2.108	0.272	8	CDF	0.7879	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.648	0.85	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0124176	0.0062088	2	0.1493	0.8629	Non-Significant Effect
Error	0.498968	0.0415807	12			
Total	0.511386		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	0.4461	9.21	0.8001	Equal Variances
	Levene Equality of Variance Test	0.284	6.927	0.7577	Equal Variances
	Mod Levene Equality of Variance Test	0.07928	8.022	0.9244	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2795	3.878	0.6750	Normal Distribution
	D'Agostino Skewness Test	0.0679	2.576	0.9459	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1312	0.2542	0.7802	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9659	0.8328	0.7935	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.648	1.445	1.852	1.682	1.43	1.802	0.0734	9.96%	0.00%
50		5	1.718	1.46	1.976	1.574	1.562	1.976	0.09284	12.08%	-4.22%
100		5	1.693	1.402	1.983	1.698	1.352	1.992	0.1046	13.82%	-2.69%

Mean Dry Biomass-mg Detail

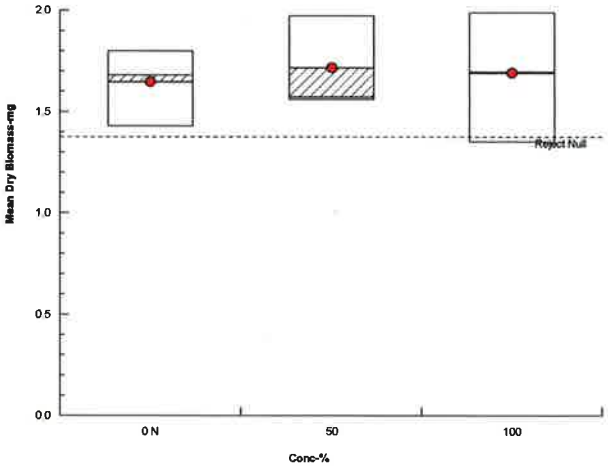
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.682	1.532	1.43	1.802	1.796
50		1.912	1.574	1.976	1.562	1.566
100		1.352	1.698	1.632	1.992	1.79

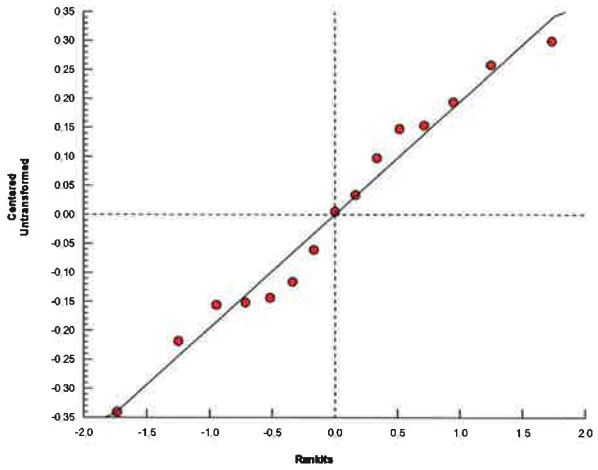
Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	16-7458-7162	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2512-4555	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	25/25	1	0.0%
50		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.98	2.0%
100		5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	25/25	0.98	2.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	0.8000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

7d Survival Rate Binomials

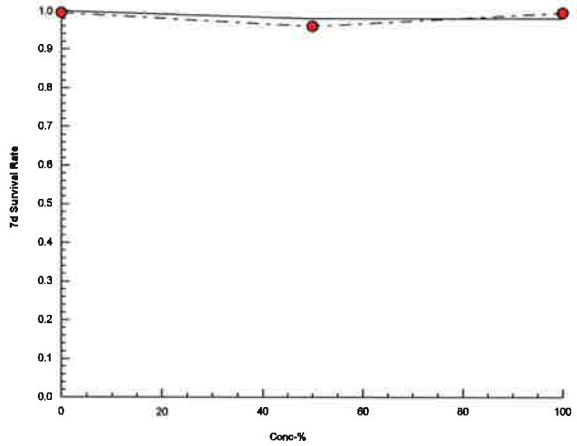
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	4/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	5/5

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-2512-4555	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-4582-9331	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 15:58	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.648	0.85	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

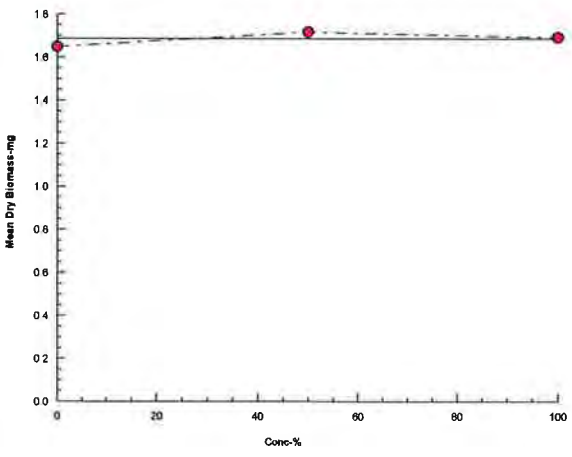
Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	5	1.648	1.43	1.802	0.1641	9.96%	0.0%	1.686	0.0%
50		5	1.718	1.562	1.976	0.2076	12.08%	-4.22%	1.686	0.0%
100		5	1.693	1.352	1.992	0.2339	13.82%	-2.69%	1.686	0.0%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.682	1.532	1.43	1.802	1.796
50		1.912	1.574	1.976	1.562	1.566
100		1.352	1.698	1.632	1.992	1.79

Graphics



Analyst: _____ QA: _____

CETIS Measurement Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-2075-7712	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:05	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	04 Dec-19 15:10	**Species:**	Atherinops affinis	**Brine:**	Not Applicable		
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	15-5383-6199	**Code:**	VCF1119.276tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 10:57	**CAS (PC):**		**Station:**	ME-CC
Sample Age:	5h (10.8 °C)	**Client:**	VCWPD		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.163	6.659	7.666	6.4	8.1	0.2129	0.6022	8.41%	0
50		8	6.587	5.534	7.641	4.2	7.8	0.4454	1.26	19.12%	0
100		8	6.35	5.344	7.356	4.2	7.7	0.4255	1.204	18.95%	0
Overall		24	6.7	6.246	7.154	4.2	8.1	0.2194	1.075	16.04%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.313	7.243	7.382	7.2	7.5	0.0295	0.08344	1.14%	0
50		8	7.4	7.311	7.489	7.2	7.5	0.0378	0.1069	1.45%	0
100		8	7.425	7.328	7.522	7.2	7.5	0.04119	0.1165	1.57%	0
Overall		24	7.379	7.333	7.426	7.2	7.5	0.02251	0.1103	1.49%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	25	25	25	25	25	0	0	0.0%	0
50		8	25	25	25	25	25	0	0	0.0%	0
100		8	25	25	25	25	25	0	0	0.0%	0
Overall		24	25	25	25	25	25	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	21	21	21	21	21	0	0	0.0%	0
50		8	21	21	21	21	21	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
Overall		24	21	21	21	21	21	0	0	0.00%	0 (0%)

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.1					
50				7.3					
100				7.7					
0	N	2		7					
50				7.4					
100				6.7					
0	N	3		6.4					
50				6.7					
100				6.3					
0	N	4		7.8					
50				7.2					
100				6.6					
0	N	5		7.4					
50				7					
100				6.7					
0	N	6		8.1					
50				7.8					
100				7.6					
0	N	7		7.1					
50				5.1					
100				5					
0	N	8		6.4					
50				4.2					
100				4.2					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.3					
50				7.4					
100				7.5					
0	N	2		7.3					
50				7.4					
100				7.5					
0	N	3		7.3					
50				7.3					
100				7.4					
0	N	4		7.3					
50				7.5					
100				7.5					
0	N	5		7.3					
50				7.5					
100				7.5					
0	N	6		7.3					
50				7.4					
100				7.3					
0	N	7		7.5					
50				7.5					
100				7.5					
0	N	8		7.2					
50				7.2					
100				7.2					

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		25					
50				25					
100				25					
0	N	2		25					
50				25					
100				25					
0	N	3		25					
50				25					
100				25					
0	N	4		25					
50				25					
100				25					
0	N	5		25					
50				25					
100				25					
0	N	6		25					
50				25					
100				25					
0	N	7		25					
50				25					
100				25					
0	N	8		25					
50				25					
100				25					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		21					
50				21					
100				21					
0	N	2		21					
50				21					
100				21					
0	N	3		21					
50				21					
100				21					
0	N	4		21					
50				21					
100				21					
0	N	5		21					
50				21					
100				21					
0	N	6		21					
50				21					
100				21					
0	N	7		21					
50				21					
100				21					
0	N	8		21					
50				21					
100				21					

CHEMICAL ANALYSIS
VCF - Topsmelt 11

Start Date: 11/27/19 1505
End Date: 12/4/19 1510
Lab # : VCF 11 19. 276
Date Rec'd: 11/27/19
YSI Used: B
Sample used for renewal: B B B B B B B

Day	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Analyst Int.	AR	0915 AR	1140 AR	0855 AR	0905 AR	1029 AR	1415 AR	L
DISSOLVED OXYGEN (mg/L)								
CONTROL	7.1	6.4 7.0	6.2 6.4	6.9 7.8	6.9 7.4	6.5 8.1	6.0 7.1	6.4
~~6.25%~~								
~~12.5%~~								
~~25%~~								
50%	7.3	6.5 7.4	6.3 6.7	6.7 7.2	6.6 7.0	6.5 7.8	5.0 5.4	4.2
100%	7.7	6.4 6.7	6.2 6.3	6.8 6.6	6.9 6.7	6.4 7.6	4.7 5.0	4.2
TEMPERATURE (°C)								
CONTROL	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0
~~6.25%~~								
~~12.5%~~								
~~25%~~								
50%	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0
100%	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0
pH								
CONTROL	7.3	7.3 7.3	7.4 7.3	7.4 7.3	7.3 7.3	7.3 7.3	7.4 7.5	7.2
~~6.25%~~								
~~12.5%~~								
~~25%~~								
50%	7.4	7.5 7.4	7.4 7.3	7.5 7.5	7.5 7.5	7.5 7.4	7.4 7.5	7.2
100%	7.5	7.7 7.5	7.4 7.4	7.5 7.5	7.5 7.5	7.5 7.3	7.5 7.5	7.2
SALINITY (ppt)								
CONTROL	25	25	25	25	25	25	25	25
~~6.25%~~								
~~12.5%~~								
~~25%~~								
50%	25	25	25	25	25	25	25	25
100%	25	25	25	25	25	25	25	25

NOTES: Aquatic Biosystem low on topsmelt supply, set up 50, and 100% only

0ppt → 25ppt

TOPSMELT SURVIVAL

Company: VCF 11

Sample ID:

Lab#: VCF 11 19.276

Start Date: 11/27/19

End Date: 12/4/19

Daily # of Surviving Fish									
Concentration	Rep. #	Initial	1	2	3	4	5	6	Final
~~SUM RW~~ Control	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5
6.25%	1								
	2								
	3								
	4								
	5								
12.5%	1								
	2								
	3								
	4								
	5								
25%	1								
	2								
	3								
	4								
	5								
50%	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	4	4
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5
100%	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5

Aquatic Bioassay & Consulting Laboratories, Inc.

QC:

TOPSMELT GROWTH

Company: VCF 11 **Lab#:** VCF 11 19. 276

Sample ID:

Chamber #	Eff Conc.	Rep. #	Number Fish	Boat Tare	Boat + Fish	Fish Wt. (mg)	Average Weight Per Fish (mg)
XH 1	CON	1		1.13831	1.14672	0.00841	
2		2		1.13535	1.14301	0.00766	
3		3		1.14176	1.14891	0.00715	
4		4		1.14077	1.14978	0.00901	
5		5		1.13463	1.4361	0.00898	
	6.25%	1					
		2					
		3					
		4					
		5					
	12.5%	1					
		2					
		3					
		4					
		5					
	25%	1					
		2					
		3					
		4					
		5					
XH 6	50%	1		1.13985	1.14436	0.00956	
7		2		1.13694	1.14481	0.00787	
8		3		1.13266	1.14254	0.00988	
9		4		1.14144	1.14925	0.00781	
10		5		1.13875	1.14658	0.00783	
XH 11	100%	1		1.13814	1.14490	0.00676	
12		2		1.14752	1.15601	0.00849	
13		3		1.12190	1.13006	0.00816	
14		4		1.12307	1.13303	0.00996	
15		5		1.12950	1.13845	0.00895	

Aquatic Bioassay & Consulting Laboratories, Inc.

QC: L-P

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arne Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receving Waters to West Coast Estuarine Organisms, EPA/821/R-02-014.* Results were as follows:

CLIENT:	Ventura County Flood Control
SAMPLE I.D.:	ME-VR2
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.278

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

Survival	NOEC	=	100.00
	TUc	=	1.00
	EC25	=	>100.00 %
	EC50	=	>100.00 %
Biomass	NOEC	=	100.00 %
	TUc	=	1.00
	IC25	=	>100.00 %
	IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater	
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**
Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)	
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report	
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2	
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD			

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
19-1612-3417	7d Survival Rate	Steel Many-One Rank Sum Test		100	>100	n/a	1	11.2%	1
14-6791-1774	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	>100	n/a	1	20.9%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
05-5216-2193	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	>100	n/a	n/a	<1	1
			✓	EC10	>100	n/a	n/a	<1	
			✓	EC15	>100	n/a	n/a	<1	
			✓	EC20	>100	n/a	n/a	<1	
			✓	EC25	>100	n/a	n/a	<1	
			✓	EC40	>100	n/a	n/a	<1	
			✓	EC50	>100	n/a	n/a	<1	
06-4678-8209	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	>100	n/a	n/a	<1	1
			✓	IC10	>100	n/a	n/a	<1	
			✓	IC15	>100	n/a	n/a	<1	
			✓	IC20	>100	n/a	n/a	<1	
			✓	IC25	>100	n/a	n/a	<1	
			✓	IC40	>100	n/a	n/a	<1	
			✓	IC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
05-5216-2193	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
19-1612-3417	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
06-4678-8209	Mean Dry Biomass-mg	Control Resp	1.63	0.85	>>	Yes	Passes Criteria
14-6791-1774	Mean Dry Biomass-mg	Control Resp	1.63	0.85	>>	Yes	Passes Criteria
19-1612-3417	7d Survival Rate	PMSD	0.1121	<<	0.25	No	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
50		5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	4.00%
100		5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	4.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.63	1.391	1.87	1.37	1.812	0.08618	0.1927	11.82%	0.00%
50		5	1.643	1.278	2.007	1.198	1.878	0.1313	0.2935	17.87%	-0.76%
100		5	1.605	1.269	1.941	1.194	1.912	0.1211	0.2707	16.87%	1.57%

Pacific Topsmelt 7-d Survival and Growth Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	0.8000	1.0000	1.0000
100		1.0000	1.0000	0.8000	1.0000	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.796	1.812	1.37	1.496	1.678
50		1.492	1.866	1.78	1.198	1.878
100		1.64	1.754	1.524	1.912	1.194

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	5/5	4/5	5/5	5/5
100		5/5	5/5	4/5	5/5	5/5

Analyst: QA:

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-1612-3417	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:21	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	11.21%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		50	25	18	1	8	CDF	0.4442	Non-Significant Effect
		100	25	18	1	8	CDF	0.4442	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria
PMSD	0.1121	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0075611	0.0037805	2	0.5	0.6186	Non-Significant Effect
Error	0.0907326	0.0075611	12			
Total	0.0982937		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	3.556	6.927	0.0613	Equal Variances
	Mod Levene Equality of Variance Test	0.5	8.022	0.6224	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	2.895	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	3.136	2.576	0.0017	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.3667	0.2542	6.9E-06	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6085	0.8328	3.0E-05	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%
100		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
100		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	0.8000	1.0000	1.0000
100		1.0000	1.0000	0.8000	1.0000	1.0000

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-1612-3417	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:21	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

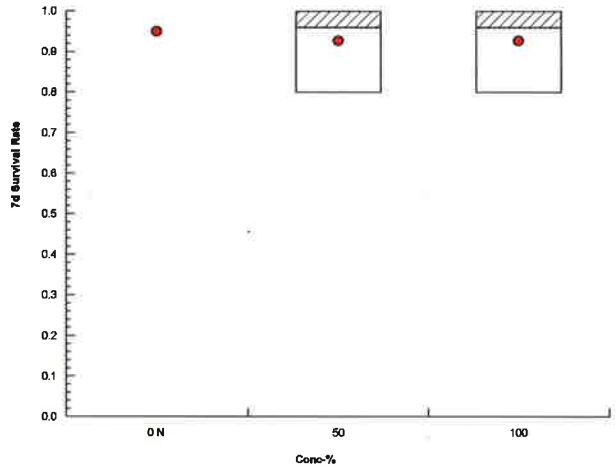
Angular (Corrected) Transformed Detail

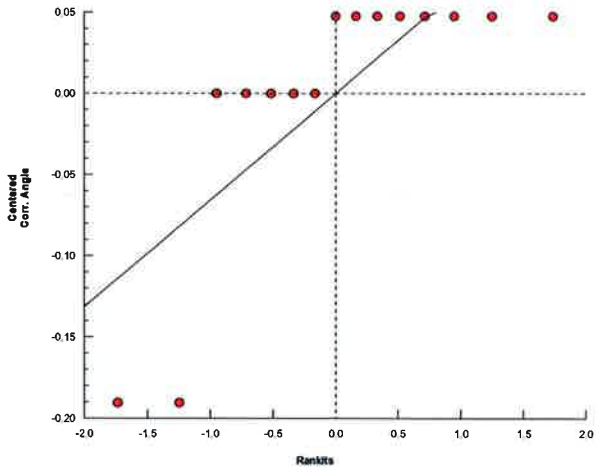
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.345	1.345	1.345	1.345	1.345
50		1.345	1.345	1.107	1.345	1.345
100		1.345	1.345	1.107	1.345	1.345

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	5/5	4/5	5/5	5/5
100		5/5	5/5	4/5	5/5	5/5

Graphics





Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-6791-1774	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:22	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	20.93%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	50	-0.0766	2.108	0.341	8	CDF	0.6960	Non-Significant Effect
	100	0.1581	2.108	0.341	8	CDF	0.6029	Non-Significant Effect

Test Acceptability Criteria — **TAC Limits**

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1.63	0.85	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0037552	0.0018776	2	0.02866	0.9718	Non-Significant Effect
Error	0.786245	0.0655204	12			
Total	0.79		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	0.6558	9.21	0.7204	Equal Variances
	Levene Equality of Variance Test	0.5249	6.927	0.6046	Equal Variances
	Mod Levene Equality of Variance Test	0.2196	8.022	0.8070	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.5615	3.878	0.1502	Normal Distribution
	D'Agostino Skewness Test	1.227	2.576	0.2200	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1854	0.2542	0.1826	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9173	0.8328	0.1751	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.63	1.391	1.87	1.678	1.37	1.812	0.08618	11.82%	0.00%
50		5	1.643	1.278	2.007	1.78	1.198	1.878	0.1313	17.87%	-0.76%
100		5	1.605	1.269	1.941	1.64	1.194	1.912	0.1211	16.87%	1.57%

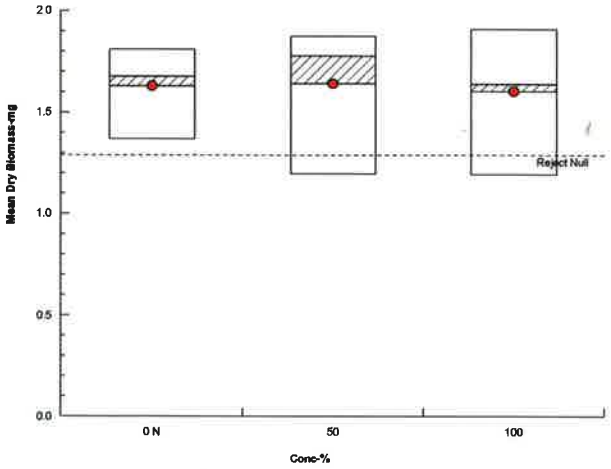
Mean Dry Biomass-mg Detail

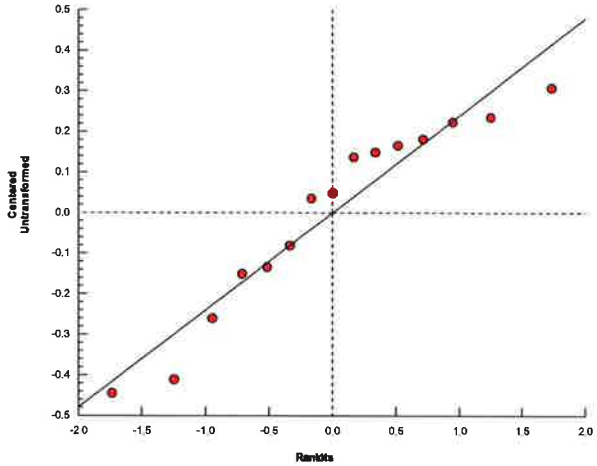
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.796	1.812	1.37	1.496	1.678
50		1.492	1.866	1.78	1.198	1.878
100		1.64	1.754	1.524	1.912	1.194

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-6791-1774	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:22	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-5216-2193	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	25/25	1	0.0%
50		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.96	4.0%
100		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.96	4.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	0.8000	1.0000	1.0000
100		1.0000	1.0000	0.8000	1.0000	1.0000

7d Survival Rate Binomials

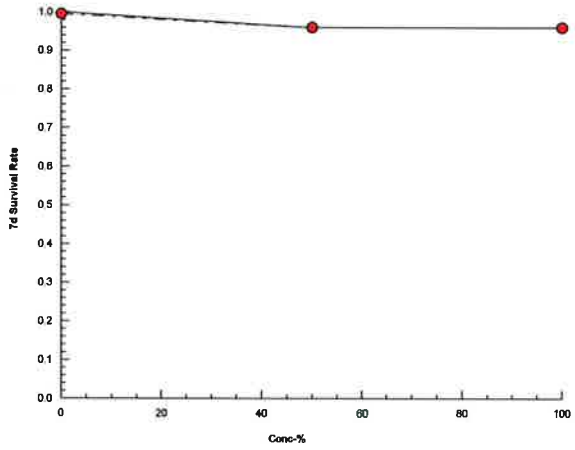
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	5/5	5/5	5/5	5/5	5/5
50		5/5	5/5	4/5	5/5	5/5
100		5/5	5/5	4/5	5/5	5/5

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-5216-2193	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-4678-8209	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	16 Dec-19 16:22	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.63	0.85	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	n/a	n/a	<1	n/a	n/a
IC10	>100	n/a	n/a	<1	n/a	n/a
IC15	>100	n/a	n/a	<1	n/a	n/a
IC20	>100	n/a	n/a	<1	n/a	n/a
IC25	>100	n/a	n/a	<1	n/a	n/a
IC40	>100	n/a	n/a	<1	n/a	n/a
IC50	>100	n/a	n/a	<1	n/a	n/a

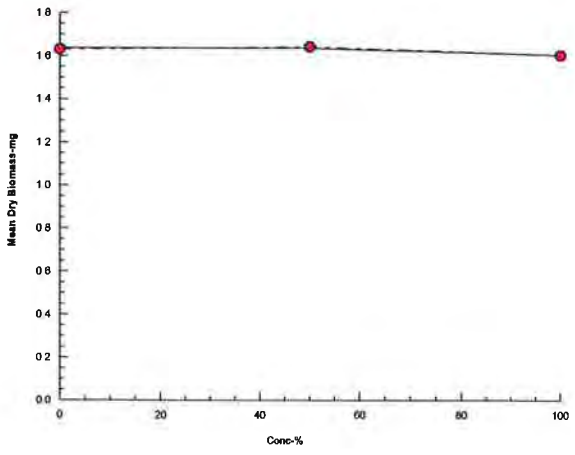
Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	5	1.63	1.37	1.812	0.1927	11.82%	0.0%	1.637	0.0%
50		5	1.643	1.198	1.878	0.2935	17.87%	-0.76%	1.637	0.0%
100		5	1.605	1.194	1.912	0.2707	16.87%	1.57%	1.605	1.94%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.796	1.812	1.37	1.496	1.678
50		1.492	1.866	1.78	1.198	1.878
100		1.64	1.754	1.524	1.912	1.194

Graphics



CETIS Measurement Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-9398-7583	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	04 Dec-19 15:17	**Species:**	Atherinops affinis	**Brine:**	Not Applicable		
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	10-5596-2002	**Code:**	VCF1119.278tops	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 10:15	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:04	**CAS (PC):**		**Station:**	ME-VR2
Sample Age:	5h (12.3 °C)	**Client:**	VCWPD		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.163	6.659	7.666	6.4	8.1	0.2129	0.6022	8.41%	0
50		8	6.688	5.914	7.461	4.9	7.5	0.327	0.925	13.83%	0
100		8	6.825	5.801	7.849	4.3	7.8	0.4329	1.224	17.94%	0
Overall		24	6.892	6.498	7.285	4.3	8.1	0.1902	0.932	13.52%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.313	7.243	7.382	7.2	7.5	0.0295	0.08344	1.14%	0
50		8	7.488	7.393	7.582	7.3	7.6	0.03981	0.1126	1.5%	0
100		8	7.525	7.438	7.612	7.4	7.7	0.0366	0.1035	1.38%	0
Overall		24	7.442	7.385	7.499	7.2	7.7	0.02753	0.1349	1.81%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	25	25	25	25	25	0	0	0.0%	0
50		8	25	25	25	25	25	0	0	0.0%	0
100		8	25	25	25	25	25	0	0	0.0%	0
Overall		24	25	25	25	25	25	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	21	21	21	21	21	0	0	0.0%	0
50		8	21	21	21	21	21	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
Overall		24	21	21	21	21	21	0	0	0.00%	0 (0%)

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.1					
50				7.3					
100				7.8					
0	N	2		7					
50				7					
100				7.6					
0	N	3		6.4					
50				6.9					
100				7.2					
0	N	4		7.8					
50				7.5					
100				7.5					
0	N	5		7.4					
50				7.1					
100				7.2					
0	N	6		8.1					
50				7.2					
100				7.4					
0	N	7		7.1					
50				5.6					
100				5.6					
0	N	8		6.4					
50				4.9					
100				4.3					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.3					
50				7.4					
100				7.4					
0	N	2		7.3					
50				7.5					
100				7.5					
0	N	3		7.3					
50				7.4					
100				7.5					
0	N	4		7.3					
50				7.6					
100				7.6					
0	N	5		7.3					
50				7.6					
100				7.6					
0	N	6		7.3					
50				7.5					
100				7.5					
0	N	7		7.5					
50				7.6					
100				7.7					
0	N	8		7.2					
50				7.3					
100				7.4					

Analyst: _____ QA: _____

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		25					
50				25					
100				25					
0	N	2		25					
50				25					
100				25					
0	N	3		25					
50				25					
100				25					
0	N	4		25					
50				25					
100				25					
0	N	5		25					
50				25					
100				25					
0	N	6		25					
50				25					
100				25					
0	N	7		25					
50				25					
100				25					
0	N	8		25					
50				25					
100				25					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		21					
50				21					
100				21					
0	N	2		21					
50				21					
100				21					
0	N	3		21					
50				21					
100				21					
0	N	4		21					
50				21					
100				21					
0	N	5		21					
50				21					
100				21					
0	N	6		21					
50				21					
100				21					
0	N	7		21					
50				21					
100				21					
0	N	8		21					
50				21					
100				21					

Analyst: QA

CHEMICAL ANALYSIS
VCF - Topsmelt 12

Start Date: 11/27/19 1510
End Date: 12/4/19 1517
YSI Used: B
Sample used for renewal: B B B B B B B

Lab # : VCF 11 19. 278
Date Rec'd: 11/27/19

Day	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Analyst Int.	AR	0830 AR	1145 AR	0900 AR	0914 AR	1042 AR	1425 AR	
DISSOLVED OXYGEN (mg/L)								
CONTROL	7.1	6.4	7.0 6.2	6.4 6.9	7.8 6.9	7.4 6.7	8.1 6.0	7.1 6.4
6.25%								
12.5%								
25%								
50%	7.3	6.7	7.0 5.9	6.9 6.5	7.5 7.0	7.1 6.3	7.2 4.6	5.6 4.9
100%	7.8	8.7	7.6 5.8	7.2 6.6	8.1 7.3	7.2 6.7	7.4 4.7	5.6 4.3
TEMPERATURE (°C)					7.5 M			
CONTROL	21.0	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0
6.25%								
12.5%								
25%								
50%	21.0	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0
100%	21.0	21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0	21.0 21.0
pH								
CONTROL	7.3	7.3	7.3 7.4	7.3 7.4	7.3 7.3	7.3 7.3	7.4 7.4	7.2
6.25%								
12.5%								
25%								
50%	7.4	7.5	7.5 7.5	7.4 7.6	7.6 7.6	7.6 7.6	7.5 7.6	7.6 7.3
100%	7.4	7.6	7.5 7.5	7.5 7.7	7.6 7.6	7.4 7.6	7.5 7.7	7.7 7.4
SALINITY (ppt)								
CONTROL	25	25	25	25	25	25	25	25
6.25%								
12.5%								
25%								
50%	25	25	25	25	25	25	25	25
100%	25	25	25	25	25	25	25	25

NOTES: Aquatic Biosystem low on topsmelt supply, set up 50, and 100% only

0 ppt → 25 ppt

TOPSMELT GROWTH

Company: VCF 12 **Lab#:** VCF 11 19. 278

Sample ID:

Chamber #	Eff Conc.	Rep. #	Number Fish	Boat Tare	Boat + Fish	Fish Wt. (mg)	Average Weight Per Fish (mg)
XI 1	CON	1		1.14075	1.14973	0.00898	
2		2		1.14675	1.15581	0.00906	
3		3		1.13724	1.14409	0.00685	
4		4		1.13586	1.14334	0.00748	
5		5		1.13972	1.14311	0.00839	
	6.25%	1					
		2					
		3					
		4					
		5					
	12.5%	1					
		2					
		3					
		4					
		5					
	25%	1					
		2					
		3					
		4					
		5					
XI 6	50%	1		1.13380	1.14126	0.00746	
7		2		1.11699	1.12632	0.00933	
8		3		1.15022	1.15912	0.00890	
9		4		1.13530	1.14129	0.00599	
10		5		1.13262	1.14201	0.00939	
XI 11	100%	1		1.13304	1.14124	0.00820	
12		2		1.12838	1.13715	0.00877	
13		3		1.14649	1.15411	0.00762	
14		4		1.15335	1.16291	0.00956	
15		5		1.13376	1.13973	0.00597	
16 - BLANK				1.15221	1.15206	-0.00015	

Aquatic Bioassay & Consulting Laboratories, Inc.

TOPSMELT SURVIVAL

Company: VCF 12

Sample ID:

Lab#: VCF 11 19.278

Start Date: 11/27/19

End Date: 12/4/19

Daily # of Surviving Fish									
Concentration	Rep. #	Initial	1 M	2 T	3 W	4 Th	5 F	6 Sa	Final Su
~~SUM RW~~ CON (R)	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5
6.25%	1								
	2								
	3								
	4								
	5								
12.5%	1								
	2								
	3								
	4								
	5								
25%	1								
	2								
	3								
	4								
	5								
50%	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	4	4	4	4
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5
100%	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	4	5	5
	3	5	5	5	5	5	4	4	4
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5

Aquatic Bioassay & Consulting Laboratories, Inc.

QC: LP

aquatic bioassay & consulting laboratories, inc

December 18, 2019

Mr. Arnie Anselm
Ventura County Watershed Protection District
800 South Victoria Ave
Ventura, CA 93009

Dear Mr. Anselm:

We are pleased to present the enclosed revised bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA-600/R95/136, 1995*. Results were as follows:

CLIENT:	County of Ventura
SAMPLE I.D.:	ME-SCR
DATE RECEIVED:	11/27/2019
ABC LAB. NO.:	VCF1119.283

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
IC25	=	>100.00 %
IC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

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

Batch ID:	03-7648-3613	**Test Type:**	Fertilization	**Analyst:**			
Start Date:	30 Nov-19 07:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Nov-19 07:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable		
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive	**Age:**	
Sample ID:	15-2518-2230	**Code:**	VCF1119.283urc	**Project:**	2019/20-1 (Wet)		
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report		
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	ME-SCR		
Sample Age:	69h (11.3 °C)	**Client:**	VCWPD				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
03-1796-1159	Fertilization Rate	Dunnett Multiple Comparison Test		100	>100	n/a	1	4.31%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	%	95% LCL	95% UCL	TU	S
19-2891-2708	Fertilization Rate	Linear Interpolation (ICPIN)		EC5	>100	n/a	n/a	<1	1
				EC10	>100	n/a	n/a	<1	
				EC15	>100	n/a	n/a	<1	
				EC20	>100	n/a	n/a	<1	
				EC25	>100	n/a	n/a	<1	
				EC40	>100	n/a	n/a	<1	
				EC50	>100	n/a	n/a	<1	

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
03-1796-1159	Fertilization Rate	Control Resp	0.93	0.7	>>	Yes	Passes Criteria
19-2891-2708	Fertilization Rate	Control Resp	0.93	0.7	>>	Yes	Passes Criteria
03-1796-1159	Fertilization Rate	PMSD	0.04306	<<	0.25	No	Passes Criteria

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.9300	0.8910	0.9690	0.9000	0.9600	0.0123	0.0245	2.63%	0.00%
6.25		4	0.9400	0.9056	0.9744	0.9100	0.9600	0.0108	0.0216	2.30%	-1.08%
12.5		4	0.9250	0.8945	0.9555	0.9100	0.9500	0.0096	0.0192	2.07%	0.54%
25		4	0.9475	0.9122	0.9828	0.9200	0.9700	0.0111	0.0222	2.34%	-1.88%
50		4	0.9225	0.8986	0.9464	0.9100	0.9400	0.0075	0.0150	1.63%	0.81%
100		4	0.9375	0.9022	0.9728	0.9100	0.9600	0.0111	0.0222	2.37%	-0.81%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9300	0.9000	0.9600
6.25		0.9500	0.9100	0.9400	0.9600
12.5		0.9100	0.9500	0.9300	0.9100
25		0.9600	0.9400	0.9200	0.9700
50		0.9100	0.9100	0.9300	0.9400
100		0.9300	0.9600	0.9500	0.9100

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	93/100	90/100	96/100
6.25		95/100	91/100	94/100	96/100
12.5		91/100	95/100	93/100	91/100
25		96/100	94/100	92/100	97/100
50		91/100	91/100	93/100	94/100
100		93/100	96/100	95/100	91/100

Analyst: _____ QA: _____ Pass

CETIS Analytical Report

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

Analysis ID:	03-1796-1159	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:45	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	03-7648-3613	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Nov-19 07:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Nov-19 07:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive **Age:**
Sample ID:	15-2518-2230	**Code:**	VCF1119.283urc	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	ME-SCR
Sample Age:	69h (11.3 °C)	**Client:**	VCWPD		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	4.31%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		6.25	-0.652	2.407	0.073	6	CDF	0.9578	Non-Significant Effect
		12.5	0.3606	2.407	0.073	6	CDF	0.7062	Non-Significant Effect
		25	-1.22	2.407	0.073	6	CDF	0.9906	Non-Significant Effect
		50	0.5404	2.407	0.073	6	CDF	0.6299	Non-Significant Effect
		100	-0.4857	2.407	0.073	6	CDF	0.9376	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.93	0.7	>>	Yes	Passes Criteria
PMSD	0.04306	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0082663	0.0016533	5	0.8872	0.5099	Non-Significant Effect
Error	0.0335433	0.0018635	18			
Total	0.0418096		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	1.049	15.09	0.9585	Equal Variances
	Levene Equality of Variance Test	0.2727	4.248	0.9221	Equal Variances
	Mod Levene Equality of Variance Test	0.24	4.248	0.9395	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.3755	3.878	0.4178	Normal Distribution
	D'Agostino Kurtosis Test	1.607	2.576	0.1082	Normal Distribution
	D'Agostino Skewness Test	0.1091	2.576	0.9132	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	2.593	9.21	0.2735	Normal Distribution
	Kolmogorov-Smirnov D Test	0.09733	0.2056	0.8841	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9495	0.884	0.2647	Normal Distribution

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9300	0.8910	0.9690	0.9300	0.9000	0.9600	0.0123	2.63%	0.00%
6.25		4	0.9400	0.9056	0.9744	0.9450	0.9100	0.9600	0.0108	2.30%	-1.08%
12.5		4	0.9250	0.8945	0.9555	0.9200	0.9100	0.9500	0.0096	2.07%	0.54%
25		4	0.9475	0.9122	0.9828	0.9500	0.9200	0.9700	0.0111	2.34%	-1.88%
50		4	0.9225	0.8986	0.9464	0.9200	0.9100	0.9400	0.0075	1.63%	0.81%
100		4	0.9375	0.9022	0.9728	0.9400	0.9100	0.9600	0.0111	2.37%	-0.81%

Analyst: _____ QA: _____

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

Analysis ID:	03-1796-1159	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:45	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.306	1.228	1.385	1.303	1.249	1.369	0.02464	3.77%	0.00%
6.25		4	1.326	1.256	1.396	1.334	1.266	1.369	0.02209	3.33%	-1.52%
12.5		4	1.295	1.235	1.355	1.285	1.266	1.345	0.01885	2.91%	0.84%
25		4	1.343	1.264	1.423	1.346	1.284	1.397	0.02491	3.71%	-2.85%
50		4	1.29	1.244	1.335	1.285	1.266	1.323	0.01421	2.20%	1.26%
100		4	1.321	1.248	1.394	1.324	1.266	1.369	0.02286	3.46%	-1.14%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9300	0.9000	0.9600
6.25		0.9500	0.9100	0.9400	0.9600
12.5		0.9100	0.9500	0.9300	0.9100
25		0.9600	0.9400	0.9200	0.9700
50		0.9100	0.9100	0.9300	0.9400
100		0.9300	0.9600	0.9500	0.9100

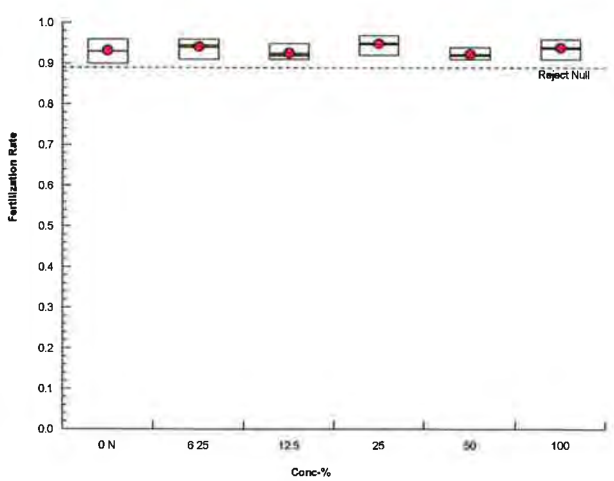
Angular (Corrected) Transformed Detail

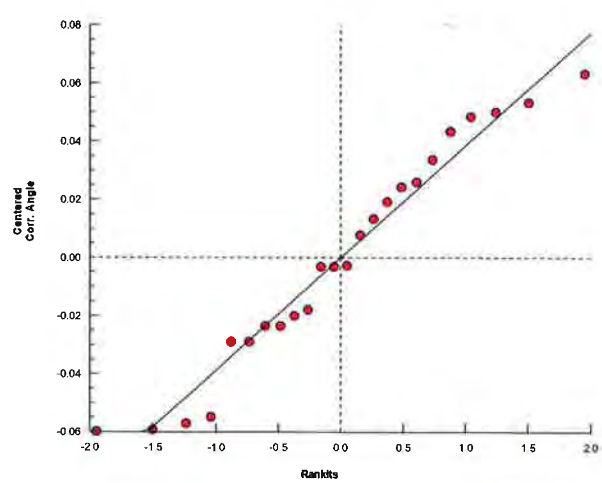
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.303	1.303	1.249	1.369
6.25		1.345	1.266	1.323	1.369
12.5		1.266	1.345	1.303	1.266
25		1.369	1.323	1.284	1.397
50		1.266	1.266	1.303	1.323
100		1.303	1.369	1.345	1.266

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	93/100	90/100	96/100
6.25		95/100	91/100	94/100	96/100
12.5		91/100	95/100	93/100	91/100
25		96/100	94/100	92/100	97/100
50		91/100	91/100	93/100	94/100
100		93/100	96/100	95/100	91/100

Graphics





CETIS Analytical Report

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

Analysis ID:	19-2891-2708	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:45	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	03-7648-3613	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Nov-19 07:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Nov-19 07:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive **Age:**
Sample ID:	15-2518-2230	**Code:**	VCF1119.283urc	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	ME-SCR
Sample Age:	69h (11.3 °C)	**Client:**	VCWPD		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.93	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	n/a	n/a	<1	n/a	n/a
EC10	>100	n/a	n/a	<1	n/a	n/a
EC15	>100	n/a	n/a	<1	n/a	n/a
EC20	>100	n/a	n/a	<1	n/a	n/a
EC25	>100	n/a	n/a	<1	n/a	n/a
EC40	>100	n/a	n/a	<1	n/a	n/a
EC50	>100	n/a	n/a	<1	n/a	n/a

Fertilization Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	0.9300	0.9000	0.9600	0.0245	2.63%	0.0%	372/400	0.9356	0.0%
6.25		4	0.9400	0.9100	0.9600	0.0216	2.30%	-1.08%	376/400	0.9356	0.0%
12.5		4	0.9250	0.9100	0.9500	0.0192	2.07%	0.54%	370/400	0.9356	0.0%
25		4	0.9475	0.9200	0.9700	0.0222	2.34%	-1.88%	379/400	0.9356	0.0%
50		4	0.9225	0.9100	0.9400	0.0150	1.63%	0.81%	369/400	0.93	0.6%
100		4	0.9375	0.9100	0.9600	0.0222	2.37%	-0.81%	375/400	0.93	0.6%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9300	0.9000	0.9600
6.25		0.9500	0.9100	0.9400	0.9600
12.5		0.9100	0.9500	0.9300	0.9100
25		0.9600	0.9400	0.9200	0.9700
50		0.9100	0.9100	0.9300	0.9400
100		0.9300	0.9600	0.9500	0.9100

Fertilization Rate Binomials

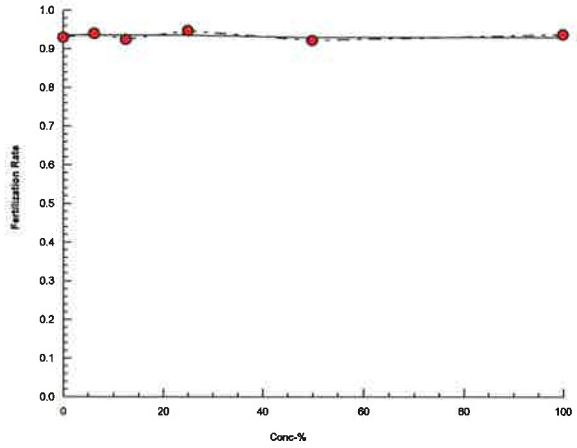
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	93/100	90/100	96/100
6.25		95/100	91/100	94/100	96/100
12.5		91/100	95/100	93/100	91/100
25		96/100	94/100	92/100	97/100
50		91/100	91/100	93/100	94/100
100		93/100	96/100	95/100	91/100

Analyst: QA:

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

Analysis ID:	19-2891-2708	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:45	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Analyst: _____ QA: _____

CETIS Measurement Report

Test Code/ID: VCF1119.283urc / 19-7688-3595

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

Batch ID:	03-7648-3613	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Nov-19 07:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Nov-19 07:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive **Age:**

Sample ID:	15-2518-2230	**Code:**	VCF1119.283urc	**Project:**	2019/20-1 (Wet)
Sample Date:	27 Nov-19 09:45	**Material:**	Sample Water	**Source:**	Bioassay Report
Receipt Date:	27 Nov-19 11:18	**CAS (PC):**		**Station:**	ME-SCR
Sample Age:	69h (11.3 °C)	**Client:**	VCWPD		

Parameter Acceptability Criteria

Parameter	Min	Max	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.7	14.8	11	13	Yes	Above Criteria

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
6.25		2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
12.5		2	6.7	4.159	9.241	6.5	6.9	0.2	0.2828	4.22%	0
25		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
50		2	6.5	2.688	10.31	6.2	6.8	0.3	0.4243	6.53%	0
100		2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
Overall		12	6.575	6.393	6.757	6.1	6.9	0.08269	0.2864	4.36%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
6.25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
12.5		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
25		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
50		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		12	7.8	7.753	7.847	7.7	7.9	0.02132	0.07386	0.95%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
6.25		2	34	34	34	34	34	0	0	0.0%	0
12.5		2	34	34	34	34	34	0	0	0.0%	0
25		2	34	34	34	34	34	0	0	0.0%	0
50		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
6.25		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
12.5		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
25		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
50		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75	14.72	14.78	14.7	14.8	0.01508	0.05222	0.35%	0 (0%)

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

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		6.8					
6.25				6.8					
12.5				6.9					
25				6.7					
50				6.8					
100				6.9					
0	N	2		6.3					
6.25				6.6					
12.5				6.5					
25				6.3					
50				6.2					
100				6.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
6.25				7.8					
12.5				7.9					
25				7.8					
50				7.8					
100				7.7					
0	N	2		7.9					
6.25				7.8					
12.5				7.8					
25				7.8					
50				7.7					
100				7.7					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		34					
6.25				34					
12.5				34					
25				34					
50				34					
100				34					
0	N	2		34					
6.25				34					
12.5				34					
25				34					
50				34					
100				34					

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

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
6.25				14.8					
12.5				14.8					
25				14.8					
50				14.8					
100				14.8					
0	N	2		14.7					
6.25				14.7					
12.5				14.7					
25				14.7					
50				14.7					
100				14.7					

Toxicity Test Data Sheet

DATE Initial	DATE Final	CLIENT	CONC (%)	TEMP (Deg. C)		pH		D.O.		SALINITY (ppt)	
11/30/19	11/30/19	STD TOX	CON	14.8	14.7	7.9	7.9	6.8	6.3	34	34
0700	0740	UF	18	14.8	14.7	7.9	7.9	6.8	6.1	34	34
			32	14.8	14.7	7.9	7.9	6.6	6.4	34	34
			56	14.8	14.7	7.9	7.9	6.8	6.3	34	34
			100	14.8	14.7	7.9	7.9	6.9	6.3	34	34
			180	14.8	14.7	7.9	7.9	6.8	6.2	34	34
11/30/19	11/30/19	VCF	CON	14.8	14.7	7.9	7.9	6.8	6.3	34	34
0701	0741	.283	6.25	14.8	14.7	7.9	7.8	6.8	6.6	34	34
		ME-SCR	12.5	14.8	14.7	7.9	7.8	6.9	6.5	34	34
			25	14.8	14.7	7.8	7.8	6.7	6.3	34	34
			50	14.8	14.7	7.8	7.7	6.8	6.2	34	34
			100	14.8	14.7	7.7	7.7	6.9	6.1	34	34
11/30/19	11/30/19	COO 1	CON	14.8	14.7	7.9	7.9	6.8	6.3	34	34
0702	0742	(096)	6.25	14.8	14.7	7.9	7.9	6.6	6.3	34	34
			12.5	14.8	14.7	8.0	8.0	6.7	6.4	34	34
			25	14.8	14.7	8.0	8.0	6.9	6.3	34	34
			50	14.8	14.7	8.0	8.0	6.8	6.2	34	34
			100	14.8	14.7	8.1	8.0	6.7	6.1	34	34
11/30/19	11/30/19	COO 2	CON	14.8	14.7	7.9	7.9	6.8	6.3	34	34
0703	0743	(297)	6.25	14.8	14.7	7.9	7.8	6.6	5.9	34	34
			12.5	14.8	14.7	7.9	7.8	6.9	5.8	34	34
			25	14.8	14.7	7.8	7.7	6.7	5.9	34	34
			50	14.8	14.7	7.7	7.7	6.5	5.5	34	34
			100	14.8	14.7	7.6	7.6	6.6	5.9	34	34

PURPLE URCHIN FERTILIZATION TEST DATA SHEET

Test Start Date: 11/30/19 0700
Test End Date: 11/30/19 0740
Microscope: 1
Urchin Source: Ventura Dive
Analyst: [signature]

Company: STANDARD TOX.
Sample Rec'd: 11/30
Lab No.: NA
Sample I.D.: URCHIN019
Dilution Water: CM 34 ppt

NOEC:

Test Cont. No.	Nominal Conc.	Number of FERTILIZED Larvae	Number of UNFERTILIZED Larvae	Proportion of Normal Larvae
1	32	79	21	
2	CON	91	9	
3	56	26	74	
4	32	73	27	
5	100	9	91	
6	56	26	74	
7	CON	93	9	
8	100	8	92	
9	CON	92	8	
10	100	4	96	
11	CON	96	4	
12	18	93	7	
13	18	98	2	
14	18	97	3	
15	32	79	21	
16	18	91	9	
17	56	26	74	
18	180	0	100	
19	180	0	100	
20	32	79	21	
21	100	13	~~4 2~~ 87	
22	180	0	100	
23	180	0	100	
24	56	21	79	

PURPLE URCHIN FERTILIZATION TEST DATA SHEET

MLE-SCR

Test Start Date: 11/30/19 0701
Test End Date: 11/30/19 0741
Microscope: 1
Urchin Source: Ventura
Analyst: [signature]

Company: VCF
Sample Rec'd: 11/30
Lab No.: NA
Sample I.D.: VCF 1119.283
Dilution Water: CM3 SW

NOEC: _____

Test Cont. No.	Nominal Conc.	Number of FERTILIZED Larvae	Number of UNFERTILIZED Larvae	Proportion of Normal Larvae
1	12.5	91	9	
2	CON	93	7	
3	25	96	4	
4	12.5	95	5	
5	50	91	9	
6	25	94	6	
7	CON	93	7	
8	50	91	9	
9	CON	90	10	
10	50	93	7	
11	CON	96	4	
12	6.25	95	5	
13	6.25	91	9	
14	6.25	94	6	
15	12.5	93	7	
16	6.25	96	4	
17	25	92	8	
18	100	93	7	
19	100	96	4	
20	12.5	91	9	
21	50	94	6	
22	100	95	5	
23	100	91	9	
24	25	97	3	

Chain of Custody Record

Ventura County Watershed Protection District
NPDES Stormwater Monitoring Program
Project: NPDES Stormwater Wet Season (Contract AE20-007)
Toxicity - ABC Laboratories

Sampling Date: ______________________ Project Number: 2019/20-1 (Wet)

Sampling Team: ______________________

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
~~ME-CC~~		X							2	Note 1, Note 2, Note 3
283 ME-SCR	11-27-19 0945				X				1	Note 1, Note 2, Note 3
~~ME-VR2~~		X							2	Note 1, Note 2, Note 3
~~MO-CAM~~						X			2	Note 1, Note 2, Note 3
~~MO-OJA~~						X			2	Note 1, Note 2, Note 3
~~MO-MEI~~						X			2	Note 1, Note 2, Note 3
~~MO-VEN~~							X		2	Note 1, Note 2, Note 3

.283
11.3°C
<0.1
<0.1

Relinquished
Printed Name: DEAN WILKINSON
Signature: Dean W
Affiliation: VCWPD Date/Time: 11-27-19 ~~1050~~ 1118

Received
Printed Name: ~~Nicole~~ ELIZABETH MATUHNO
Signature: [illegible]
Affiliation: AQUATIC BIOASSAY Date/Time: 11 27 19 1118

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 1 of 2

Sampling Date: 11/27/19 Project Number: 2019/20-1 (Wet)

Sampling Team: DAVID LAAK + MICHELLE CARTER

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
276 ME-CC	11/27/19/0945	X							2	Note 1, Note 2, Note 3
~~ME-SCR~~					X				1	Note 1, Note 2, Note 3 ML
~~ME-VR2~~		X							2	Note 1, Note 2, Note 3 ML
~~MO-CAM~~						X			2	Note 1, Note 2, Note 3 ML
~~MO-OJA~~						X			2	Note 1, Note 2, Note 3 ML
~~MO-MEI~~						X			2	Note 1, Note 2, Note 3 ML
277 MO-VEN	11/27/19/0620						X		2	Note 1, Note 2, Note 3

276 = 277

TEMP = 10.3°C = 8.3 C

CHLORINE = <0.1 = <0.1

NH3 = <0.1 x 1.0

Relinquished Printed Name David Laak

Signature

Affiliation VCWPD Date/Tim 11/27/19 10:57

Received Printed Name

Signature

Affiliation AQUATIC BIOASSAY Date/Tim 11.27.19 1057

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

* SET-UP 30 + 10 hr ON ME-CC, NOT ENOUGH ORGANISMS TO SET-UP 5 BKS. 11/27/19

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Sampling Date: 11-27-19 Project Number: 2019/20-1 (Wet)

Sampling Team: Lara Meeker, Nico N.

.278 = .279 = .280
Temp = 12.8°C = 8.8°C = 8.8°C
Chlorine = <0.1 = <0.1 = <0.1
NH3 = <0.1 = 2.3 = 8.0

	SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
	ME-CC	—	X							2	Note 1, Note 2, Note 3
	ME-SCR	—				X				1	Note 1, Note 2, Note 3
.278	ME-VR2	11-27-19 10:15	X							2	Note 1, Note 2, Note 3
	MO-CAM	—					X			2	Note 1, Note 2, Note 3
.279	MO-OJA	11-27-19 7:00					X			2	Note 1, Note 2, Note 3
.280	MO-MEI	11-27-19 8:30					X			2	Note 1, Note 2, Note 3
	MO-VEN	—						X		2	Note 1, Note 2, Note 3

Relinquished
Printed Name: Lara Meeker
Signature: Lara Meeker
Affiliation: WPD Date/Time: 11-27-19 11:04

Received
Printed Name: Jim Mann
Signature: [signature]
Affiliation: Aquatic Bioassay Date/Time: 11-27-19 1104

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

* SET-UP 50 + 100 ON ME-VR2, NOT ENOUGH VOLUME TO SET-UP 5 DILUTIONS [initials] 11-27-19

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 2 of 2

Sampling Date: 11/27/19 Project Number: 2019/20-1 (Wet)

Sampling Team: PD, DF

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
MO-OXN						X			2	Note 1, Note 2, Note 3
MO-HUE							X		3	Note 1, Note 2, Note 3,Note 4
MO-THO	11/27/19 / 1010						X		2	Note 1, Note 2, Note 3
MO-MPK	11/27/19 / 0750							X	2	Note 1, Note 2, Note 3
MO-SIM	11/27/19 / 0900						X		2	Note 1, Note 2, Note 3
MO-FIL							X		2	Note 1, Note 2, Note 3
MO-SPA						X			2	Note 1, Note 2, Note 3

.284 = .285 = .286

TEMP = 12.3°C 28.3°C = 11.3°C

SALINITY = <0.1 <0.1 = <0.1

NH3 = 2.0 = 2.0 = 3.0

Relinquished Printed Name Peter Doran

Signature

Affiliation VTA / Rincon Date/Time 11/27/19 / 1136

Received Printed Name ELIZABETH MATHENO

Signature

Affiliation AQUATIC BIOASSAY Date/Time 11-27-19 / 1136

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

Note 4: If salinity >2 ppt then also run topsmelt for comparison. If topsmelt unavailable, use *Hyalella*

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 1 of 2

Sampling Date: 11/27/19 Project Number: 2019/20-1 (Wet)

Sampling Team: PD, DF

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
ME-CC		X							2	Note 1, Note 2, Note 3
ME-SCR					X				1	Note 1, Note 2, Note 3
ME-VR2		X							2	Note 1, Note 2, Note 3
MO-CAM	11/27/19 / 0630					X			2	Note 1, Note 2, Note 3
MO-OJA						X			2	Note 1, Note 2, Note 3
MO-MEI						X			2	Note 1, Note 2, Note 3
MO-VEN							X		2	Note 1, Note 2, Note 3

.287
9.3 °C
<0.1
12

Relinquished Printed Name Peter Doran

Signature

Affiliation VTA / Rincon Date/Tim 11/27/19 / 1136

Received Printed Name ELIZABETH MARTINO

Signature

Affiliation AQUATIC BIOASSAY Date/Tim 11-27-19 / 1136

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 2 of 2

Sampling Date: 11-27-19 Project Number: 2019/20-1 (Wet)

Sampling Team: Lara Mecker

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
MO-OXN						X			2	Note 1, Note 2, Note 3
MO-HUE							X		3	Note 1, Note 2, Note 3,Note 4
MO-THO							X		2	Note 1, Note 2, Note 3
MO-MPK								X	2	Note 1, Note 2, Note 3
MO-SIM							X		2	Note 1, Note 2, Note 3
MO-FIL							X		2	Note 1, Note 2, Note 3
MO-SPA						X			2	Note 1, Note 2, Note 3

Relinquished Printed Name _____

Signature _____

Affiliation _____ Date/Tim _____

Received Printed Name _____

Signature _____

Affiliation _____ Date/Tim _____

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

Note 4: If salinity >2 ppt then also run topsmelt for comparison. If topsmelt unavailable, use *Hyalella*

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 2 of 2

Sampling Date: 11/27/19 Project Number: 2019/20-1 (Wet)

Sampling Team: DAVID LAAK + MICHELLE CARTER

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
MO-OXN	11/27/19/0730					X			2	Note 1, Note 2, Note 3
MO-HUE	11/27/19/0845						X		3	Note 1, Note 2, Note 3, Note 4
~~MO-THO~~							X		2	~~Note 1, Note 2, Note 3~~ MC
~~MO-MPK~~								X	2	~~Note 1, Note 2, Note 3~~ MC
~~MO-SIM~~							X		2	~~Note 1, Note 2, Note 3~~ MC
~~MO-FIL~~							X		2	~~Note 1, Note 2, Note 3~~ MC
~~MO-SPA~~						X			2	~~Note 1, Note 2, Note 3~~ MC

.274 = .275
TEMP = 7.8°C = 9.2°C
CHLORINE <0.1 = <0.1
NH3 1.J = 2.J

.274
.275

1 MET

Relinquished
Printed Name: David Laak
Signature:
Affiliation: VCWPD Date/Time: 11/27/19 10:57

Received
Printed Name:
Signature:
Affiliation: AQUATIC BIOASSAY Date/Time: 11.27.19 10:57

Other Notes:
Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%
Note 3: Notify District within 24 hours if significant toxicity is observed.
Note 4: If salinity >2 ppt then also run topsmelt for comparison. If topsmelt unavailable, use *Hyalella*

Chain of Custody Record

Ventura County Watershed Protection District

NPDES Stormwater Monitoring Program

Project: NPDES Stormwater Wet Season (Contract AE20-007)

Toxicity - ABC Laboratories

Side 2 of 2

Sampling Date: _____ Project Number: 2019/20-1 (Wet)

Sampling Team: _____

SAMPLE ID	DATE/TIME COLLECTED	Chronic toxicity - topsmelt (*Atherinops affinis*)	Chronic toxicity - inland silverside (*Menidia beryllina*)	Chronic toxicity - giant kelp (*Macrocystis pyrifera*)	Chronic toxicity - purple sea urchin (*Strongylocentrotus purpuratus*)	Chronic toxicity - fathead minnow (*Pimephales promelas*)	Chronic toxicity - daphnid (*Ceriodaphnia dubia*)	Chronic toxicity - green alga (*Raphidocelis subcapitata*)	Number of 5-Gallon Buckets	NOTES
~~MO-OXN~~						X			2	Note 1, Note 2, Note 3
~~MO-HUE~~							X		3	Note 1, Note 2, Note 3,Note 4
~~MO-THO~~							X		2	Note 1, Note 2, Note 3
~~MO-MPK~~								X	2	Note 1, Note 2, Note 3
~~MO-SIM~~							X		2	Note 1, Note 2, Note 3
281 MO-FIL	11-27-19 0730						X		2	Note 1, Note 2, Note 3
282 MO-SPA	11-27-19 0615					X			2	Note 1, Note 2, Note 3

281 = 282
TEMP = 7.8°C = 7.9°C
SALINITY = 2.0 = 2.0
NH3 = 1.0 = 2.0

Relinquished Printed Name DEAN WILKINSON

Signature _____

Affiliation VCWPD Date/Tim 11-27-19 ~~1050~~ 1118

Received Printed Name ELIZABETH MARTINEZ

Signature _____

Affiliation ADVANCE BIOASSAY Date/Tim 11-27-19 1118

Other Notes: Note 1: Dilutions - 6.25%, 12.5%, 25%, 50%, 100% Note 2: Please execute TIE if mortality > 50%

Note 3: Notify District within 24 hours if significant toxicity is observed.

Note 4: If salinity >2 ppt then also run topsmelt for comparison. If topsmelt unavailable, use *Hyalella*

Beth Maturino

From: Michael Machuzak
Sent: Tuesday, November 26, 2019 8:52 AM
To: Hahs, Kelly
Cc: Beth Maturino; Joseph Freas (joefreas@hotmail.com)
Subject: Re: Possible rain this week

Hi Kelly,
We'll order all organisms today. Including Hyalella for potential use for the Hueneme sample. Also, as we discussed, we will reduce the sample concentrations for the topsmelt tests to on 50 & 100%'s.
Thank you,
Michael

Get Outlook for iOS

From: Hahs, Kelly <Kelly.Hahs@ventura.org>
Sent: Tuesday, November 26, 2019 8:43:42 AM
To: Kiernan Brtalik <kbrtalik@rinconconsultants.com>; Peter Doran <pdoran@rinconconsultants.com>; Michelle Carter <mcarter@rinconconsultants.com>; Nico Navarro <nnavarro@rinconconsultants.com>; VCWetWeather@rinconconsultants.com <VCWetWeather@rinconconsultants.com>; Laak, David <David.Laak@ventura.org>; Carey, WB <WB.Carey@ventura.org>; Meeker, Lara <Lara.Meeker@ventura.org>; Dean Wilkinson <dean@floodlimits.com>; Brandon Gee <Brandon.Gee@wecklabs.com>; Michael Machuzak <michael@aquaticbioassay.com>; West, Nadia <Nadia.West@ventura.org>; Danielle Fitts <dfitts@rinconconsultants.com>
Cc: VonBargen, Denise <Denise.VonBargen@ventura.org>; Anselm, Arne <Arne.Anselm@ventura.org>
Subject: RE: Possible rain this week

Good morning!
The storm still looks to be on track for arriving before dawn tomorrow morning (according to 3 of 4 forecasters). The current plan (I will confirm after the afternoon forecasts are out) is four sampling teams starting on Wednesday morning at 5 am at the Government Center parking lot. It looks the first wave of the storm might be over around noon, in which case we might be able to collect most of the composite bottles on the same day (fingers crossed). I expect toxicity and bacteria samples will be delivered to the labs during business hours on Wednesday morning. (Michael – we have enough confidence in this storm to order the toxicity organisms now). Weck pickup might be possible Wednesday afternoon or evening, but a second pickup will probably also be needed Thursday morning for some of the slower responding watersheds (I'll have a better idea by noon on Wednesday).
Sampling teams (vehicle, sites) are:
Dave Laak and Michelle Carter (4330; OXN/VEN/HUE/CC)
Bill Carey and Dean Wilkinson (5493; SPA/FIL/SCR)
Lara Meeker and Nico Navarro (Escape; MEI/OJA/VR2)
Peter Doran and Danielle Fitts (Rincon truck; CAM/MPK/SIM/THO)
Let me know if you have any questions or concerns.
Cheers,
Kelly

Kelly Hahs
Water Resources Specialist IV
Ventura County Watershed Protection District
800 South Victoria Avenue

Ventura, CA 93009-1610
(805) 658-4375
www.vcstormwater.org

From: Hahs, Kelly
Sent: Monday, November 25, 2019 8:07 AM
To: Kiernan Brtalik <kbrtalik@rinconconsultants.com>; Peter Doran <pdoran@rinconconsultants.com>; Michelle Carter <mcarter@rinconconsultants.com>; Nico Navarro <nnavarro@rinconconsultants.com>; VCWetWeather@rinconconsultants.com; Laak, David <David.Laak@ventura.org>; Carey, WB <WB.Carey@ventura.org>; 'Lara Meeker (Lara.Meeker@ventura.org)' <Lara.Meeker@ventura.org>; 'Jim (jim@goldcoastenv.com)' <jim@goldcoastenv.com>; Dean Wilkinson <dean@floodlimits.com>; Brandon Gee <Brandon.Gee@wecklabs.com>; Michael Machuzak <michael@aquaticbioassay.com>; West, Nadia (Nadia.West@ventura.org) <Nadia.West@ventura.org>
Cc: VonBargen, Denise <Denise.VonBargen@ventura.org>; Anselm, Arne <Arne.Anselm@ventura.org>
Subject: RE: Possible rain this week

Good morning all.
It looks like we are going to get a sampleable storm just in time for the Thanksgiving holiday. Lousy timing for the first flush for the second year in a row. Currently looks like it would be Wednesday (probably morning) for collecting grab samples with bacteria (VCPHL) and tox (ABC) samples delivered to the labs on Wednesday, and sample composite pickup and delivery to Weck sometime between Wednesday night and Thursday morning.
Denise – can VCPHL process our bacteria samples Wednesday since it would mean reading them on Thursday?
Brandon – can Weck get a courier for pickup on Thursday? Can you accept our samples on Thursday?
Michael – what is the cutoff time for ordering organisms for delivery on Wednesday?
Sample crew – please let me know your availability Tuesday night through Thursday.
Thank you and I'm so sorry about the timing!
Kelly

From: Hahs, Kelly
Sent: Tuesday, November 19, 2019 8:29 AM
To: Kiernan Brtalik <kbrtalik@rinconconsultants.com>; 'Jaime McClain (jmcclain@rinconconsultants.com)' <jmcclain@rinconconsultants.com>; Peter Doran <pdoran@rinconconsultants.com>; Michelle Carter <mcarter@rinconconsultants.com>; Nico Navarro <nnavarro@rinconconsultants.com>; VCWetWeather@rinconconsultants.com; Laak, David <David.Laak@ventura.org>; Carey, WB <WB.Carey@ventura.org>; 'Lara Meeker (Lara.Meeker@ventura.org)' <Lara.Meeker@ventura.org>; 'Jim (jim@goldcoastenv.com)' <jim@goldcoastenv.com>; Dean Wilkinson <dean@floodlimits.com>; Brandon Gee <Brandon.Gee@wecklabs.com>; Michael Machuzak <michael@aquaticbioassay.com>; West, Nadia (Nadia.West@ventura.org) <Nadia.West@ventura.org>
Cc: VonBargen, Denise <Denise.VonBargen@ventura.org>; Anselm, Arne <Arne.Anselm@ventura.org>
Subject: RE: Possible rain this week

Good morning,
This storm is not an easy one to predict. Confidence is low in sampleable amounts for Ventura County but since it would be the first flush we don't want to miss it if it turns out to be sampleable. Current plan is to have VCWPD staff set up sites today just in case. Sample teams would likely be dispatched early Wednesday (probably early daylight hours) with samples to VCPHL and ABC during business hours Wednesday, and samples for Weck Courier pickup would be on Thursday.
Samplers – please let me know your availability for Wednesday (from pre-daylight – daylight hours).
Also, there looks like there could be another storm coming in around the Thanksgiving Holiday again (ugh!). Can you let me know your availability for that too?
Thank you!

aquatic bioassay & consulting laboratories, inc

CHRONIC CERIODAPHNIA SURVIVAL AND REPRODUCTION BIOASSAY

DATE: 27 November - 2019

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 10.00 ug/l

EC25 = 11.67 ug/l
EC50 = 20.00 ug/l

ENDPOINT: REPRODUCTION

NOEC = 5.00 ug/l

IC25 = 8.338 ug/l
IC50 = 16.44 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX		
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant		
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX		
Sample Age:	n/a	**Client:**	ABC Labs				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
19-4203-3779	7d Survival Rate	Fisher Exact/Bonferroni-Holm Test		10	30	17.32		n/a	1
11-3310-7015	Reproduction	Dunnett Multiple Comparison Test	✓	5	10	7.071		24.6%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	TU	S
10-7169-3113	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	5	1	11.11		1
				EC10	6.667	2	12.22		
				EC15	8.333	5	13.5		
				EC20	10	6.667	15		
				EC25	11.67	7.5	16.25		
				EC40	16.67	10	22		
				EC50	20	13.33	26.67		
02-9884-5287	Reproduction	Linear Interpolation (ICPIN)	✓	IC5	3.283	0.7184	5.956		1
			✓	IC10	5.128	1.437	6.961		
			✓	IC15	6.198	2.155	9.365		
			✓	IC20	7.268	2.874	11.1		
			✓	IC25	8.338	5.573	12.48		
			✓	IC40	12.7	8.396	16.69		
			✓	IC50	16.44	9.691	20.04		

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
10-7169-3113	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
19-4203-3779	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
02-9884-5287	Reproduction	Control Resp	35.1	15	>>	Yes	Passes Criteria
11-3310-7015	Reproduction	Control Resp	35.1	15	>>	Yes	Passes Criteria
11-3310-7015	Reproduction	PMSD	0.2462	0.13	0.47	Yes	Passes Criteria

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
3		10	0.9000	0.6738	1.0000	0.0000	1.0000	0.1000	0.3162	35.14%	10.00%
5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
10		10	0.8000	0.4984	1.0000	0.0000	1.0000	0.1333	0.4216	52.70%	20.00%
30		10	0.2000	0.0000	0.5016	0.0000	1.0000	0.1333	0.4216	210.82%	80.00%
50		10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Reproduction Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	35.1	30.35	39.85	27	47	2.1	6.641	18.92%	0.00%
3		10	33.6	25.6	41.6	7	47	3.535	11.18	33.27%	4.27%
5		10	31.8	27.58	36.02	20	38	1.867	5.903	18.56%	9.40%
10		10	23.6	16.47	30.73	6	36	3.152	9.969	42.24%	32.76%
30		10	4.8	-1.38	10.98	0	25	2.732	8.638	179.97%	86.32%
50		10	0	0	0	0	0	0	0		100.00%

Ceriodaphnia 7-d Survival and Reproduction Test **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
30		0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
50		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Reproduction Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	29	34	43	29	31	41	35	35	47	27
3		47	46	7	32	33	39	35	27	34	36
5		35	20	34	30	38	38	28	30	38	27
10		34	18	33	17	15	20	36	32	6	25
30		0	0	0	25	14	0	0	0	9	0
50		0	0	0	0	0	0	0	0	0	0

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
10		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	0/1	1/1
30		0/1	0/1	0/1	1/1	0/1	0/1	0/1	0/1	1/1	0/1
50		0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-3310-7015	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	5	10	7.071		24.62%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	3	0.3858	2.222	8.64	18	CDF	0.6524	Non-Significant Effect
	5	0.8488	2.222	8.64	18	CDF	0.4435	Non-Significant Effect
	10*	2.958	2.222	8.64	18	CDF	0.0087	Significant Effect
	30*	7.794	2.222	8.64	18	CDF	9.3E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	35.1	15	>>	Yes	Passes Criteria
PMSD	0.2462	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6291.68	1572.92	4	20.81	<1.0E-37	Significant Effect
Error	3400.9	75.5756	45			
Total	9692.58		49			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	4.732	13.28	0.3159	Equal Variances
	Levene Equality of Variance Test	0.7851	3.767	0.5409	Equal Variances
	Mod Levene Equality of Variance Test	0.6759	3.767	0.6122	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.7021	3.878	0.0667	Normal Distribution
	D'Agostino Kurtosis Test	1.732	2.576	0.0833	Normal Distribution
	D'Agostino Skewness Test	0.9257	2.576	0.3546	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	3.857	9.21	0.1454	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1141	0.1453	0.1016	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9616	0.9367	0.1035	Normal Distribution

Reproduction Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	35.1	30.35	39.85	34.5	27	47	2.1	18.92%	0.00%
3		10	33.6	25.6	41.6	34.5	7	47	3.535	33.27%	4.27%
5		10	31.8	27.58	36.02	32	20	38	1.867	18.56%	9.40%
10		10	23.6	16.47	30.73	22.5	6	36	3.152	42.24%	32.76%
30		10	4.8	-1.38	10.98	0	0	25	2.732	179.97%	86.32%
50		10	0	0	0	0	0	0	0		100.00%

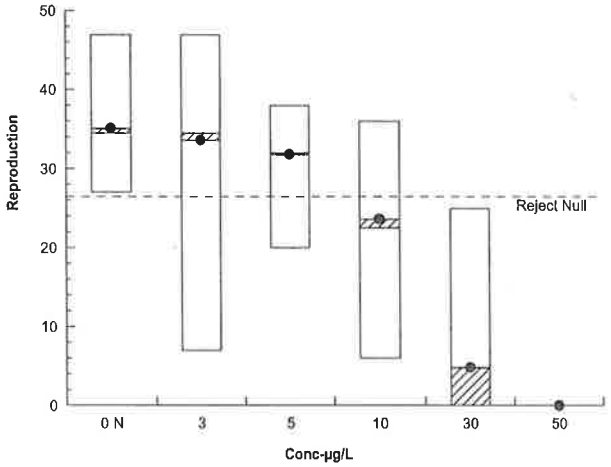
Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

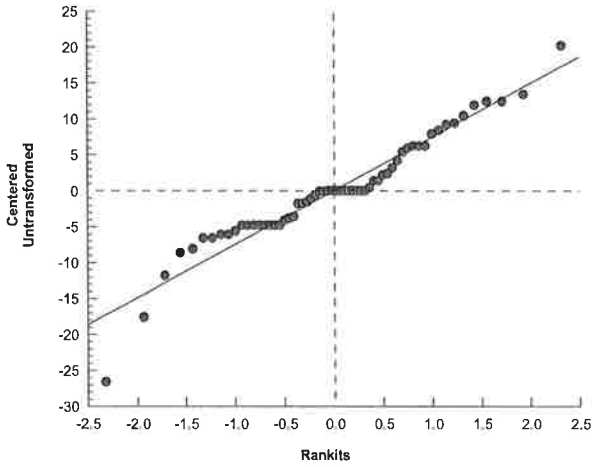
Analysis ID:	11-3310-7015	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Reproduction Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	29	34	43	29	31	41	35	35	47	27
3		47	46	7	32	33	39	35	27	34	36
5		35	20	34	30	38	38	28	30	38	27
10		34	18	33	17	15	20	36	32	6	25
30		0	0	0	25	14	0	0	0	9	0
50		0	0	0	0	0	0	0	0	0	0

Graphics





Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-7169-3113	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	5	1	11.11
EC10	6.667	2	12.22
EC15	8.333	5	13.5
EC20	10	6.667	15
EC25	11.67	7.5	16.25
EC40	16.67	10	22
EC50	20	13.33	26.67

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	1	0.0%
3		10	0.9000	0.0000	1.0000	0.3162	35.14%	10.0%	9/10	0.95	5.0%
5		10	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	10/10	0.95	5.0%
10		10	0.8000	0.0000	1.0000	0.4216	52.70%	20.0%	8/10	0.8	20.0%
30		10	0.2000	0.0000	1.0000	0.4216	210.80%	80.0%	2/10	0.2	80.0%
50		10	0.0000	0.0000	0.0000	0.0000		100.0%	0/10	0	100.0%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
30		0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
50		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

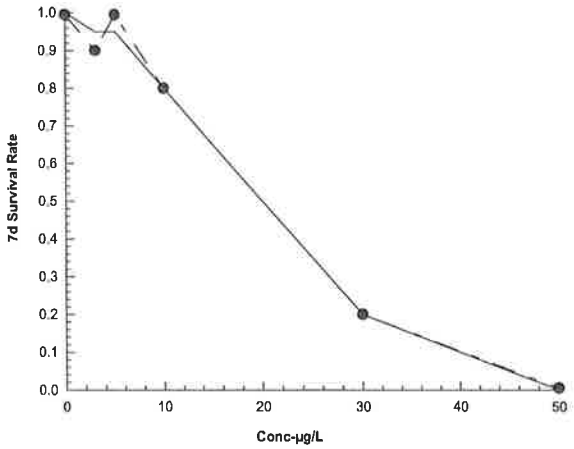
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
10		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	0/1	1/1
30		0/1	0/1	0/1	1/1	0/1	0/1	0/1	0/1	1/1	0/1
50		0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-7169-3113	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-9884-5287	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	35.1	15	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	3.283	0.7184	5.956
IC10	5.128	1.437	6.961
IC15	6.198	2.155	9.365
IC20	7.268	2.874	11.1
IC25	8.338	5.573	12.48
IC40	12.7	8.396	16.69
IC50	16.44	9.691	20.04

Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	10	35.1	27	47	6.641	18.92%	0.0%	35.1	0.0%
3		10	33.6	7	47	11.18	33.27%	4.27%	33.6	4.27%
5		10	31.8	20	38	5.903	18.56%	9.4%	31.8	9.4%
10		10	23.6	6	36	9.969	42.24%	32.76%	23.6	32.76%
30		10	4.8	0	25	8.638	180.00%	86.32%	4.8	86.32%
50		10	0	0	0	0		100.0%	0	100.0%

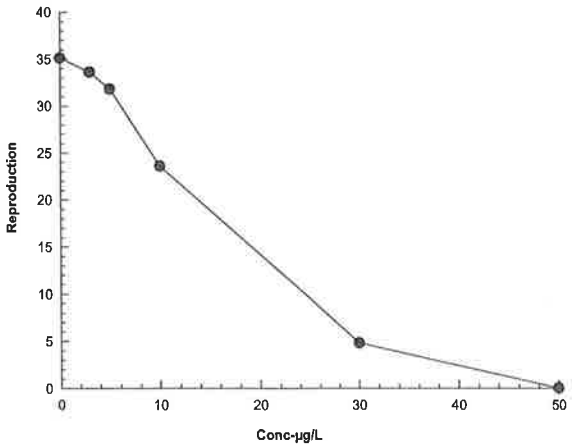
Reproduction Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	29	34	43	29	31	41	35	35	47	27
3		47	46	7	32	33	39	35	27	34	36
5		35	20	34	30	38	38	28	30	38	27
10		34	18	33	17	15	20	36	32	6	25
30		0	0	0	25	14	0	0	0	9	0
50		0	0	0	0	0	0	0	0	0	0

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-9884-5287	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:48	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-4203-3779	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:47	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	10	30	17.32	

Fisher Exact/Bonferroni-Holm Test

Control vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control	3	0.5000	Exact	1.0000	Non-Significant Effect
	5	1.0000	Exact	1.0000	Non-Significant Effect
	10	0.2368	Exact	0.7105	Non-Significant Effect
	30*	0.0004	Exact	0.0014	Significant Effect
	50*	0.0000	Exact	2.7E-05	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Data Summary

Conc-µg/L	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	N	10	0	10	1	0	0.0%
3		9	1	10	0.9	0.1	10.0%
5		10	0	10	1	0	0.0%
10		8	2	10	0.8	0.2	20.0%
30		2	8	10	0.2	0.8	80.0%
50		0	10	10	0	1	100.0%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
30		0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
50		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

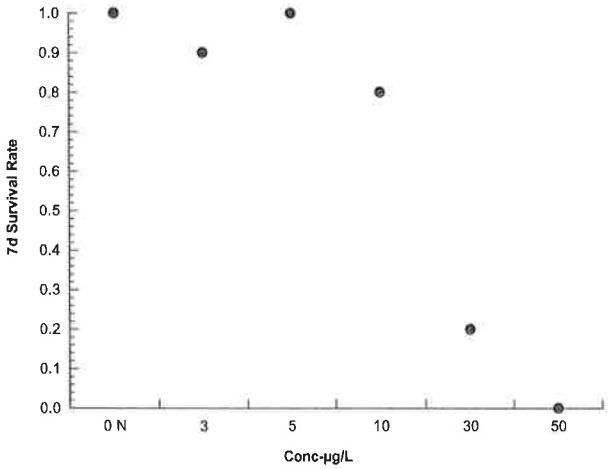
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
10		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	0/1	1/1
30		0/1	0/1	0/1	1/1	0/1	0/1	0/1	0/1	1/1	0/1
50		0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-4203-3779	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:47	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	05-4105-5876	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 13:00	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	6d 22h	**Taxon:**	Branchiopoda	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	14-3690-1777	**Code:**	CER112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
50		2	61	61	61	61	61	0	0	0.0%	0
Overall		10	60.2	59.9	60.5	60	61	0.1333	0.4216	0.70%	0 (0%)

Conductivity-µmhos

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
3		8	339	330.8	347.2	329	356	3.469	9.813	2.9%	0
5		8	331	326.8	335.2	321	337	1.763	4.986	1.51%	0
10		8	329.9	327	332.7	325	337	1.202	3.399	1.03%	0
30		8	327.4	323.4	331.3	320	333	1.668	4.719	1.44%	0
50		2	334.5	277.3	391.7	330	339	4.5	6.364	1.9%	0
Overall		42	333.8	331	336.7	320	360	1.417	9.186	2.75%	0 (0%)

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
3		8	8.362	7.986	8.739	7.4	8.9	0.1592	0.4502	5.38%	0
5		8	8.45	8.218	8.682	7.9	8.8	0.0982	0.2777	3.29%	0
10		8	8.513	8.315	8.71	8.1	8.9	0.08332	0.2357	2.77%	0
30		8	8.475	8.359	8.591	8.3	8.7	0.0491	0.1389	1.64%	0
50		2	7.7	0.07629	15.32	7.1	8.3	0.6	0.8485	11.02%	0
Overall		42	8.29	8.158	8.422	7.1	8.9	0.06536	0.4236	5.11%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
50		2	108	108	108	108	108	0	0	0.0%	0
Overall		10	98	94.21	101.8	95	108	1.673	5.292	5.40%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
3		8	7.65	7.466	7.834	7.4	8	0.07792	0.2204	2.88%	0
5		8	7.637	7.465	7.81	7.4	8	0.07304	0.2066	2.71%	0
10		8	7.65	7.502	7.798	7.4	8	0.06268	0.1773	2.32%	0
30		8	7.65	7.502	7.798	7.4	8	0.06268	0.1773	2.32%	0
50		2	7.7	6.429	8.971	7.6	7.8	0.1	0.1414	1.84%	0
Overall		42	7.679	7.612	7.745	7.4	8.3	0.03314	0.2147	2.80%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24.06	23.91	24.21	24	24.5	0.0625	0.1768	0.73%	0
3		8	24.06	23.91	24.21	24	24.5	0.0625	0.1768	0.73%	0
5		8	24.06	23.91	24.21	24	24.5	0.0625	0.1768	0.73%	0
10		8	24.06	23.91	24.21	24	24.5	0.0625	0.1768	0.73%	0
30		8	24.06	23.91	24.21	24	24.5	0.0625	0.1768	0.73%	0
50		2	24	24	24	24	24	0	0	0.0%	0
Overall		42	24.06	24.01	24.11	24	24.5	0.02529	0.1639	0.68%	0 (0%)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
50				61					
0	N	2		60					
50				61					
0	N	3		60					
0	N	4		60					
0	N	5		60					
0	N	6		60					
0	N	7		60					
0	N	8		60					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
3				350					
5				331					
10				329					
30				330					
50				330					
0	N	2		332					
3				329					
5				329					
10				328					
30				320					
50				339					
0	N	3		331					
3				329					
5				321					
10				325					
30				327					
0	N	4		339					
3				339					
5				329					
10				329					
30				321					
0	N	5		335					
3				356					
5				336					
10				331					
30				328					
0	N	6		330					
3				331					
5				332					
10				330					
30				328					
0	N	7		360					
3				339					
5				333					
10				330					
30				332					
0	N	8		360					
3				339					
5				337					
10				337					
30				333					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
3				8.2					
5				8.3					
10				8.3					
30				8.3					
50				8.3					
0	N	2		8					
3				8.4					
5				8.4					
10				8.6					
30				8.5					
50				7.1					
0	N	3		7.3					
3				8.6					
5				8.6					
10				8.6					
30				8.5					
0	N	4		7.7					
3				8.9					
5				8.8					
10				8.9					
30				8.7					
0	N	5		7.6					
3				8.7					
5				8.7					
10				8.6					
30				8.6					
0	N	6		7.9					
3				8.3					
5				8.4					
10				8.5					
30				8.5					
0	N	7		7.7					
3				8.4					
5				8.5					
10				8.5					
30				8.4					
0	N	8		8.3					
3				7.4					
5				7.9					
10				8.1					
30				8.3					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
50				108					
0	N	2		96					
50				108					
0	N	3		96					
0	N	4		96					
0	N	5		95					
0	N	6		95					
0	N	7		95					
0	N	8		95					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
3				7.6					
5				7.6					
10				7.6					
30				7.6					
50				7.6					
0	N	2		7.7					
3				7.7					
5				7.7					
10				7.7					
30				7.7					
50				7.8					
0	N	3		7.5					
3				7.5					
5				7.5					
10				7.6					
30				7.6					
0	N	4		7.6					
3				7.7					
5				7.7					
10				7.7					
30				7.7					
0	N	5		7.8					
3				7.9					
5				7.8					
10				7.7					
30				7.7					
0	N	6		7.5					
3				7.4					
5				7.4					
10				7.5					
30				7.5					
0	N	7		8.3					
3				8					
5				8					
10				8					
30				8					
0	N	8		7.8					
3				7.4					
5				7.4					
10				7.4					
30				7.4					

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

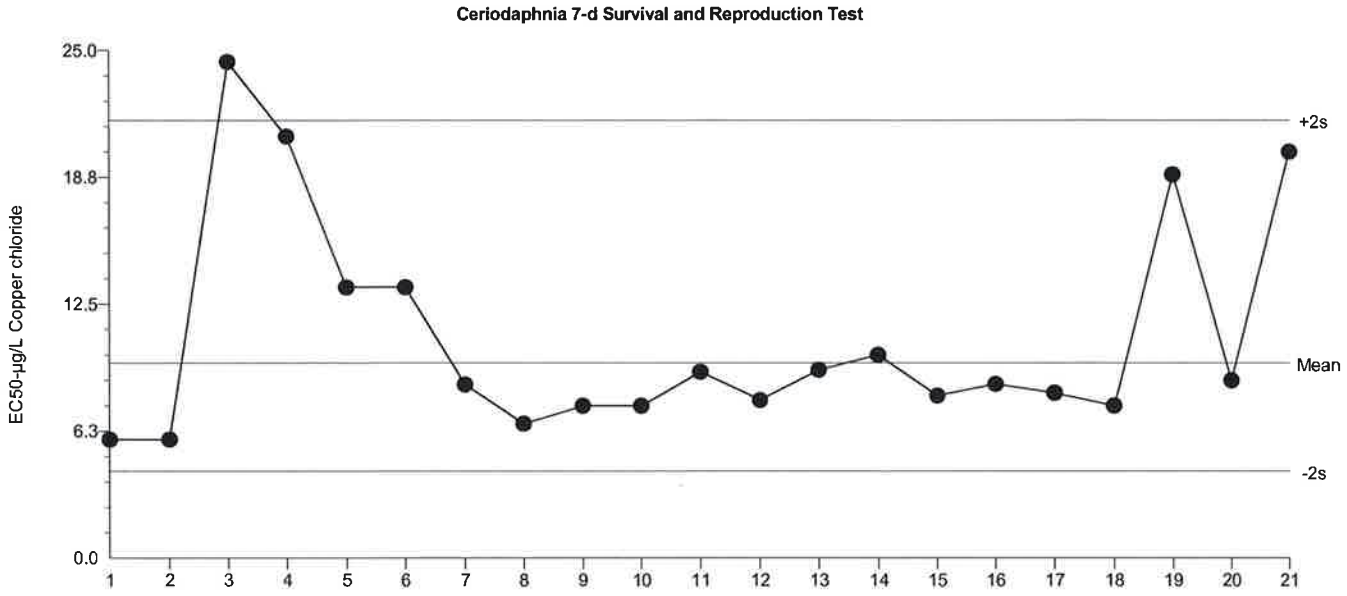
Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
3				24					
5				24					
10				24					
30				24					
50				24					
0	N	2		24					
3				24					
5				24					
10				24					
30				24					
50				24					
0	N	3		24					
3				24					
5				24					
10				24					
30				24					
0	N	4		24					
3				24					
5				24					
10				24					
30				24					
0	N	5		24.5					
3				24.5					
5				24.5					
10				24.5					
30				24.5					
0	N	6		24					
3				24					
5				24					
10				24					
30				24					
0	N	7		24					
3				24					
5				24					
10				24					
30				24					
0	N	8		24					
3				24					
5				24					
10				24					
30				24					

CETIS QC Plot

Report Date: 18 Dec-19 14:33 (1 of 1)

Ceriodaphnia 7-d Survival and Reproduction Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Reproduction-Survival (7d)	**Organism:**	Ceriodaphnia dubia (Water Flea)	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-013 (2002)	**Endpoint:**	7d Survival Rate	**Source:**	Reference Toxicant-REF



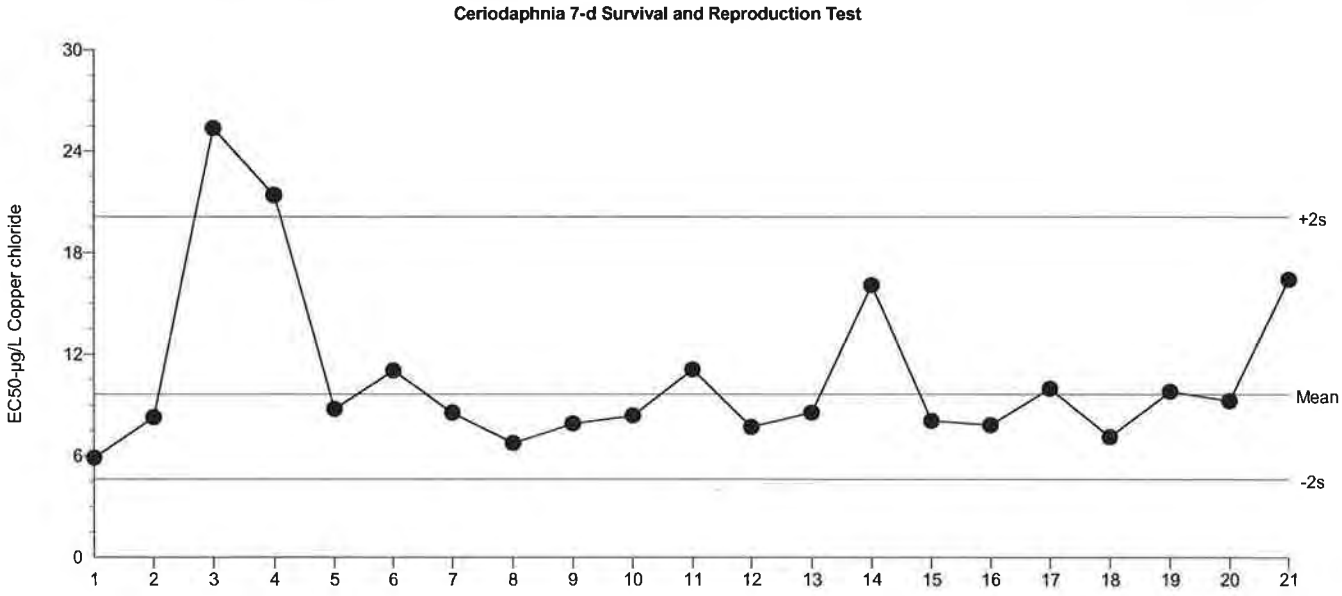
Mean:	9.602	**Count:**	20	**-2s Warning Limit:**	4.277	**-2s Action Limit:**	4.277
Sigma:	n/a	**CV:**	42.20%	**+2s Warning Limit:**	21.56	**+2s Action Limit:**	21.56

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Feb	8	15:15	5.833	-3.769	-1.232			02-0766-2366	19-2562-0984
2		Mar	6	15:30	5.833	-3.769	-1.232			04-2362-1720	05-2934-1161
3			26	14:50	24.44	14.84	2.311	(+)	(+)	02-1439-8921	01-4818-4664
4		Apr	2	15:30	20.77	11.17	1.908			00-9263-8985	06-3943-5762
5			9	11:35	13.33	3.731	0.8117			01-7726-5146	14-4258-5469
6			23	14:15	13.33	3.731	0.8117			04-8587-5037	02-1376-9025
7			24	15:00	8.542	-1.061	-0.2894			19-7176-9544	16-4635-5751
8			26	14:35	6.607	-2.995	-0.9245			12-4083-5238	02-3824-7054
9		May	7	12:00	7.5	-2.102	-0.611			02-1359-6909	17-6501-7206
10			30	13:20	7.5	-2.102	-0.611			16-7470-3328	16-8259-0511
11		Jun	4	15:00	9.167	-0.4356	-0.1148			19-8671-1897	01-5404-2812
12		Jul	9	12:00	7.778	-1.824	-0.5211			12-9588-1402	20-0607-8303
13			16	15:38	9.265	-0.3376	-0.0885			08-8661-1763	13-0130-5461
14		Aug	1	13:00	10	0.3977	0.1004			00-3315-8844	11-4262-4430
15			6	12:15	8	-1.602	-0.4514			08-9891-3414	03-0191-1615
16		Sep	11	12:00	8.571	-1.031	-0.2808			10-8221-3440	16-0132-2005
17			17	14:30	8.125	-1.477	-0.4131			07-2708-1473	15-0750-6008
18		Oct	8	14:25	7.5	-2.102	-0.611			02-2867-3360	11-7834-3596
19		Nov	5	13:30	18.89	9.287	1.673			11-1012-7561	10-9131-7043
20			19	14:35	8.75	-0.8523	-0.2298			06-8480-1839	06-6558-7623
21			27	15:00	20	10.4	1.814			17-7122-4733	10-7169-3113

Ceriodaphnia 7-d Survival and Reproduction Test **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type: Reproduction-Survival (7d) **Organism:** Ceriodaphnia dubia (Water Flea) **Material:** Copper chloride
Protocol: EPA/821/R-02-013 (2002) **Endpoint:** Reproduction **Source:** Reference Toxicant-REF



Mean:	9.641	**Count:**	20	**-2s Warning Limit:**	4.615	**-2s Action Limit:**	4.615
Sigma:	n/a	**CV:**	38.10%	**+2s Warning Limit:**	20.14	**+2s Action Limit:**	20.14

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Feb	8	15:15	5.898	-3.742	-1.334			02-0766-2366	10-9167-0489
2		Mar	6	15:30	8.293	-1.348	-0.409			04-2362-1720	09-3942-9938
3			26	14:50	25.38	15.74	2.628	(+)	(+)	02-1439-8921	08-2927-6201
4		Apr	2	15:30	21.42	11.78	2.168	(+)	(+)	00-9263-8985	18-4787-2727
5			9	11:35	8.786	-0.855	-0.2522			01-7726-5146	10-0146-6641
6			23	14:15	11.04	1.401	0.3684			04-8587-5037	06-0900-6621
7			24	15:00	8.559	-1.082	-0.3233			19-7176-9544	02-9438-0679
8			26	14:35	6.761	-2.88	-0.9636			12-4083-5238	11-2015-2737
9		May	7	12:00	7.921	-1.72	-0.5335			02-1359-6909	16-1604-6629
10			30	13:20	8.394	-1.247	-0.376			16-7470-3328	09-7944-9264
11		Jun	4	15:00	11.11	1.47	0.3854			19-8671-1897	00-9079-0935
12		Jul	9	12:00	7.72	-1.921	-0.6033			12-9588-1402	16-8377-6248
13			16	15:38	8.565	-1.075	-0.3211			08-8661-1763	19-1600-3770
14		Aug	1	13:00	16.1	6.464	1.393			00-3315-8844	05-8369-4693
15			6	12:15	8.083	-1.558	-0.4785			08-9891-3414	03-3385-0997
16		Sep	11	12:00	7.84	-1.8	-0.5613			10-8221-3440	05-2053-8934
17			17	14:30	9.984	0.3431	0.09495			07-2708-1473	07-0752-0195
18		Oct	8	14:25	7.136	-2.505	-0.8169			02-2867-3360	13-7273-4588
19		Nov	5	13:30	9.827	0.1861	0.05191			11-1012-7561	03-9992-2121
20			19	14:35	9.26	-0.3808	-0.1094			06-8480-1839	14-8289-5076
21			27	15:00	16.44	6.795	1.449			17-7122-4733	02-9884-5287

Analyst:_____ QA:_____

CHEMICAL ANALYSIS DATA SHEET
STD TOX - CERIO

Start Date: 11/27/19 1500 | Lab # : CER

End Date: 12/4/19 1300 | Date Rec'd:

YSI used: B

Renewal Sample Used: B B B B B B B

DAY	0	1	2	3	4	5	6	7
Initials								

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.7	7.3	8.6	7.7	8.6	7.6	7.3	7.9	7.6	7.7	8.3
0.003	8.2	7.1	8.4	6.7	8.6	8.3	8.9	8.2	8.7	7.2	8.3	7.6	8.4	7.4
0.005	8.3	7.1	8.4	6.5	8.6	8.7	8.8	8.6	8.7	7.2	8.4	7.8	8.5	7.9
0.01	8.3	7.2	8.6	6.4	8.6	8.6	8.9	8.8	8.6	7.2	8.5	8.4	8.5	8.1
0.03	8.3	7.1	8.5	6.4	8.5	8.6	8.7	8.8	8.6	7.2	8.5	8.4	8.4	8.3
0.05	8.3	7.1												

TEMPERATURE (°C)

Control	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
0.003	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
0.005	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
0.01	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
0.03	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
0.05	14.0	14.0	14.0											

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
0.003	7.6	7.9	7.7	7.8	7.5	7.6	7.7	8.0	7.9	8.0	7.4	7.9	8.0	7.9
0.005	7.6	7.9	7.7	7.8	7.5	7.6	7.7	7.9	7.8	8.0	7.4	7.9	8.0	7.4
0.01	7.6	7.9	7.7	7.8	7.6	7.6	7.7	7.6	7.7	8.0	7.5	7.8	8.0	7.4
0.03	7.6	7.8	7.7	7.8	7.6	7.6	7.7	7.6	7.7	7.9	7.5	7.9	8.0	7.4
0.05	7.6	7.9												

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	360	360
0.003	350	329	329	339	356	331	339	339
0.005	331	329	321	329	336	332	333	337
0.01	329	328	325	329	331	330	330	337
0.03	330	320	327	32.1	324	328	332	333
0.05	330	339						

ALKALINITY

Control	60	60	60	60	60	60	60	60
0.05	61	61						

HARDNESS

Control	96	96	96	96	95	95	95	95
0.05	100	100						

Residual Chlorine 1st Sample:_____ 2nd Sample:_____ 3rd Sample:_____

QC: Jm Ross

Chronic *Ceriodaphnia dubia* survival and reproduction - STD TOX

Aquatic Bioassay & Consulting Laboratories, Inc.

Start Date: 11/27/19 Lab #: .

End Date: 12/4/19

Conc.	Day#	Initial	# YOUNG / REPLICATE									
			1	2	3	4	5	6	7	8	9	10
CON	3	AM	2	4	✓	✓	2	3	3	✓	2	1
	4	LB	5	✓	13	5	7	13	✓	✓	11	6
	5	LB	✓	5	✓	9	10	12	✓	10	✓	7
	6	LB	14	12	15	15	12	12	15	13	18	✓
	7	LB	8	13	15	✓	✓	1	17	12	16	13
	Total	TD	29	34	43	29	31 29(1)	41	35 41(1)	35	47	27
.003	3	-	2	✓	✓	3	2	3	2	1	2	2
	4	-	12	13	7	6	✓	10	6	6	6	7
	5	-	1	✓	✓	✓	9	12	✓	11	10	9
	6	-	17	16	X 12/2	11	22	✓	10	9	✓	✓
	7	-	15	17		12	✓	14	17	✓	16	18
		-										
	Total	-	47	46	7	32	33	39	35	27	34	36
.005	3	-	3	✓	1	1	1	1	1	2	1	1
	4	-	1	2	6	3	6	7	✓	1	6	5
	5	-	12	✓	✓	✓	✓	✓	9	9	✓	✓
	6	-	19	8	12	12	13	15	18	17	14	11
	7	-	✓	10	15	14	18	15	✓	1	17	10
		-										
	Total	-	35	20	34	30	38	38	28	30	38	27
.01	3	-	✓	✓	✓	✓	✓	✓	✓	✓	1	2
	4	-	6	2	6	4	6	9	2	8	5	4
	5	-	2	✓	11	✓	9	11	✓	✓	✓	10
	6	-	17	16	✓	13	✓	✓	20	15	12/2 X	9
	7	-	9	✓	16	X 12/4	✓	✓	14	9		✓
		-										
	Total	-	34	18	33	17	15	20	36	32	6	25
.03	3	-					✓				✓	
	4	-				3	5				✓	
	5	-				8	9				✓	
	6	-				12					9	
	7	-				2	X 12/2				✓	
		-		11/28				11/28		11/28		
	Total	-	0	0	0	25	14	0	0	0	9	0
.05	3	-										
	4	-										
	5	-										
	6	-										
	7	-					11/28					
		-										
	Total	-	0	0	0	0	0	0	0	0	0	0

Neonates Data (see back)

QC: L - P

aquatic bioassay & consulting laboratories, inc

CHRONIC FATHEAD MINNOW SURVIVAL AND GROWTH BIOASSAY

DATE: 27 Nov 2019

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 38.00 ug/l

EC25 = 54.82 ug/l
EC50 = 71.64 ug/l

ENDPOINT: GROWTH

NOEC = 19.00 ug/l

IC25 = 38.71 ug/l
IC50 = 54.86 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable		
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX		
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant		
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX		
Sample Age:	n/a	**Client:**	ABC Labs				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
00-1765-6236	7d Survival Rate	Steel Many-One Rank Sum Test		38	75	53.39		7.75%	1
16-4959-4598	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test	✓	19	38	26.87		19.3%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	TU	S
17-4641-3241	7d Survival Rate	Linear Interpolation (ICPIN)		EC5	41.36	40.11	43.38		1
				EC10	44.73	42.22	48.76		
				EC15	48.09	44.34	54.15		
				EC20	51.45	46.45	59.53		
				EC25	54.82	48.56	64.91		
				EC40	64.91	54.9	81.05		
				EC50	71.64	59.12	97.59		
05-1534-9561	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	✓	IC5	13.98	n/a	32.24		1
			✓	IC10	18.71	n/a	43.33		
			✓	IC15	25.56	n/a	47.74		
			✓	IC20	32.55	5.541	48.36		
			✓	IC25	38.71	10.7	48.78		
			✓	IC40	48.4	37.17	56.42		
			✓	IC50	54.86	44.93	61.76		

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
00-1765-6236	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
17-4641-3241	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
05-1534-9561	Mean Dry Biomass-mg	Control Resp	0.5043	0.25	>>	Yes	Passes Criteria
16-4959-4598	Mean Dry Biomass-mg	Control Resp	0.5043	0.25	>>	Yes	Passes Criteria
16-4959-4598	Mean Dry Biomass-mg	PMSD	0.1933	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
10		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
19		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
38		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
75		4	0.4500	0.1332	0.7668	0.2000	0.6667	0.0995	0.1991	44.24%	55.00%
150		4	0.0167	0.0000	0.0697	0.0000	0.0667	0.0167	0.0333	200.00%	98.33%

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.5043	0.3712	0.6374	0.4027	0.5973	0.04182	0.08364	16.58%	0.00%
10		4	0.5003	0.3943	0.6064	0.4533	0.5967	0.03333	0.06666	13.32%	0.79%
19		4	0.4523	0.3543	0.5504	0.3973	0.5367	0.03081	0.06163	13.62%	10.31%
38		4	0.3838	0.304	0.4637	0.3193	0.436	0.0251	0.05019	13.08%	23.89%
75		4	0.09483	0.0257	0.164	0.05	0.154	0.02172	0.04345	45.82%	81.20%
150		4	0.003333	-0.00728	0.01394	0	0.01333	0.003333	0.006667	200.00%	99.34%

Fathead Minnow 7-d Larval Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	1.0000
19		1.0000	1.0000	1.0000	1.0000
38		1.0000	1.0000	1.0000	1.0000
75		0.2000	0.6667	0.4000	0.5333
150		0.0000	0.0667	0.0000	0.0000

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4027	0.4773	0.54	0.5973
10		0.458	0.4533	0.5967	0.4933
19		0.458	0.5367	0.4173	0.3973
38		0.436	0.3727	0.3193	0.4073
75		0.05	0.154	0.08267	0.09267
150		0	0.01333	0	0

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
10		15/15	15/15	15/15	15/15
19		15/15	15/15	15/15	15/15
38		15/15	15/15	15/15	15/15
75		3/15	10/15	6/15	8/15
150		0/15	1/15	0/15	0/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-1765-6236	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	38	75	53.39		7.75%

Steel Many-One Rank Sum Test

Control	vs	Conc-µg/L	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		10	18	10	1	6	CDF	0.8333	Non-Significant Effect
		19	18	10	1	6	CDF	0.8333	Non-Significant Effect
		38	18	10	1	6	CDF	0.8333	Non-Significant Effect
		75*	10	10	0	6	CDF	0.0417	Significant Effect
		150*	10	10	0	6	CDF	0.0417	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.92417	1.18483	5	147.4	<1.0E-37	Significant Effect
Error	0.144646	0.0080359	18			
Total	6.06882		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	7.722	4.248	4.9E-04	Unequal Variances
	Mod Levene Equality of Variance Test	5.806	4.248	0.0023	Unequal Variances
Distribution	Anderson-Darling A2 Normality Test	4.247	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Kurtosis Test	3.519	2.576	4.3E-04	Non-Normal Distribution
	D'Agostino Skewness Test	1.291	2.576	0.1966	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	14.05	9.21	8.9E-04	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.375	0.2056	1.3E-09	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6609	0.884	3.2E-06	Non-Normal Distribution

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
10		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
19		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
38		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
75		4	0.4500	0.1332	0.7668	0.4667	0.2000	0.6667	0.0995	44.24%	55.00%
150		4	0.0167	0.0000	0.0697	0.0000	0.0000	0.0667	0.0167	200.00%	98.33%

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 00-1765-6236 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.5
Analyzed: 10 Dec-19 9:17 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
10		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
19		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
38		4	1.441	1.441	1.442	1.441	1.441	1.441	0	0.00%	0.00%
75		4	0.7306	0.3973	1.064	0.7517	0.4636	0.9553	0.1047	28.67%	49.31%
150		4	0.1624	0.05761	0.2672	0.1295	0.1295	0.2612	0.03292	40.55%	88.73%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	1.0000
19		1.0000	1.0000	1.0000	1.0000
38		1.0000	1.0000	1.0000	1.0000
75		0.2000	0.6667	0.4000	0.5333
150		0.0000	0.0667	0.0000	0.0000

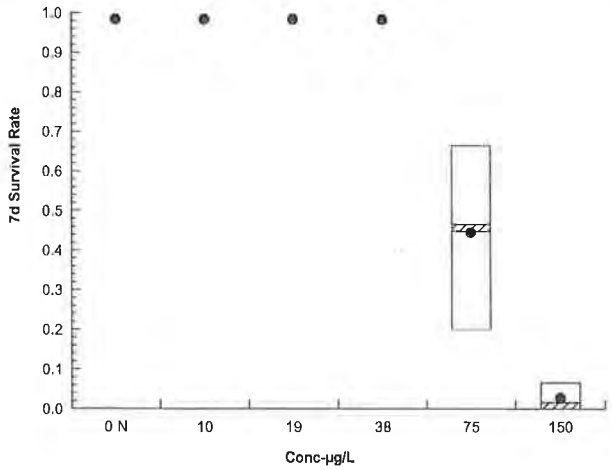
Angular (Corrected) Transformed Detail

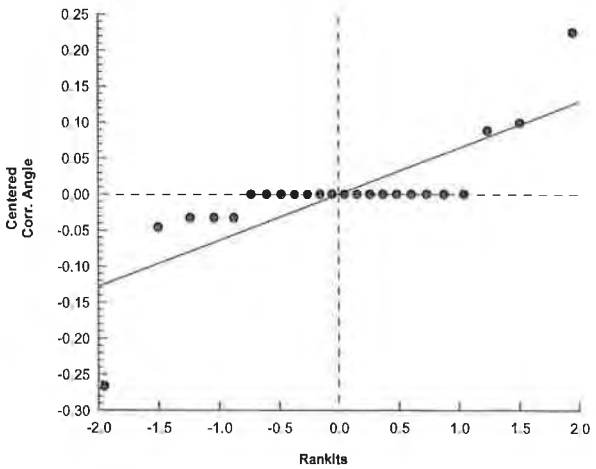
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.441	1.441	1.441	1.441
10		1.441	1.441	1.441	1.441
19		1.441	1.441	1.441	1.441
38		1.441	1.441	1.441	1.441
75		0.4636	0.9553	0.6847	0.8188
150		0.1295	0.2612	0.1295	0.1295

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
10		15/15	15/15	15/15	15/15
19		15/15	15/15	15/15	15/15
38		15/15	15/15	15/15	15/15
75		3/15	10/15	6/15	8/15
150		0/15	1/15	0/15	0/15

Graphics





Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	16-4959-4598	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	19	38	26.87		19.33%

Dunnett Multiple Comparison Test

Control	vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		10	0.09875	2.407	0.098	6	CDF	0.8026	Non-Significant Effect
		19	1.284	2.407	0.098	6	CDF	0.3042	Non-Significant Effect
		38*	2.975	2.407	0.098	6	CDF	0.0162	Significant Effect
		75*	10.11	2.407	0.098	6	CDF	2.7E-05	Significant Effect
		150*	12.37	2.407	0.098	6	CDF	2.7E-05	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.5043	0.25	>>	Yes	Passes Criteria
PMSD	0.1933	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.956013	0.191203	5	58.27	<1.0E-37	Significant Effect
Error	0.059066	0.0032814	18			
Total	1.01508		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	10.39	15.09	0.0649	Equal Variances
	Levene Equality of Variance Test	1.827	4.248	0.1582	Equal Variances
	Mod Levene Equality of Variance Test	1.411	4.248	0.2674	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.441	3.878	0.2944	Normal Distribution
	D'Agostino Kurtosis Test	0.01396	2.576	0.9889	Normal Distribution
	D'Agostino Skewness Test	0.7188	2.576	0.4722	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.5169	9.21	0.7722	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1421	0.2056	0.2368	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9625	0.884	0.4913	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.5043	0.3712	0.6374	0.5087	0.4027	0.5973	0.04182	16.58%	0.00%
10		4	0.5003	0.3943	0.6064	0.4757	0.4533	0.5967	0.03333	13.32%	0.79%
19		4	0.4523	0.3543	0.5504	0.4377	0.3973	0.5367	0.03081	13.62%	10.31%
38		4	0.3838	0.304	0.4637	0.39	0.3193	0.436	0.0251	13.08%	23.89%
75		4	0.09483	0.0257	0.164	0.08767	0.05	0.154	0.02172	45.82%	81.20%
150		4	0.003333	-0.00728	0.01394	0	0	0.01333	0.003333	200.00%	99.34%

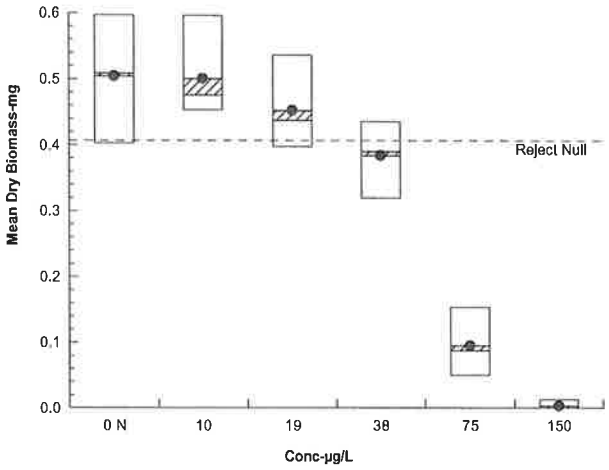
Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

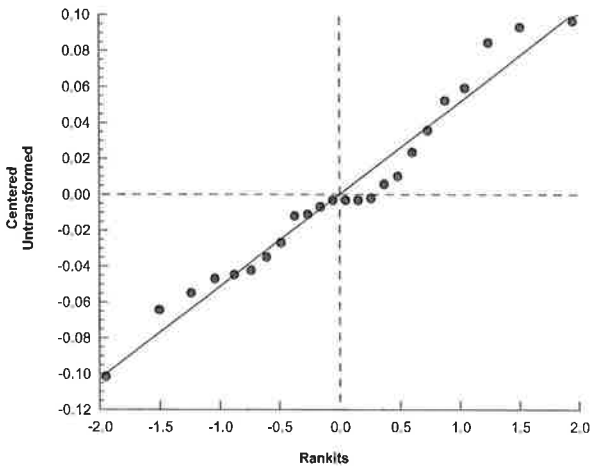
Analysis ID:	16-4959-4598	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4027	0.4773	0.54	0.5973
10		0.458	0.4533	0.5967	0.4933
19		0.458	0.5367	0.4173	0.3973
38		0.436	0.3727	0.3193	0.4073
75		0.05	0.154	0.08267	0.09267
150		0	0.01333	0	0

Graphics





CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4641-3241	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	41.36	40.11	43.38
EC10	44.73	42.22	48.76
EC15	48.09	44.34	54.15
EC20	51.45	46.45	59.53
EC25	54.82	48.56	64.91
EC40	64.91	54.9	81.05
EC50	71.64	59.12	97.59

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
10		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
19		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
38		4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	60/60	1	0.0%
75		4	0.4500	0.2000	0.6667	0.1991	44.24%	55.0%	27/60	0.45	55.0%
150		4	0.0167	0.0000	0.0667	0.0333	200.00%	98.33%	1/60	0.01667	98.33%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
10		1.0000	1.0000	1.0000	1.0000
19		1.0000	1.0000	1.0000	1.0000
38		1.0000	1.0000	1.0000	1.0000
75		0.2000	0.6667	0.4000	0.5333
150		0.0000	0.0667	0.0000	0.0000

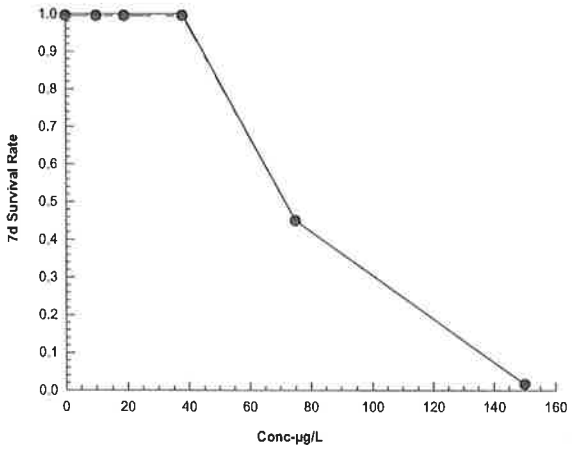
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	15/15	15/15	15/15	15/15
10		15/15	15/15	15/15	15/15
19		15/15	15/15	15/15	15/15
38		15/15	15/15	15/15	15/15
75		3/15	10/15	6/15	8/15
150		0/15	1/15	0/15	0/15

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4641-3241	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-1534-9561	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1785922	280	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.5043	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	13.98	n/a	32.24
IC10	18.71	n/a	43.33
IC15	25.56	n/a	47.74
IC20	32.55	5.541	48.36
IC25	38.71	10.7	48.78
IC40	48.4	37.17	56.42
IC50	54.86	44.93	61.76

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	0.5043	0.4027	0.5973	0.08364	16.58%	0.0%	0.5043	0.0%
10		4	0.5003	0.4533	0.5967	0.06666	13.32%	0.79%	0.5003	0.79%
19		4	0.4523	0.3973	0.5367	0.06163	13.62%	10.31%	0.4523	10.31%
38		4	0.3838	0.3193	0.436	0.05019	13.08%	23.89%	0.3838	23.89%
75		4	0.09483	0.05	0.154	0.04345	45.82%	81.2%	0.09483	81.2%
150		4	0.003333	0	0.01333	0.006667	200.00%	99.34%	0.003333	99.34%

Mean Dry Biomass-mg Detail

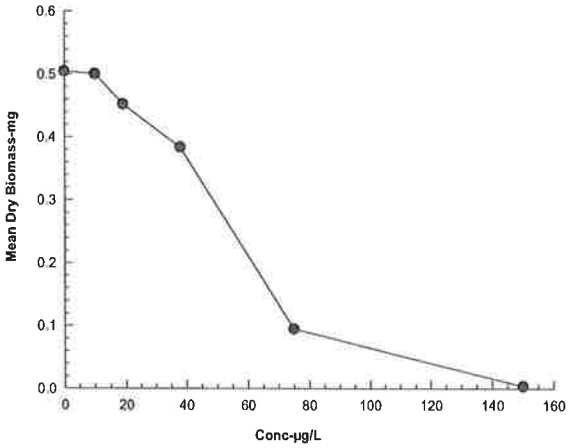
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.4027	0.4773	0.54	0.5973
10		0.458	0.4533	0.5967	0.4933
19		0.458	0.5367	0.4173	0.3973
38		0.436	0.3727	0.3193	0.4073
75		0.05	0.154	0.08267	0.09267
150		0	0.01333	0	0

Analyst: _____ QA: _____

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-1534-9561	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:17	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	11-5204-6891	**Test Type:**	Growth-Survival (7d)	**Analyst:**		
Start Date:	27 Nov-19 15:30	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water	
Ending Date:	04 Dec-19 14:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable	
Test Length:	6d 23h	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**

Sample ID:	18-4413-3154	**Code:**	FML112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:30	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	ABC Labs		

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	60	60	60	60	60	0	0	0.0%	0
150		8	62	62	62	62	62	0	0	0.0%	0
Overall		16	61	60.45	61.55	60	62	0.2582	1.033	1.69%	0 (0%)

Conductivity-µmhos

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	341.8	331.3	352.2	330	360	4.423	12.51	3.66%	0
10		8	338.2	333.1	343.4	332	352	2.169	6.135	1.81%	0
19		8	331.2	326.2	336.3	318	338	2.136	6.042	1.82%	0
38		8	332	328.5	335.5	326	339	1.488	4.209	1.27%	0
75		8	331.1	324	338.3	319	344	3.014	8.526	2.58%	0
150		8	331.2	324.9	337.6	320	340	2.684	7.592	2.29%	0
Overall		48	334.3	331.8	336.8	318	360	1.244	8.619	2.58%	0 (0%)

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.551	8.049	7.3	8.3	0.1052	0.2976	3.82%	0
10		8	8.263	7.98	8.545	7.7	8.8	0.1194	0.3378	4.09%	0
19		8	8.425	8.198	8.652	8	8.9	0.0959	0.2712	3.22%	0
38		8	8.425	8.165	8.685	8	9	0.1098	0.3105	3.69%	0
75		8	8.425	8.217	8.633	8.1	8.8	0.08814	0.2493	2.96%	0
150		8	8.438	8.214	8.661	8.1	8.9	0.09437	0.2669	3.16%	0
Overall		48	8.296	8.191	8.4	7.3	9	0.05191	0.3596	4.34%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	95.5	95.05	95.95	95	96	0.189	0.5345	0.56%	0
150		8	108	108	108	108	108	0	0	0.0%	0
Overall		16	101.8	98.3	105.2	95	108	1.616	6.465	6.35%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.8	7.547	8.053	7.5	8.3	0.1069	0.3024	3.88%	0
10		8	7.6	7.445	7.755	7.4	8	0.06547	0.1852	2.44%	0
19		8	7.625	7.485	7.765	7.5	8	0.05901	0.1669	2.19%	0
38		8	7.625	7.485	7.765	7.5	8	0.05901	0.1669	2.19%	0
75		8	7.637	7.497	7.778	7.5	8	0.05957	0.1685	2.21%	0
150		8	7.637	7.497	7.778	7.5	8	0.05957	0.1685	2.21%	0
Overall		48	7.654	7.596	7.712	7.4	8.3	0.02886	0.2	2.61%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	24	24	24	24	24	0	0	0.0%	0
10		8	24	24	24	24	24	0	0	0.0%	0
19		8	24	24	24	24	24	0	0	0.0%	0
38		8	24	24	24	24	24	0	0	0.0%	0
75		8	24	24	24	24	24	0	0	0.0%	0
150		8	24	24	24	24	24	0	0	0.0%	0
Overall		48	24	24	24	24	24	0	0	0.00%	0 (0%)

Fathead Minnow 7-d Larval Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
150				62					
0	N	2		60					
150				62					
0	N	3		60					
150				62					
0	N	4		60					
150				62					
0	N	5		60					
150				62					
0	N	6		60					
150				62					
0	N	7		60					
150				62					
0	N	8		60					
150				62					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Conductivity-µmhos

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		347					
10				352					
19				332					
38				330					
75				319					
150				320					
0	N	2		332					
10				333					
19				333					
38				331					
75				320					
150				320					
0	N	3		331					
10				336					
19				318					
38				326					
75				331					
150				330					
0	N	4		339					
10				338					
19				336					
38				337					
75				344					
150				337					
0	N	5		335					
10				332					
19				329					
38				330					
75				330					
150				333					
0	N	6		330					
10				339					
19				338					
38				339					
75				339					
150				340					
0	N	7		360					
10				337					
19				331					
38				330					
75				332					
150				333					
0	N	8		360					
10				339					
19				333					
38				333					
75				334					
150				337					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
10				8.2					
19				8.3					
38				8.3					
75				8.3					
150				8.3					
0	N	2		8					
10				8.3					
19				8.2					
38				8.1					
75				8.1					
150				8.2					
0	N	3		7.3					
10				8					
19				8					
38				8					
75				8.1					
150				8.1					
0	N	4		7.7					
10				8.8					
19				8.9					
38				9					
75				8.8					
150				8.9					
0	N	5		7.6					
10				8.6					
19				8.6					
38				8.6					
75				8.6					
150				8.7					
0	N	6		7.9					
10				8.2					
19				8.5					
38				8.5					
75				8.6					
150				8.5					
0	N	7		7.7					
10				8.3					
19				8.5					
38				8.5					
75				8.5					
150				8.5					
0	N	8		8.3					
10				7.7					
19				8.4					
38				8.4					
75				8.4					
150				8.3					

Fathead Minnow 7-d Larval Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		96					
150				108					
0	N	2		96					
150				108					
0	N	3		96					
150				108					
0	N	4		96					
150				108					
0	N	5		95					
150				108					
0	N	6		95					
150				108					
0	N	7		95					
150				108					
0	N	8		95					
150				108					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
10				7.6					
19				7.6					
38				7.6					
75				7.6					
150				7.6					
0	N	2		7.7					
10				7.5					
19				7.5					
38				7.5					
75				7.5					
150				7.5					
0	N	3		7.5					
10				7.7					
19				7.7					
38				7.7					
75				7.7					
150				7.7					
0	N	4		7.6					
10				7.5					
19				7.6					
38				7.6					
75				7.7					
150				7.7					
0	N	5		7.8					
10				7.6					
19				7.6					
38				7.6					
75				7.6					
150				7.6					
0	N	6		7.5					
10				7.5					
19				7.5					
38				7.5					
75				7.5					
150				7.5					
0	N	7		8.3					
10				8					
19				8					
38				8					
75				8					
150				8					
0	N	8		7.8					
10				7.4					
19				7.5					
38				7.5					
75				7.5					
150				7.5					

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

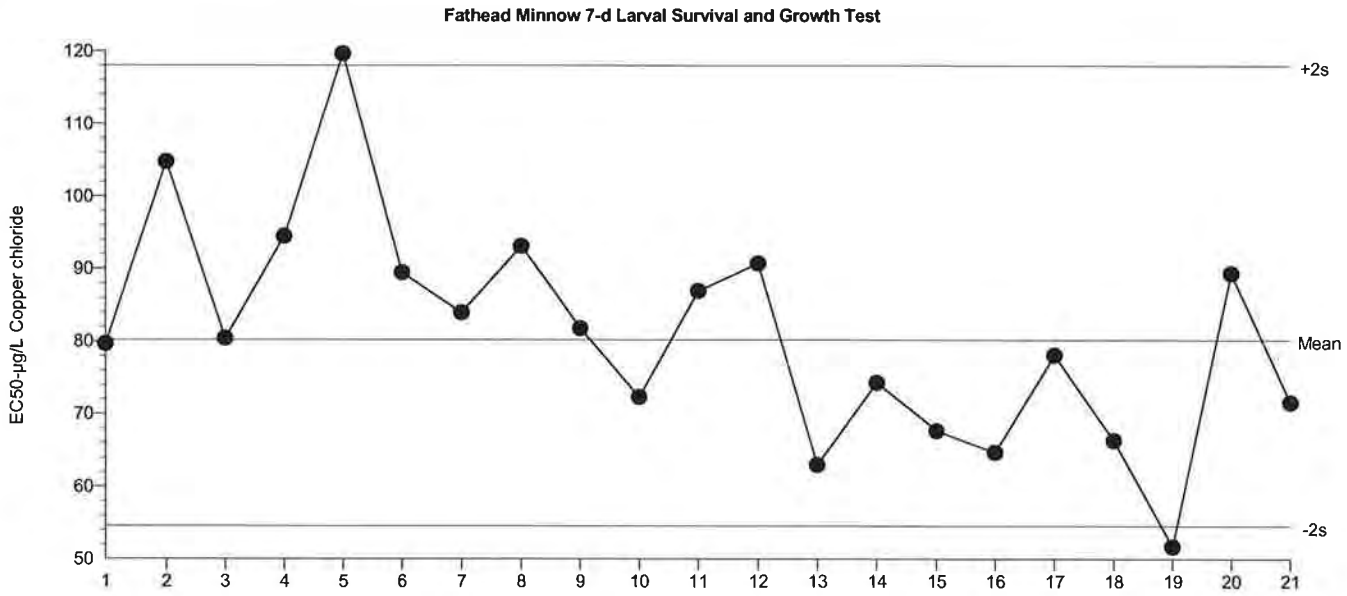
Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	2		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	3		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	4		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	5		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	6		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	7		24					
10				24					
19				24					
38				24					
75				24					
150				24					
0	N	8		24					
10				24					
19				24					
38				24					
75				24					
150				24					

CETIS QC Plot

Report Date: 18 Dec-19 14:35 (1 of 1)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Growth-Survival (7d)	**Organism:**	Pimephales promelas (Fathead Minn	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-013 (2002)	**Endpoint:**	7d Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	80.24	**Count:**	20	**-2s Warning Limit:**	54.54	**-2s Action Limit:**	54.54
Sigma:	n/a	**CV:**	19.50%	**+2s Warning Limit:**	118	**+2s Action Limit:**	118

Quality Control Data

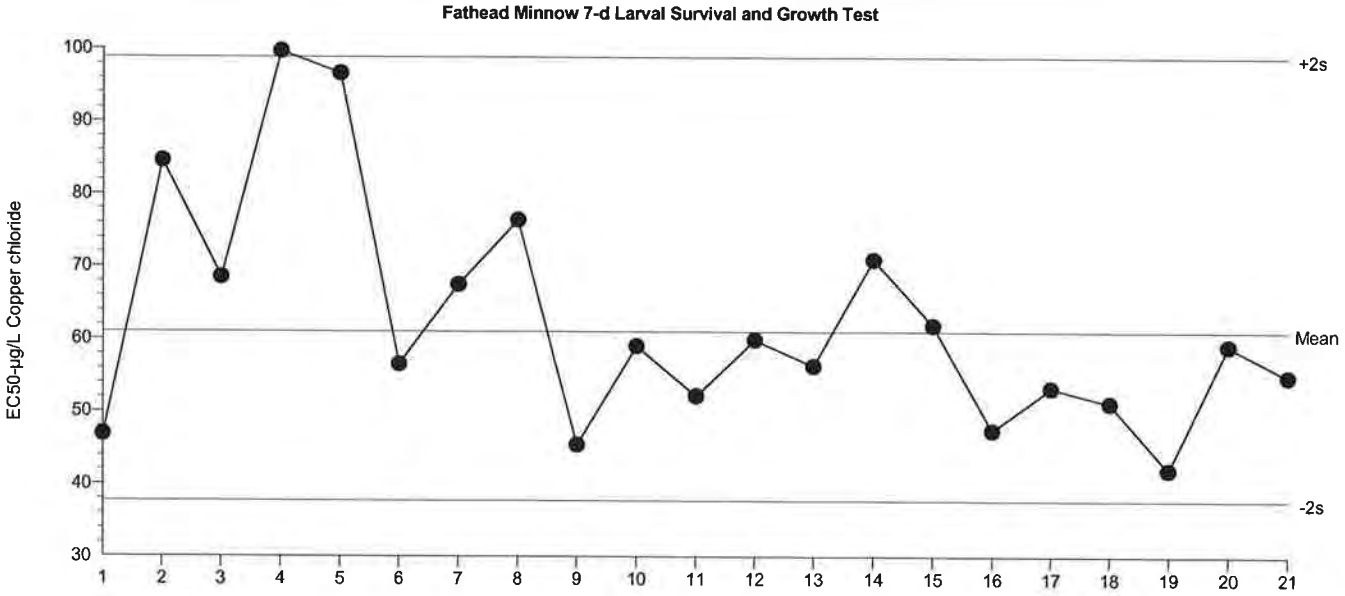
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Jun	5	14:00	79.69	-0.5507	-0.03569			00-5475-9523	15-5258-0292
2			11	14:00	104.8	24.57	1.384			01-5736-3910	19-2511-4608
3		Jul	9	14:18	80.43	0.1966	0.01268			19-0936-4707	00-2098-2433
4			16	15:50	94.5	14.26	0.8477			03-9106-6564	17-4473-6536
5			23	15:50	119.7	39.47	2.073	(+)	(+)	08-8823-6351	17-6794-5650
6		Aug	6	15:30	89.52	9.278	0.5669			18-5341-1710	14-5433-6807
7			27	15:10	84	3.762	0.2374			02-4963-9756	12-3537-9474
8		Sep	4	15:40	93.12	12.89	0.7717			07-7953-0389	11-6829-4309
9			10	15:30	81.82	1.58	0.101			06-9306-2551	06-4512-5736
10			17	12:00	72.36	-7.881	-0.5357			00-7919-5331	08-3051-0708
11			24	14:00	87	6.762	0.4192			02-1446-8016	16-5041-2097
12			26	13:40	90.81	10.57	0.6412			10-6630-3286	08-6556-5775
13		Oct	4	12:55	63	-17.24	-1.253			01-6054-1440	05-7621-9927
14			8	14:50	74.31	-5.923	-0.3974			18-5506-0992	00-0038-4045
15			15	12:55	67.71	-12.53	-0.8795			13-3353-7068	18-1446-7739
16			22	12:20	64.72	-15.52	-1.113			01-3292-4153	10-8330-9000
17			25	11:00	78.12	-2.113	-0.1383			05-8354-0232	06-0960-4854
18			29	12:30	66.37	-13.87	-0.9834			08-2781-6612	04-6508-3530
19		Nov	5	11:30	51.73	-28.51	-2.275	(-)	(-)	12-1925-3504	03-0328-0347
20			19	14:20	89.42	9.185	0.5615			18-5815-0782	15-3196-8211
21			27	15:30	71.64	-8.602	-0.5876			17-7578-1977	17-4641-3241

CETIS QC Plot

Report Date: 18 Dec-19 14:35 (1 of 1)

Fathead Minnow 7-d Larval Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Growth-Survival (7d)	**Organism:**	Pimephales promelas (Fathead Minn	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-013 (2002)	**Endpoint:**	Mean Dry Biomass-mg	**Source:**	Reference Toxicant-REF



Mean:	61.01	**Count:**	20	**-2s Warning Limit:**	37.66	**-2s Action Limit:**	37.66
Sigma:	n/a	**CV:**	24.50%	**+2s Warning Limit:**	98.83	**+2s Action Limit:**	98.83

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Jun	5	14:00	46.9	-14.11	-1.09			00-5475-9523	19-4781-7588
2			11	14:00	84.62	23.61	1.356			01-5736-3910	04-4337-3497
3		Jul	9	14:18	68.56	7.55	0.4838			19-0936-4707	14-6310-7341
4			16	15:50	99.68	38.67	2.036	(+)	(+)	03-9106-6564	10-9054-2062
5			23	15:50	96.63	35.63	1.907			08-8823-6351	19-7322-8110
6		Aug	6	15:30	56.53	-4.481	-0.3163			18-5341-1710	19-7933-4309
7			27	15:10	67.54	6.534	0.4218			02-4963-9756	07-9551-3859
8		Sep	4	15:40	76.42	15.41	0.9339			07-7953-0389	08-7458-6497
9			10	15:30	45.42	-15.59	-1.223			06-9306-2551	04-2402-8103
10			17	12:00	59.05	-1.961	-0.1354			00-7919-5331	01-8079-0050
11			24	14:00	52.18	-8.832	-0.6483			02-1446-8016	10-4470-2196
12			26	13:40	59.91	-1.095	-0.07509			10-6630-3286	18-0000-0212
13		Oct	4	12:55	56.31	-4.696	-0.3321			01-6054-1440	12-2150-4270
14			8	14:50	70.95	9.941	0.6258			18-5506-0992	10-8887-6398
15			15	12:55	61.88	0.8772	0.05919			13-3353-7068	03-9351-1003
16			22	12:20	47.4	-13.61	-1.046			01-3292-4153	11-3740-7839
17			25	11:00	53.27	-7.738	-0.5623			05-8354-0232	06-2946-1496
18			29	12:30	51.16	-9.843	-0.7295			08-2781-6612	12-8175-2478
19		Nov	5	11:30	41.97	-19.04	-1.551			12-1925-3504	09-0503-4210
20			19	14:20	59.06	-1.948	-0.1345			18-5815-0782	01-0341-3326
21			27	15:30	54.86	-6.151	-0.4406			17-7578-1977	05-1534-9561

CHEMICAL ANALYSIS DATA SHEET
STD TOX - FML

Start Date: 11/27/19 1530 | Lab # : FML 112719

End Date: 12/4/19 1445 | Date Rec'd:

YSI used: B B B B B B B

Renewal Sample Used:

DAY	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Initials		TD 1000	1150	1015	1000	TD 1010	TD 1118	

DISSOLVED OXYGEN (mg/L)

Control	7.9	7.0	8.0	6.9	7.3	8.6	7.7	8.6	7.6	7.3	7.9	7.6	7.7	8.3
0.010	8.2	7.1	8.3	6.7	8.0	8.7	8.8	8.0	8.6	7.1	8.2	7.9	8.3	7.7
0.019	8.3	7.2	8.2	6.5	8.0	8.9	8.9	8.6	8.6	7.1	8.5	7.9	8.5	8.4
0.038	8.3	7.2	8.1	6.3	8.0	9.0	9.0	8.6	8.6	7.1	8.5	8.5	8.5	8.4
0.075	8.3	7.2	8.1	6.2	8.1	8.8	8.8	8.9	8.6	7.1	8.6	8.6	8.5	8.4
0.15	8.3	7.1	8.2	6.1	8.1	8.8	8.9	8.8	8.7	7.1	8.5	8.6	8.5	8.3

TEMPERATURE (°C)

Control	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
0.010	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
0.019	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
0.038	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
0.075	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
0.15	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0

pH

Control	8.2	7.9	7.7	7.8	7.5	7.9	7.6	7.8	7.8	7.8	7.5	8.3	8.3	7.8
0.010	7.6	7.9	7.5	7.8	7.7	7.7	7.5	7.6	7.6	7.8	7.5	7.7	8.0	7.4
0.019	7.6	7.9	7.5	7.7	7.7	7.6	7.6	7.7	7.6	7.8	7.5	7.9	8.0	7.5
0.038	7.6	7.9	7.5	7.2	7.7	7.6	7.6	7.7	7.6	7.8	7.5	7.9	8.0	7.5
0.075	7.6	7.9	7.5	7.1	7.7	7.6	7.7	7.7	7.6	7.8	7.5	7.9	8.0	7.5
0.15	7.6	7.9	7.5	7.2	7.7	7.6	7.7	7.7	7.6	7.8	7.5	7.9	8.0	7.5

CONDUCTIVITY (uS/cm)

Control	347	332	331	339	335	330	340	340
0.010	332	333	336	338	332	339	337	339
0.019	332	333	318	336	329	338	331	333
0.038	330	331	326	337	330	339	330	333
0.075	319	320	331	344	330	339	332	334
0.15	320	320	330	337	333	340	337	337

ALKALINITY

Control	60	60	60	60	60	60	60	60
0.15	62	62	62	62	62	62	62	62

HARDNESS

Control	96	96	96	96	95	95	95	95
0.15	108	108	108	108	108	108	WR	WR

Residual Chlorine 1st Sample:_____ 2nd Sample:_____ 3rd Sample:_____

Chronic juvenile Fathead minnow (*Pimephales promelas*) Survival and Growth

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: STD. TOX. Lab #: _____

Sample I.D.: _____

Date & Time Start: 11/27/19 1530 Date & Time End: 12/4/19 1445

Conc.	Rep.#	INITIAL ~	1 TD	2 ~	3 ✓	4 ~	5 TD	6 TD	FINAL TD
CONTROL	1	IF	15	15	15	15	15	15	15
	2	IF	15	15	15	15	15	15	15
	3	IF	15	15	15	15	15	15	15
	4	IF	15	IF	15	15	15	15	15
.010	1	IF	15	15	15	15	15	15	15
	2	IF	15	15	15	15	15	15	15
	3	IF	15	15	15	15	15	15	15
	4	IF	15	15	15	15	15	15	15
.019	1	IF	15	15	15	15	15	15	15
	2	IF	15	15	15	15	15	15	15
	3	IF	15	15	15	15	15	15	15
	4	IF	15	15	15	15	15	15	15
.038	1	IF	15	15	15	15	15	15	15
	2	IF	15	15	15	15	15	15	15
	3	IF	15	15	15	15	15	15	15
	4	IF	15	15	15	15	15	15	15
.075	1	IF	11	10	10	9	9	4	3
	2	IF	11	11	11	11	11	11	10
	3	IF	10	9	9	8	8	6	6
	4	IF	11	8	8	8	8	8	8
.15	1	IF	8	5	4	3	2	2	0
	2	IF	5	2	2	1	1	1	1
	3	IF	5	2	2	2	2	0	
	4	IF	4	2	2	2	2	2	0

CHAMBER NUMBER	EFF. CONC.	REPL. #	NUMBER FISH	BOAT TARE	BOAT + FISH	FISH WEIGHT (g)	AVG. WT. PER FISH (g)
XA 1	CONTROL	1		1.14188	1.14792	0.00604 ~	
2		2		1.12987	1.13703	0.00716	
3		3		1.14525	1.15335	0.00810	
4		4		1.13270	1.14166	0.00896	
XA 5	.010	1		1.11970	1.12657	0.00687	
6		2		1.13106	1.13786	0.00680	
7		3		1.12851	1.13746	0.00895	
8		4		1.13730	1.14470	0.00740	
XA 9	.019	1		1.13583	1.14270	0.00687	
10		2		1.12843	1.13648	0.00805	
11		3		1.15800	1.16426	0.00626	
12		4		1.14404	1.15000	0.00596	
XA 13	.038	1		1.13295	1.13949	0.00654	
14		2		1.14928	1.15487	0.00559	
15		3		1.15013	1.15492	0.00479	
16		4		1.13336	1.13947	0.00611	
XA 17	.075	1		1.12404	1.12479	0.00075	
18		2		1.13141	1.13372	0.00231	
19		3		1.12760	1.12884	0.00124	
20		4		1.12863	1.13002	0.00139	
XA 21 - Blank	.15	1		1.13381	1.13391	0.00010	
22		2		1.15705	1.15725	0.00020	
23 - Blank		3		1.13156	1.13161	0.00005	
24 - Blank		4		1.14170	1.14182	0.00012	
25 - Blank				1.14100	1.14109	-0.00009	

QC: _____

aquatic bioassay & consulting laboratories, inc

CHRONIC SELENASTRUM GROWTH BIOASSAY

DATE: 27 November - 2019

STANDARD TOXICANT: Cadmium Chloride

NOEC = 40.00 ug/l

IC25 = 71.54 ug/l
IC50 = 109.60 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Report Date: 09 Dec-19 12:52 (p 1 of 1)
Test Code/ID: SEL112719 / 08-2121-4517

Selenastrum Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	19-4769-5272	**Test Type:**	Cell Growth	**Analyst:**			
Start Date:	27 Nov-19 16:01	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable		
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	00-7293-6711	**Code:**	SEL112719	**Project:**	REF TOX		
Sample Date:	27 Nov-19 16:01	**Material:**	Cadmium chloride	**Source:**	Reference Toxicant		
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX		
Sample Age:	n/a	**Client:**	Internal Lab				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
17-8864-3016	Cell Density	Dunnett Multiple Comparison Test		40	80	56.57		8.78%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	TU	S
15-2177-7638	Cell Density	Linear Interpolation (ICPIN)		IC5	42.66	21.67	49.86		1
				IC10	49.88	32.61	56.99		
				IC15	57.1	43.07	64.5		
				IC20	64.32	52.71	71.76		
				IC25	71.54	62.07	79.62		
				IC40	94.15	86.62	101.1		
				IC50	109.6	103.6	115		

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
15-2177-7638	Cell Density	Control CV	0.06339	<<	0.2	Yes	Passes Criteria
17-8864-3016	Cell Density	Control CV	0.06339	<<	0.2	Yes	Passes Criteria
15-2177-7638	Cell Density	Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria
17-8864-3016	Cell Density	Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

Cell Density Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.440E+6	1.294E+6	1.585E+6	1.329E+6	1.551E+6	4.563E+4	9.125E+4	6.34%	0.00%
20		4	1.547E+6	1.444E+6	1.651E+6	1.512E+6	1.645E+6	3.260E+4	6.519E+4	4.21%	-7.49%
40		4	1.446E+6	1.245E+6	1.647E+6	1.280E+6	1.575E+6	6.322E+4	1.264E+5	8.74%	-0.47%
80		4	1.032E+6	9.429E+5	1.122E+6	9.920E+5	1.114E+6	2.816E+4	5.632E+4	5.45%	28.27%
140		4	4.538E+5	4.086E+5	4.989E+5	4.180E+5	4.780E+5	1.418E+4	2.836E+4	6.25%	68.48%
180		4	2.500E+5	2.122E+5	2.878E+5	2.290E+5	2.810E+5	1.188E+4	2.376E+4	9.51%	82.63%

Cell Density Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
20		1.512E+6	1.645E+6	1.516E+6	1.516E+6
40		1.575E+6	1.280E+6	1.504E+6	1.426E+6
80		1.114E+6	9.980E+5	1.026E+6	9.920E+5
140		4.440E+5	4.750E+5	4.780E+5	4.180E+5
180		2.290E+5	2.560E+5	2.810E+5	2.340E+5

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-8864-3016	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	09 Dec-19 12:51	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	19-4769-5272	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	27 Nov-19 16:01	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-7293-6711	**Code:**	SEL112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 16:01	**Material:**	Cadmium chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	40	80	56.57		8.78%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	20	-2.051	2.407	1E+05	6	CDF	0.9992	Non-Significant Effect
	40	-0.1285	2.407	1E+05	6	CDF	0.8684	Non-Significant Effect
	80*	7.749	2.407	1E+05	6	CDF	2.8E-05	Significant Effect
	140*	18.77	2.407	1E+05	6	CDF	2.7E-05	Significant Effect
	180*	22.65	2.407	1E+05	6	CDF	2.7E-05	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control CV	0.06339	<<	0.2	Yes	Passes Criteria
Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.196E+12	1.239E+12	5	224.6	<1.0E-37	Significant Effect
Error	9.931E+10	5.517E+09	18			
Total	6.295E+12		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	9.413	15.09	0.0937	Equal Variances
	Levene Equality of Variance Test	1.856	4.248	0.1526	Equal Variances
	Mod Levene Equality of Variance Test	1.345	4.248	0.2906	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.7937	3.878	0.0394	Normal Distribution
	D'Agostino Kurtosis Test	1.253	2.576	0.2101	Normal Distribution
	D'Agostino Skewness Test	0.3691	2.576	0.7121	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	1.707	9.21	0.4259	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1855	0.2056	0.0321	Normal Distribution
	Shapiro-Wilk W Normality Test	0.937	0.884	0.1397	Normal Distribution

Cell Density Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.440E+6	1.294E+6	1.585E+6	1.439E+6	1.329E+6	1.551E+6	4.563E+4	6.34%	0.00%
20		4	1.547E+6	1.444E+6	1.651E+6	1.516E+6	1.512E+6	1.645E+6	3.260E+4	4.21%	-7.49%
40		4	1.446E+6	1.245E+6	1.647E+6	1.465E+6	1.280E+6	1.575E+6	6.322E+4	8.74%	-0.47%
80		4	1.032E+6	9.429E+5	1.122E+6	1.012E+6	9.920E+5	1.114E+6	2.816E+4	5.45%	28.27%
140		4	4.538E+5	4.086E+5	4.989E+5	4.595E+5	4.180E+5	4.780E+5	1.418E+4	6.25%	68.48%
180		4	2.500E+5	2.122E+5	2.878E+5	2.450E+5	2.290E+5	2.810E+5	1.188E+4	9.51%	82.63%

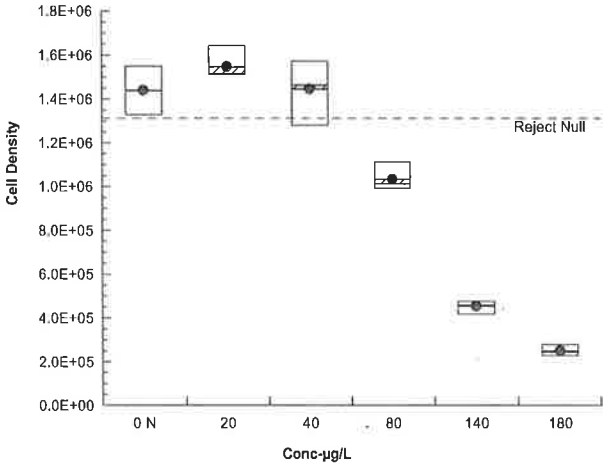
Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

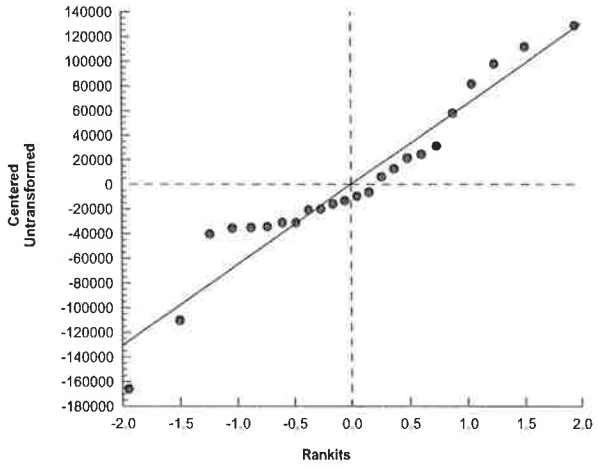
Analysis ID:	17-8864-3016	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	09 Dec-19 12:51	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Cell Density Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
20		1.512E+6	1.645E+6	1.516E+6	1.516E+6
40		1.575E+6	1.280E+6	1.504E+6	1.426E+6
80		1.114E+6	9.980E+5	1.026E+6	9.920E+5
140		4.440E+5	4.750E+5	4.780E+5	4.180E+5
180		2.290E+5	2.560E+5	2.810E+5	2.340E+5

Graphics





Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-2177-7638	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	09 Dec-19 12:51	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	19-4769-5272	**Test Type:**	Cell Growth	**Analyst:**	
Start Date:	27 Nov-19 16:01	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	00-7293-6711	**Code:**	SEL112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 16:01	**Material:**	Cadmium chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control CV	0.06339	<<	0.2	Yes	Passes Criteria
Control Resp	1.44E+6	1000000	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	42.66	21.67	49.86
IC10	49.88	32.61	56.99
IC15	57.1	43.07	64.5
IC20	64.32	52.71	71.76
IC25	71.54	62.07	79.62
IC40	94.15	86.62	101.1
IC50	109.6	103.6	115

Cell Density Summary

			Calculated Variate						Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	4	1.440E+6	1.329E+6	1.551E+6	9.125E+4	6.34%	0.0%	1493000	0.0%
20		4	1.547E+6	1.512E+6	1.645E+6	6.519E+4	4.21%	-7.49%	1493000	0.0%
40		4	1.446E+6	1.280E+6	1.575E+6	1.264E+5	8.74%	-0.47%	1446000	3.16%
80		4	1.032E+6	9.920E+5	1.114E+6	5.632E+4	5.45%	28.27%	1032000	30.86%
140		4	4.538E+5	4.180E+5	4.780E+5	2.836E+4	6.25%	68.48%	453800	69.62%
180		4	2.500E+5	2.290E+5	2.810E+5	2.376E+4	9.51%	82.63%	250000	83.26%

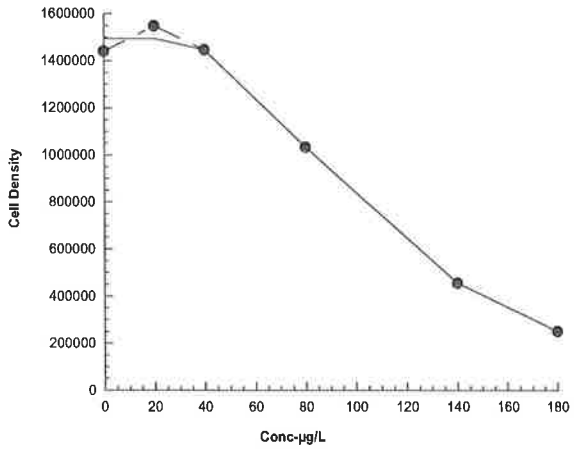
Cell Density Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.452E+6	1.329E+6	1.426E+6	1.551E+6
20		1.512E+6	1.645E+6	1.516E+6	1.516E+6
40		1.575E+6	1.280E+6	1.504E+6	1.426E+6
80		1.114E+6	9.980E+5	1.026E+6	9.920E+5
140		4.440E+5	4.750E+5	4.780E+5	4.180E+5
180		2.290E+5	2.560E+5	2.810E+5	2.340E+5

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-2177-7638	**Endpoint:**	Cell Density	**CETIS Version:**	CETISv1.9.5
Analyzed:	09 Dec-19 12:51	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	19-4769-5272	**Test Type:**	Cell Growth	**Analyst:**			
Start Date:	27 Nov-19 16:01	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Laboratory Water		
Ending Date:	01 Dec-19 14:20	**Species:**	Selenastrum capricornutum	**Brine:**	Not Applicable		
Test Length:	94h	**Taxon:**	Chlorophyta	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	00-7293-6711	**Code:**	SEL112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 16:01	**Material:**	Cadmium chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	1	60			60	60	0	0	0.0%	0
20		1	59			59	59	0	0	0.0%	0
40		1	60			60	60	0	0	0.0%	0
80		1	59			59	59	0	0	0.0%	0
140		1	53			53	53	0	0	0.0%	0
180		1	59			59	59	0	0	0.0%	0
Overall		6	58.33	55.54	61.12	53	60	1.085	2.658	4.56%	0 (0%)

Conductivity-µmhos

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	436.6	418.7	454.5	425	456	6.431	14.38	3.29%	0
20		5	408.4	403.9	412.9	405	414	1.631	3.647	0.89%	0
40		5	404.4	402.5	406.3	402	406	0.6782	1.517	0.38%	0
80		5	396.8	395	398.6	395	399	0.6633	1.483	0.37%	0
140		5	377.8	366.7	388.9	368	389	4.005	8.955	2.37%	0
180		5	368	353.6	382.4	358	385	5.187	11.6	3.15%	0
Overall		30	398.7	389.8	407.6	358	456	4.353	23.84	5.98%	0 (0%)

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	1	117			117	117	0	0	0.0%	0
20		1	112			112	112	0	0	0.0%	0
40		1	117			117	117	0	0	0.0%	0
80		1	115			115	115	0	0	0.0%	0
140		1	110			110	110	0	0	0.0%	0
180		1	118			118	118	0	0	0.0%	0
Overall		6	114.8	111.5	118.2	110	118	1.302	3.189	2.78%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	7.7	7.612	7.788	7.6	7.8	0.03162	0.07071	0.92%	0
20		5	7.66	7.592	7.728	7.6	7.7	0.02449	0.05477	0.72%	0
40		5	7.68	7.518	7.842	7.5	7.8	0.05831	0.1304	1.7%	0
80		5	7.7	7.524	7.876	7.5	7.8	0.06325	0.1414	1.84%	0
140		5	7.68	7.544	7.816	7.5	7.8	0.04899	0.1095	1.43%	0
180		5	7.68	7.544	7.816	7.5	7.8	0.04899	0.1095	1.43%	0
Overall		30	7.683	7.647	7.72	7.5	7.8	0.01799	0.09855	1.28%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
20		5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
40		5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
80		5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
140		5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
180		5	24.72	23.99	25.45	24	25.5	0.2634	0.5891	2.38%	0
Overall		30	24.72	24.52	24.92	24	25.5	0.09784	0.5359	2.17%	0 (0%)

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Alkalinity (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
20				59					
40				60					
80				59					
140				53					
180				59					

Conductivity-µmhos

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		426					
20				406					
40				405					
80				396					
140				378					
180				358					
0	N	2		425					
20				407					
40				404					
80				397					
140				370					
180				362					
0	N	3		428					
20				405					
40				402					
80				395					
140				368					
180				360					
0	N	4		448					
20				410					
40				405					
80				397					
140				384					
180				375					
0	N	5		456					
20				414					
40				406					
80				399					
140				389					
180				385					

Hardness (CaCO3)-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		117					
20				112					
40				117					
80				115					
140				110					
180				118					

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.6					
20				7.6					
40				7.5					
80				7.5					
140				7.5					
180				7.5					
0	N	2		7.7					
20				7.7					
40				7.8					
80				7.8					
140				7.7					
180				7.7					
0	N	3		7.7					
20				7.7					
40				7.7					
80				7.8					
140				7.7					
180				7.7					
0	N	4		7.8					
20				7.7					
40				7.8					
80				7.8					
140				7.8					
180				7.8					
0	N	5		7.7					
20				7.6					
40				7.6					
80				7.6					
140				7.7					
180				7.7					

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

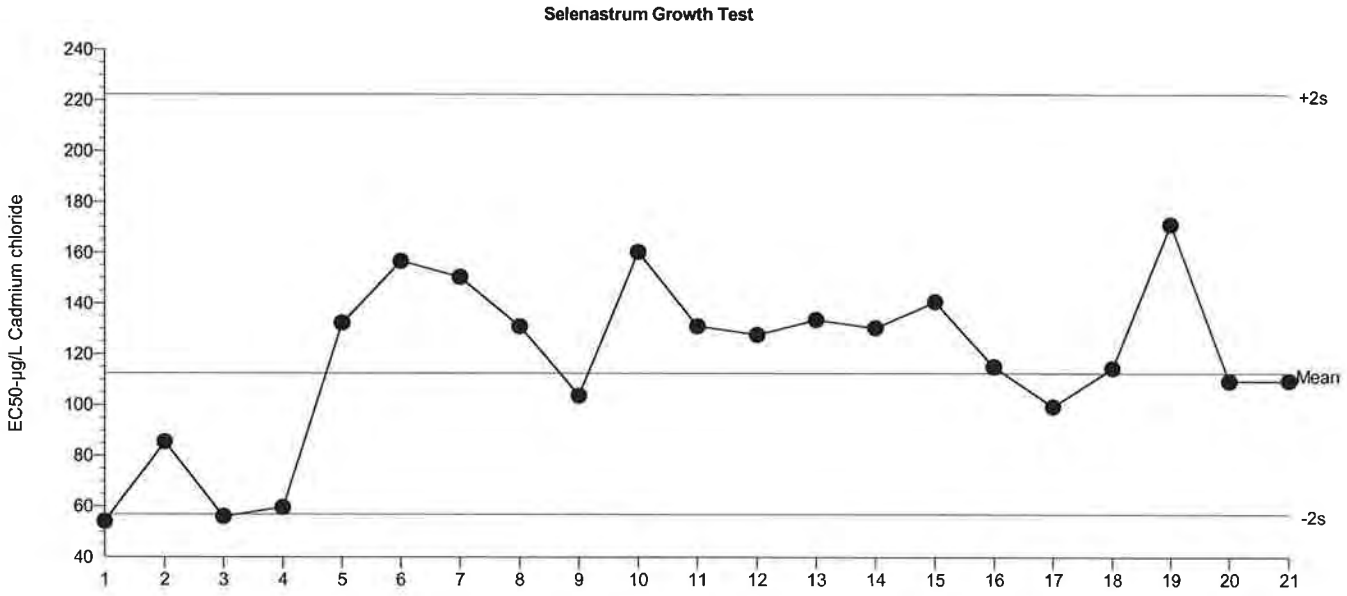
Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		25.5					
20				25.5					
40				25.5					
80				25.5					
140				25.5					
180				25.5					
0	N	2		25					
20				25					
40				25					
80				25					
140				25					
180				25					
0	N	3		24					
20				24					
40				24					
80				24					
140				24					
180				24					
0	N	4		24.3					
20				24.3					
40				24.3					
80				24.3					
140				24.3					
180				24.3					
0	N	5		24.8					
20				24.8					
40				24.8					
80				24.8					
140				24.8					
180				24.8					

CETIS QC Plot

Report Date: 18 Dec-19 14:36 (1 of 1)

Selenastrum Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Cell Growth	**Organism:**	Selenastrum capricornutum (Green	**Material:**	Cadmium chloride
Protocol:	EPA/821/R-02-013 (2002)	**Endpoint:**	Cell Density	**Source:**	Reference Toxicant-REF



Mean:	112.5	**Count:**	20	**-2s Warning Limit:**	56.89	**-2s Action Limit:**	56.89
Sigma:	n/a	**CV:**	35.10%	**+2s Warning Limit:**	222.5	**+2s Action Limit:**	222.5

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2018	Oct	11	12:28	54.04	-58.46	-2.151	(-)	(-)	09-6412-1992	01-9246-0983
2			16	11:31	85.53	-26.98	-0.8042			20-4071-9558	04-1899-8914
3		Nov	8	11:50	56.09	-56.42	-2.042	(-)	(-)	17-3634-7948	19-3639-6354
4			29	11:55	59.76	-52.74	-1.856			01-0149-2508	08-9257-3254
5		Dec	14	11:31	132.3	19.82	0.476			02-5754-6085	14-1528-3453
6	2019	Jan	30	14:01	156.7	44.15	0.9711			04-0642-1943	06-6785-5361
7		Feb	1	13:32	150.5	37.98	0.8533			00-9414-6126	20-4224-8624
8			7	12:20	131	18.49	0.4464			16-5473-9494	20-7346-9603
9			8	11:49	103.7	-8.779	-0.2383			05-9464-1461	09-1407-8787
10		Apr	9	15:34	160.4	47.9	1.04			10-4196-4105	15-3776-5874
11			26	11:16	131.1	18.6	0.4487			09-5640-9308	16-6724-4065
12		May	2	11:46	127.8	15.26	0.3731			02-9620-9622	19-3020-3847
13			30	11:16	133.6	21.13	0.505			20-3255-6910	07-1716-6469
14		Jun	4	11:28	130.5	17.99	0.4351			11-4296-6517	04-2674-6652
15		Jul	9	12:57	140.7	28.19	0.6559			16-6968-2343	04-3765-0939
16			11	11:36	115.1	2.6	0.06703			15-8328-7536	02-0423-9173
17			25	11:22	99.4	-13.11	-0.3633			04-0835-2009	13-5243-1653
18		Aug	6	12:21	114.5	1.981	0.0512			02-3337-9234	03-9335-0042
19		Oct	10	12:39	171.3	58.77	1.233			17-7054-3604	05-4647-5387
20		Nov	7	12:07	109.4	-3.089	-0.08166			10-1930-3893	02-7607-7161
21			27	16:01	109.6	-2.875	-0.07593			08-2121-4517	15-2177-7638

Analyst:_____ QA:_____

Chemical Analysis Data Sheet - Selenastrum Growth

Aquatic Bioassay & Consulting Laboratories, Inc.

Company: STD TOX Lab #:

Start date and time: 11-27-19 1601 Sample ID:

End date and time: 12-1-19 1420 Date Rec'd:

YSI Used: B B B B

Day	0 11/27	1 11/28	2 11/29	3 11/30	4 12-1
Analyst	~	M	MR	L	L
Time	1601	1500	1400	1300	1420

Temperature (°C)

Control	25.5	25.0	24.0	24.3	24.4
20	25.5	25.0	24.0	24.3	24.4
40	25.5	25.0	24.0	24.3	24.4
80	25.5	25.0	24.0	24.3	24.4
140	25.5	25.0	24.0	24.3	24.4
180	25.5	25.0	24.0	24.3	24.4

pH

Control	7.6	7.7	7.7	7.6	7.7
20	7.6	7.7	7.7	7.7	7.6
40	7.5	7.8	7.7	7.6	7.6
80	7.5	7.8	7.8	7.6	7.6
140	7.5	7.7	7.7	7.6	7.7
180	7.5	7.7	7.7	7.6	7.7

Conductivity (uS/cm)

Control	426	424	424	440	456
20	404	407	407	410	414
40	405	404	402	405	406
80	396	397	397	397	399
140	378	370	384	384	389
180	358	362	360	375	385

QC: LM PRS

SELANASTRUM GROWTH TOXICITY TEST

COMPANY: SPD TOX
SAMPLE I.D:
START DATE: 11-27-19
END DATE: 12-1-19

LAB NO.
REC'D DATE:

TREATMENT	EFFLUENT CONCENTRATION						REMARKS
	CON	20	40	80	140	180	
Temp. °C.							
pH							
Alkalinity mg/L	60	59	60	59	53	59	
Hardness mg/L (CaCO3)	117	112	117	115	110	118	
Salinity (ppt)							
Chlorine mg/L							

Test Chamber Concentration		Cell Density Measurement Number of Cells Per mL Sample Replicate Per Test Chamber			Average Per Replicate
		1	2	3	
Control	1				1.453
Control	2				1.329
Control	3				1.426
Control	4				1.553
20	1	1.708	1.717	1.774	1.733
	2	1.683	1.632	1.607	1.645
	3	1.334	1.370	1.364	1.356
	4	1.379	1.414	1.373	1.389
40	1	1.573	1.520	1.581	1.558
	2	1.287	1.329	1.275	1.297
	3	1.505	1.508	1.498	1.504
	4	1.449	1.403	1.426	1.426
80	1	1.121	1.118	1.103	1.114
	2	.989	.994	1.010	0.998
	3	1.038	1.019	1.021	1.026
	4	.996	.996	.984	0.992
140	1	.448	.443	.441	0.444
	2	.474	.476	.473	0.474
	3	.476	.483	.477	0.479
	4	.428	.411	.416	0.418
180	1	.227	.243	.212	0.229
	2	.256	.260	.251	0.256
	3	.239	.224	.233	0.232
	4	.237	.233	.227	0.234

CONTROL MEAN VCF1119.285

Hemacytometer Conversion Formula: Selenastrum / mL - (Total Algae Counted) (4,000,000)
Number of Squares Counted

QC: L P

aquatic bioassay & consulting laboratories, inc

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

DATE: 27 November - 2019

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 56.00 ug/l

EC25 = 100.00 ug/l
EC50 = 128.20 ug/l

ENDPOINT: GROWTH

NOEC = 100.00 ug/l

IC25 = 103.80 ug/l
IC50 = 132.60 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

*25ppt

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX		
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant		
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX		
Sample Age:	n/a	**Client:**	Internal Lab				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
08-8634-8290	7d Survival Rate	Dunnett Multiple Comparison Test	✓	56	100	74.83		13.8%	1
19-4819-8886	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test		100	180	134.2		27.4%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	TU	S
05-4569-9301	7d Survival Rate	Linear Interpolation (ICPIN)	✓	EC5	64.8	18	71.4		1
			✓	EC10	73.6	52.7	86.8		
			✓	EC15	82.4	62.05	102.2		
			✓	EC20	91.2	71.4	109.2		
			✓	EC25	100	78	112		
			✓	EC40	116.9	99.53	126.9		
			✓	EC50	128.2	113.9	137.1		
17-0319-9578	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)		IC5	65.86	n/a	86.26		1
				IC10	76.09	0.946	113.3		
				IC15	86.32	15.33	115.2		
				IC20	96.55	29.71	117.8		
				IC25	103.8	66.45	121.8		
				IC40	121.1	99.62	136.2		
				IC50	132.6	113.5	151.7		

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
05-4569-9301	7d Survival Rate	Control Resp	0.96	0.8	>>	Yes	Passes Criteria
08-8634-8290	7d Survival Rate	Control Resp	0.96	0.8	>>	Yes	Passes Criteria
17-0319-9578	Mean Dry Biomass-mg	Control Resp	1.542	0.85	>>	Yes	Passes Criteria
19-4819-8886	Mean Dry Biomass-mg	Control Resp	1.542	0.85	>>	Yes	Passes Criteria
08-8634-8290	7d Survival Rate	PMSD	0.1382	<<	0.25	No	Passes Criteria

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	0.00%
56		5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	0.00%
100		5	0.7200	0.5840	0.8560	0.6000	0.8000	0.0490	0.1095	15.21%	25.00%
180		5	0.0400	0.0000	0.1511	0.0000	0.2000	0.0400	0.0894	223.61%	95.83%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
560		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.542	1.187	1.897	1.168	1.948	0.128	0.2861	18.56%	0.00%
56		5	1.539	1.064	2.015	1.198	2.018	0.1713	0.383	24.88%	0.18%
100		5	1.208	0.9717	1.444	0.938	1.358	0.08497	0.19	15.73%	21.69%
180		5	0.1376	-0.2444	0.5196	0	0.688	0.1376	0.3077	223.61%	91.08%
320		5	0	0	0	0	0	0	0		100.00%
560		5	0	0	0	0	0	0	0		100.00%

Pacific Topsmelt 7-d Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	1.0000
100		0.8000	0.6000	0.6000	0.8000	0.8000
180		0.2000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.418	1.548	1.168	1.948	1.628
56		1.198	1.372	2.018	1.228	1.88
100		1.358	0.938	1.076	1.32	1.346
180		0.688	0	0	0	0
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	5/5
100		4/5	3/5	3/5	4/5	4/5
180		1/5	0/5	0/5	0/5	0/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-8634-8290	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	56	100	74.83		13.82%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	56	0	2.227	0.155	8	CDF	0.7500	Non-Significant Effect
	100*	3.998	2.227	0.155	8	CDF	0.0014	Significant Effect
	180*	14.68	2.227	0.155	8	CDF	7.0E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria
PMSD	0.1382	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.51346	1.17115	3	96.22	<1.0E-37	Significant Effect
Error	0.194746	0.0121716	16			
Total	3.7082		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	0.09332	11.34	0.9926	Equal Variances
	Levene Equality of Variance Test	0.3485	5.292	0.7907	Equal Variances
	Mod Levene Equality of Variance Test	0.1769	5.953	0.9100	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.197	3.878	0.0039	Non-Normal Distribution
	D'Agostino Kurtosis Test	0.03203	2.576	0.9745	Normal Distribution
	D'Agostino Skewness Test	1.039	2.576	0.2988	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	1.081	9.21	0.5826	Normal Distribution
	Kolmogorov-Smirnov D Test	0.281	0.2235	2.2E-04	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.8968	0.866	0.0360	Normal Distribution

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
56		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
100		5	0.7200	0.5840	0.8560	0.8000	0.6000	0.8000	0.0490	15.21%	25.00%
180		5	0.0400	0.0000	0.1511	0.0000	0.0000	0.2000	0.0400	223.61%	95.83%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
560		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 08-8634-8290 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.5
Analyzed: 10 Dec-19 9:34 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.00%
56		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.00%
100		5	1.019	0.8684	1.169	1.107	0.8861	1.107	0.05415	11.89%	21.50%
180		5	0.2731	0.1409	0.4054	0.2255	0.2255	0.4636	0.04763	38.99%	78.95%
320		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	82.62%
560		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	82.62%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	1.0000
100		0.8000	0.6000	0.6000	0.8000	0.8000
180		0.2000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

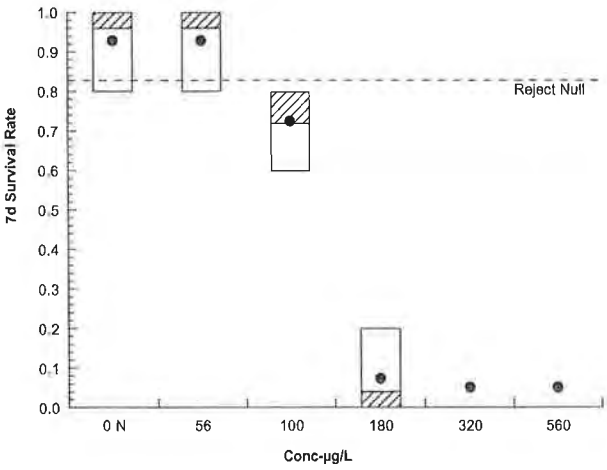
Angular (Corrected) Transformed Detail

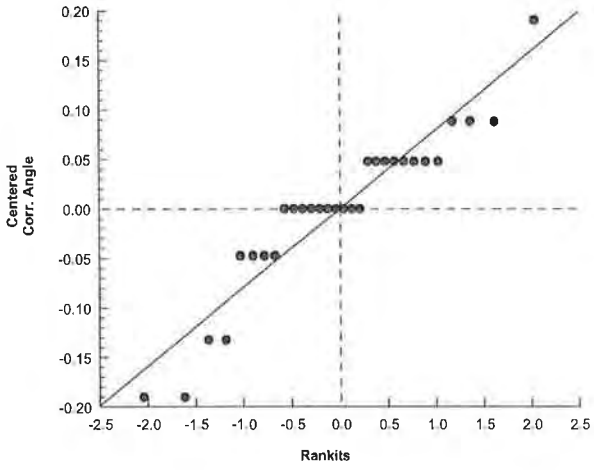
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.107	1.345	1.345	1.345	1.345
56		1.345	1.345	1.345	1.107	1.345
100		1.107	0.8861	0.8861	1.107	1.107
180		0.4636	0.2255	0.2255	0.2255	0.2255
320		0.2255	0.2255	0.2255	0.2255	0.2255
560		0.2255	0.2255	0.2255	0.2255	0.2255

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	5/5
100		4/5	3/5	3/5	4/5	4/5
180		1/5	0/5	0/5	0/5	0/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	19-4819-8886	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	180	134.2		27.38%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	56	0.01477	2.227	0.422	8	CDF	0.7447	Non-Significant Effect
	100	1.764	2.227	0.422	8	CDF	0.1122	Non-Significant Effect
	180*	7.409	2.227	0.422	8	CDF	2.8E-06	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.542	0.85	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.62939	2.2098	3	24.6	3.1E-06	Significant Effect
Error	1.43722	0.0898262	16			
Total	8.06661		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	1.672	11.34	0.6433	Equal Variances
	Levene Equality of Variance Test	1.244	5.292	0.3265	Equal Variances
	Mod Levene Equality of Variance Test	0.5766	5.953	0.6413	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.7376	3.878	0.0544	Normal Distribution
	D'Agostino Kurtosis Test	0.4725	2.576	0.6366	Normal Distribution
	D'Agostino Skewness Test	1.298	2.576	0.1942	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	1.909	9.21	0.3851	Normal Distribution
	Kolmogorov-Smirnov D Test	0.224	0.2235	0.0098	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.9199	0.866	0.0988	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.542	1.187	1.897	1.548	1.168	1.948	0.128	18.56%	0.00%
56		5	1.539	1.064	2.015	1.372	1.198	2.018	0.1713	24.88%	0.18%
100		5	1.208	0.9717	1.444	1.32	0.938	1.358	0.08497	15.73%	21.69%
180		5	0.1376	-0.2444	0.5196	0	0	0.688	0.1376	223.61%	91.08%
320		5	0	0	0	0	0	0	0		100.00%
560		5	0	0	0	0	0	0	0		100.00%

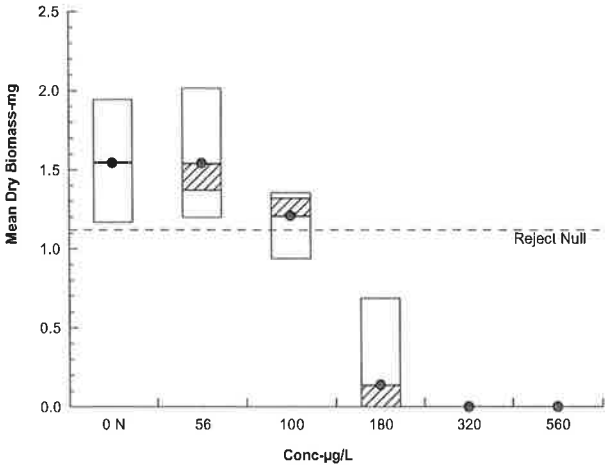
Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

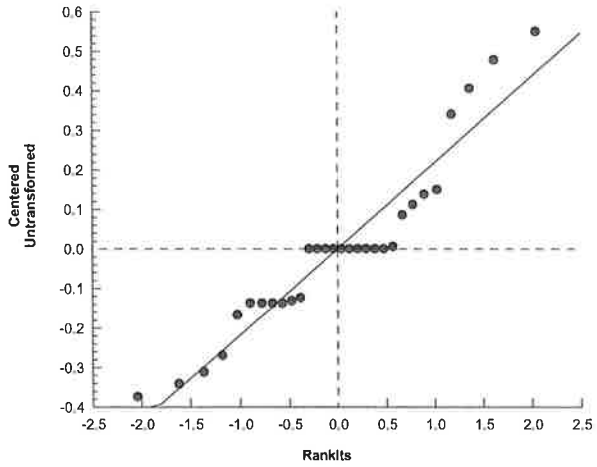
Analysis ID:	19-4819-8886	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.418	1.548	1.168	1.948	1.628
56		1.198	1.372	2.018	1.228	1.88
100		1.358	0.938	1.076	1.32	1.346
180		0.688	0	0	0	0
320		0	0	0	0	0
560		0	0	0	0	0

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-4569-9301	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	64.8	18	71.4
EC10	73.6	52.7	86.8
EC15	82.4	62.05	102.2
EC20	91.2	71.4	109.2
EC25	100	78	112
EC40	116.9	99.53	126.9
EC50	128.2	113.9	137.1

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	5	0.9600	0.8000	1.0000	0.0894	9.32%	0.0%	24/25	0.96	0.0%
56		5	0.9600	0.8000	1.0000	0.0894	9.32%	0.0%	24/25	0.96	0.0%
100		5	0.7200	0.6000	0.8000	0.1095	15.21%	25.0%	18/25	0.72	25.0%
180		5	0.0400	0.0000	0.2000	0.0894	223.60%	95.83%	1/25	0.04	95.83%
320		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/25	0	100.0%
560		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/25	0	100.0%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	1.0000
100		0.8000	0.6000	0.6000	0.8000	0.8000
180		0.2000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

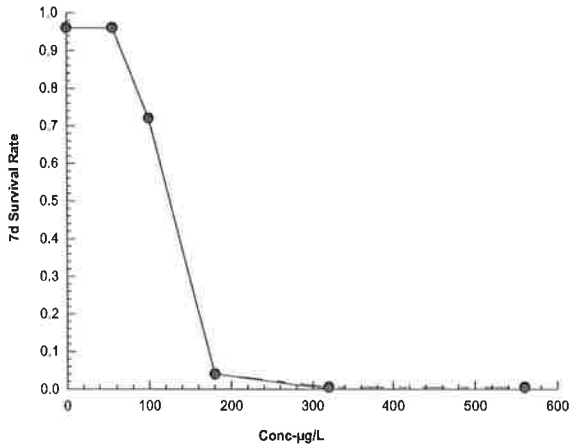
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	5/5
100		4/5	3/5	3/5	4/5	4/5
180		1/5	0/5	0/5	0/5	0/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	05-4569-9301	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-0319-9578	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO **Age:**
Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.542	0.85	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	65.86	n/a	86.26
IC10	76.09	0.946	113.3
IC15	86.32	15.33	115.2
IC20	96.55	29.71	117.8
IC25	103.8	66.45	121.8
IC40	121.1	99.62	136.2
IC50	132.6	113.5	151.7

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	N	5	1.542	1.168	1.948	0.2861	18.56%	0.0%	1.542	0.0%
56		5	1.539	1.198	2.018	0.383	24.88%	0.18%	1.539	0.18%
100		5	1.208	0.938	1.358	0.19	15.73%	21.69%	1.208	21.69%
180		5	0.1376	0	0.688	0.3077	223.60%	91.08%	0.1376	91.08%
320		5	0	0	0	0		100.0%	0	100.0%
560		5	0	0	0	0		100.0%	0	100.0%

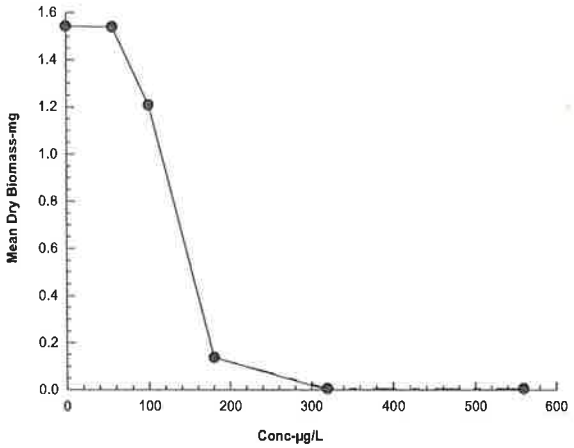
Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.418	1.548	1.168	1.948	1.628
56		1.198	1.372	2.018	1.228	1.88
100		1.358	0.938	1.076	1.32	1.346
180		0.688	0	0	0	0
320		0	0	0	0	0
560		0	0	0	0	0

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-0319-9578	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.5
Analyzed:	10 Dec-19 9:34	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	03-4012-7680	**Test Type:**	Growth-Survival (7d)	**Analyst:**			
Start Date:	27 Nov-19 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	04 Dec-19 14:47	**Species:**	Atherinops affinis	**Brine:**	Not Applicable		
Test Length:	7d	**Taxon:**	Actinopterygii	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	14-8015-9932	**Code:**	TOPS112719	**Project:**	REF TOX
Sample Date:	27 Nov-19 15:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.163	6.659	7.666	6.4	8.1	0.2129	0.6022	8.41%	0
56		8	7.075	6.584	7.566	6.2	8	0.2077	0.5874	8.3%	0
100		8	7.138	6.766	7.509	6.5	7.8	0.1569	0.4438	6.22%	0
180		8	7.225	6.894	7.556	6.6	7.9	0.1398	0.3955	5.47%	0
320		8	7.363	6.896	7.829	6.6	8.2	0.1972	0.5579	7.58%	0
560		2	6.65	-0.3384	13.64	6.1	7.2	0.55	0.7778	11.7%	0
Overall		42	7.167	7.004	7.329	6.1	8.2	0.08048	0.5216	7.28%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.313	7.243	7.382	7.2	7.5	0.0295	0.08344	1.14%	0
56		8	7.35	7.273	7.427	7.2	7.5	0.03273	0.09258	1.26%	0
100		8	7.363	7.3	7.425	7.3	7.5	0.0263	0.0744	1.01%	0
180		8	7.363	7.3	7.425	7.3	7.5	0.0263	0.0744	1.01%	0
320		8	7.375	7.301	7.449	7.3	7.5	0.03134	0.08864	1.2%	0
560		2	7.4	6.129	8.671	7.3	7.5	0.1	0.1414	1.91%	0
Overall		42	7.355	7.329	7.381	7.2	7.5	0.01284	0.08323	1.13%	0 (0%)

Salinity-ppt

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	25	25	25	25	25	0	0	0.0%	0
56		8	25	25	25	25	25	0	0	0.0%	0
100		8	25	25	25	25	25	0	0	0.0%	0
180		8	25	25	25	25	25	0	0	0.0%	0
320		8	25	25	25	25	25	0	0	0.0%	0
560		2	25	25	25	25	25	0	0	0.0%	0
Overall		42	25	25	25	25	25	0	0	0.00%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	21	21	21	21	21	0	0	0.0%	0
56		8	21	21	21	21	21	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
180		8	21	21	21	21	21	0	0	0.0%	0
320		8	21	21	21	21	21	0	0	0.0%	0
560		2	21	21	21	21	21	0	0	0.0%	0
Overall		42	21	21	21	21	21	0	0	0.00%	0 (0%)

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.1					
56				7.2					
100				7.2					
180				7.2					
320				7.2					
560				7.2					
0	N	2		7					
56				7.4					
100				7.4					
180				7.4					
320				7.3					
560				6.1					
0	N	3		6.4					
56				6.3					
100				6.5					
180				6.6					
320				6.6					
0	N	4		7.8					
56				7.2					
100				7.3					
180				7.4					
320				7.4					
0	N	5		7.4					
56				7.3					
100				7.3					
180				7.3					
320				7.3					
0	N	6		8.1					
56				8					
100				7.8					
180				7.9					
320				8.1					
0	N	7		7.1					
56				7					
100				7.1					
180				7.2					
320				8.2					
0	N	8		6.4					
56				6.2					
100				6.5					
180				6.8					
320				6.8					

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

pH-Units

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.3					
56				7.3					
100				7.3					
180				7.3					
320				7.3					
560				7.3					
0	N	2		7.3					
56				7.4					
100				7.4					
180				7.4					
320				7.4					
560				7.5					
0	N	3		7.3					
56				7.3					
100				7.3					
180				7.3					
320				7.3					
0	N	4		7.3					
56				7.4					
100				7.4					
180				7.4					
320				7.5					
0	N	5		7.3					
56				7.4					
100				7.4					
180				7.4					
320				7.4					
0	N	6		7.3					
56				7.3					
100				7.3					
180				7.3					
320				7.3					
0	N	7		7.5					
56				7.5					
100				7.5					
180				7.5					
320				7.5					
0	N	8		7.2					
56				7.2					
100				7.3					
180				7.3					
320				7.3					

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Salinity-ppt

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		25					
56				25					
100				25					
180				25					
320				25					
560				25					
0	N	2		25					
56				25					
100				25					
180				25					
320				25					
560				25					
0	N	3		25					
56				25					
100				25					
180				25					
320				25					
0	N	4		25					
56				25					
100				25					
180				25					
320				25					
0	N	5		25					
56				25					
100				25					
180				25					
320				25					
0	N	6		25					
56				25					
100				25					
180				25					
320				25					
0	N	7		25					
56				25					
100				25					
180				25					
320				25					
0	N	8		25					
56				25					
100				25					
180				25					
320				25					

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Temperature-°C

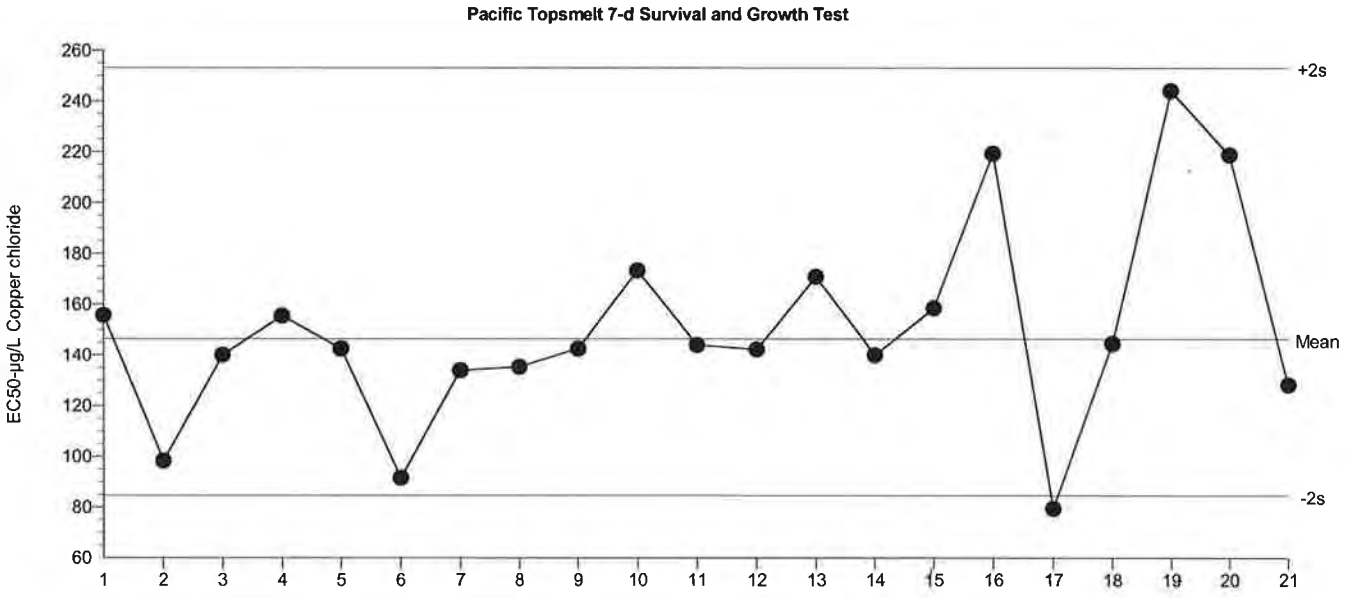
Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		21					
56				21					
100				21					
180				21					
320				21					
560				21					
0	N	2		21					
56				21					
100				21					
180				21					
320				21					
560				21					
0	N	3		21					
56				21					
100				21					
180				21					
320				21					
0	N	4		21					
56				21					
100				21					
180				21					
320				21					
0	N	5		21					
56				21					
100				21					
180				21					
320				21					
0	N	6		21					
56				21					
100				21					
180				21					
320				21					
0	N	7		21					
56				21					
100				21					
180				21					
320				21					
0	N	8		21					
56				21					
100				21					
180				21					
320				21					

CETIS QC Plot

Report Date: 18 Dec-19 14:37 (1 of 1)

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Growth-Survival (7d)	**Organism:**	Atherinops affinis (Topsmelt)	**Material:**	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	7d Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	146.3	**Count:**	20	**-2s Warning Limit:**	84.59	**-2s Action Limit:**	84.59
Sigma:	n/a	**CV:**	27.90%	**+2s Warning Limit:**	253.2	**+2s Action Limit:**	253.2

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	May	7	13:15	155.7	9.364	0.2263			10-2107-5445	19-7435-3618
2			9	15:15	98.31	-48.04	-1.452			08-0198-4581	01-2274-5698
3		Jun	6	15:50	140	-6.35	-0.1618			11-5630-0132	13-9906-8644
4			11	14:55	155.4	9.035	0.2185			17-9417-9588	03-5280-7573
5		Jul	9	15:45	142.5	-3.85	-0.09726			20-0886-0392	12-8695-4603
6			16	16:00	91.54	-54.81	-1.712			18-1941-4693	16-9341-2113
7		Aug	6	14:00	134	-12.35	-0.3216			05-2334-2175	12-4728-6403
8			13	16:10	135.4	-10.97	-0.2841			14-4952-3647	15-8913-1108
9			27	16:35	142.5	-3.85	-0.09726			20-0080-6919	19-1252-0275
10		Sep	5	15:15	173.3	26.98	0.6174			02-8657-5314	12-9172-3146
11			10	13:30	144	-2.35	-0.05905			02-3696-8630	13-2655-3744
12			17	14:00	142.2	-4.128	-0.1044			06-7417-4062	16-9616-7321
13			25	15:10	170.8	24.42	0.563			12-0851-4379	20-6716-4308
14		Oct	8	15:00	140	-6.35	-0.1618			07-7852-2338	11-7131-2473
15			15	16:00	158.5	12.11	0.2901			04-5099-7868	03-1624-1046
16			16	15:10	219.4	73.03	1.477			07-2524-7411	19-2341-7985
17			22	12:50	79.38	-66.97	-2.232	(-)	(-)	03-4531-8167	05-5758-3123
18		Nov	5	13:40	144.4	-1.905	-0.04781			18-2510-8716	15-0213-2548
19			19	10:57	244.2	97.82	1.867			11-1936-8695	13-8359-2252
20			20	13:25	218.9	72.54	1.469			11-5158-8943	13-1061-2154
21			27	15:00	128.2	-18.11	-0.4821			05-5806-1682	05-4569-9301

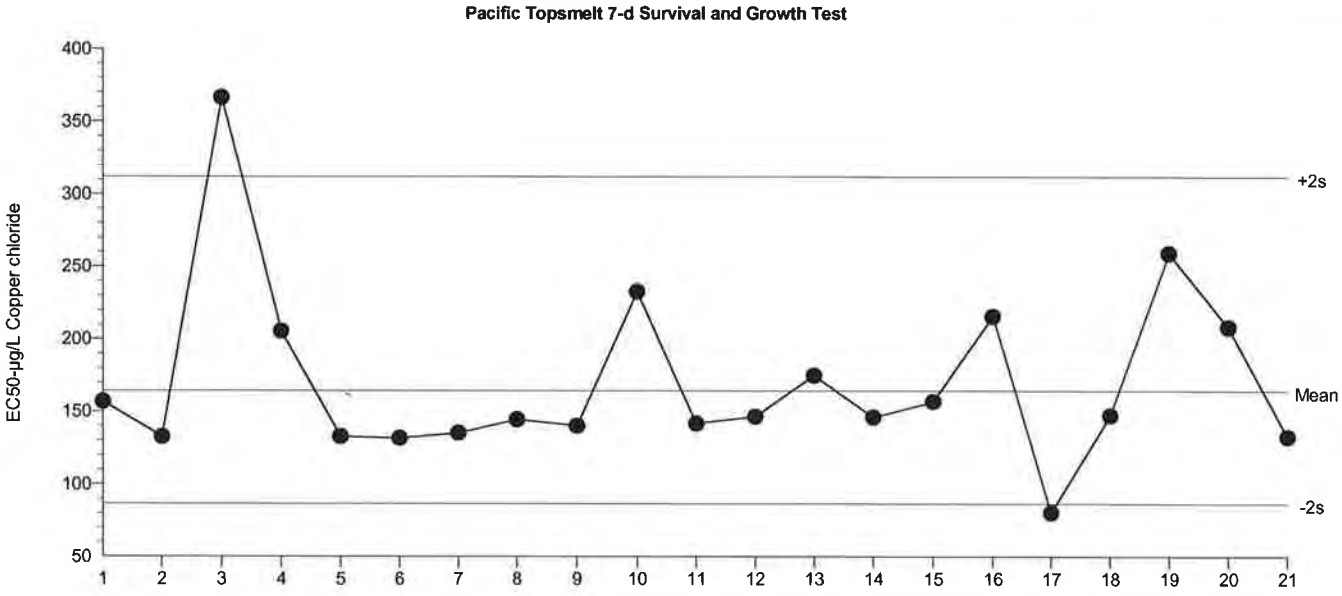
Analyst: _____ QA: _____

CETIS QC Plot

Report Date: 18 Dec-19 14:37 (1 of 1)

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Test Type:	Growth-Survival (7d)	**Organism:**	Atherinops affinis (Topsmelt)	**Material:**	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Mean Dry Biomass-mg	**Source:**	Reference Toxicant-REF



Mean:	164.2	**Count:**	20	**-2s Warning Limit:**	86.45	**-2s Action Limit:**	86.45
Sigma:	n/a	**CV:**	32.90%	**+2s Warning Limit:**	311.8	**+2s Action Limit:**	311.8

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	May	7	13:15	156.9	-7.28	-0.1414			10-2107-5445	14-8443-8544
2			9	15:15	132.6	-31.55	-0.6654			08-0198-4581	18-1243-0505
3		Jun	6	15:50	366.6	202.4	2.504	(+)	(+)	11-5630-0132	19-3120-3606
4			11	14:55	205.5	41.36	0.7006			17-9417-9588	02-8099-4559
5		Jul	9	15:45	132.8	-31.4	-0.6618			20-0886-0392	21-1256-6481
6			16	16:00	131.8	-32.44	-0.6863			18-1941-4693	09-1451-6718
7		Aug	6	14:00	135.3	-28.88	-0.6032			05-2334-2175	16-1947-9352
8			13	16:10	144.5	-19.66	-0.3978			14-4952-3647	20-3689-3502
9			27	16:35	140.3	-23.94	-0.4913			20-0080-6919	17-1686-3051
10		Sep	5	15:15	232.6	68.45	1.087			02-8657-5314	17-3364-9645
11			10	13:30	141.8	-22.39	-0.4571			02-3696-8630	05-4759-2745
12			17	14:00	146.6	-17.54	-0.3523			06-7417-4062	15-2156-3990
13			25	15:10	174.8	10.65	0.196			12-0851-4379	03-0592-9948
14		Oct	8	15:00	146.1	-18.04	-0.363			07-7852-2338	03-7579-4645
15			15	16:00	157	-7.152	-0.1389			04-5099-7868	18-0244-5593
16			16	15:10	215.8	51.63	0.8526			07-2524-7411	10-1204-9378
17			22	12:50	80.25	-83.93	-2.232	(-)	(-)	03-4531-8167	09-9950-6147
18		Nov	5	13:40	147.3	-16.84	-0.3374			18-2510-8716	16-6979-4214
19			19	10:57	259.2	95.04	1.424			11-1936-8695	03-9361-1023
20			20	13:25	208.3	44.08	0.7416			11-5158-8943	17-8842-8870
21			27	15:00	132.6	-31.54	-0.6652			05-5806-1682	17-0319-9578

CHEMICAL ANALYSIS
STD TOX-TOPS

Start Date: 11/27/19 1500 25ppt
End Date: 12/4/19 1447
YSI used: B
Lab # : TOPS 112719
Date Rec'd:
Sample used for renewal: B B B B B B B

Day	11/27 0	11/28 1	11/29 2	11/30 3	12/1 4	12/2 5	12/3 6	12/4 7
Analyst Int.	[illegible]	0910 NR	1127 AR	0850 [illegible]	0900 [illegible]	1020 NR	1400 AR	[illegible]

DISSOLVED OXYGEN (mg/L)

CONTROL	7.1	6.7	7.0	6.2	6.4	6.9	7.8	6.9	7.4	6.7	8.1	6.0	7.1	6.4
56	7.2	6.2	7.4	6.1	6.3	7.4	7.2	6.5	7.3	6.5	8.0	5.8	7.0	6.2
100	7.2	6.2	7.4	6.1	6.5	7.4	7.3	6.7	7.3	6.4	7.8	6.8	7.1	6.5
180	7.2	6.2	7.4	6.1	6.6	7.6	7.4	6.8	7.3	6.3	7.9	7.0	7.2	6.8
320	7.2	6.2	7.3	6.1	6.6	7.3	7.4	7.1	7.3	6.2	8.1	6.9	7.3	6.8
560	7.2	6.1												

TEMPERATURE (°C)

CONTROL	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
56	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
100	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
180	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
320	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
560	21.0	21.0												

pH

CONTROL	7.3	7.3	7.3	7.4	7.3	7.4	7.3	7.3	7.3	7.3	7.3	7.4	7.5	7.2
56	7.3	7.5	7.4	7.4	7.3	7.4	7.4	7.3	7.4	7.4	7.3	7.4	7.5	7.2
100	7.3	7.5	7.4	7.5	7.3	7.4	7.4	7.3	7.4	[illegible]	7.3	7.4	7.5	7.3
180	7.3	7.5	7.4	7.5	7.3	7.4	7.4	7.3	7.4	7.4	7.3	7.5	7.5	7.3
320	7.3	7.5	7.4	7.5	7.3	7.4	7.5	7.3	7.4	7.4	7.3	7.5	7.5	7.3
560	7.3	7.5												

SALINITY (ppt)

CONTROL	25	25	25	25	25	25	25	25
56	25	25	25	25	25	25	25	25
100	25	25	25	25	25	25	25	25
180	25	25	25	25	25	25	25	25
320	25	25	25	25	25	25	25	25
560	25	25						

NOTES:

Aquatic Bioassay Consulting Laboratories, Inc.
QC: [illegible]

TOPSMELT SURVIVAL

Company: STD TOX

Sample ID: **Lab#:**

Start Date: 11/27/19

End Date: 12/4/19

Daily # of Surviving Fish									
Concentration	**Rep. #**	**Initial**	**1**	**2**	**3**	**4**	**5**	**6**	**Final**
CON	1	5	5	5	5	5	5	4	4
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5
56	1	5	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5	5
	4	5	5	5	5	4	4	4	4
	5	5	5	5	5	5	5	5	5
100	1	5	5	4	4	4	4	4	4
	2	5	5	5	5	5	4	3	3
	3	5	5	4	4	4	3	3	3
	4	5	5	5	5	5	4	4	4
	5	5	5	5	5	5	4	4	4
180	1	5	5	5	4	3	1	1	1
	2	5	5	2	1	0			
	3	5	5	3	1	1	0		
	4	5	4	2	0				
	5	5	5	3	3	3	1	0	
320	1	5	5	4	2	2	2	0	
	2	5	5	4	3	1	1	0	
	3	5	5	5	2	2	1	1	0
	4	5	5	4	1	0			
	5	5	4	1	0				
560	1	5	0						
	2	5	0						
	3	5	0						
	4	5	0						
	5	5	0						

Aquatic Bioassay & Consulting Laboratories, Inc.

QC: LP

TOPSMELT GROWTH 25pmK

Company: STD TOX 11/27/19 **Lab#:**

Sample ID:

Chamber #	Eff Conc.	Rep. #	Number Fish	Boat Tare	Boat + Fish	Fish Wt. (mg)	Average Weight Per Fish (mg)
XG 1	CON	1		1.14078	1.14787	0.00709	
2		2		1.12833	1.13607	0.00774	
3		3		1.13173	1.13987	0.00814	
4		4		1.13522	1.14496	0.00974	
5		5		1.14586	1.15400	0.00814	
XG 6	56	1		1.14253	1.15185	0.00599	
7		2		1.15020	1.15706	0.00686	
8		3		1.13881	1.14890	0.01009	
9		4		1.12513	1.13127	0.00614	
10		5		1.14581	1.15521	0.00940	
XG 11	100	1		1.13649	1.14328	0.00679	
12		2		1.15137	1.15608	0.00469	
13		3		1.13594	1.14132	0.00538	
14		4		1.13250	1.13916	0.00666	
15		5		1.14769	1.15442	0.00673	
XG 16	180	1		1.14028	1.14372	0.00344	
		2					
		3					
		4					
		5					
	320	1					
		2					
		3					
		4					
		5					
	560	1					
		2					
		3					
		4					
		5					

Aquatic Bioassay & Consulting Laboratories, Inc.

QC:

aquatic bioassay & consulting laboratories, inc

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: 30 November 2019

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35. 23 ug/l
EC50 = 45.91 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CETIS Summary Report

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

Batch ID:	18-3559-1385	**Test Type:**	Fertilization	**Analyst:**			
Start Date:	30 Nov-19 07:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater		
Ending Date:	30 Nov-19 07:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable		
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive	**Age:**	
Sample ID:	20-0125-6463	**Code:**	URC113019	**Project:**			
Sample Date:	30 Nov-19 07:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant		
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX		
Sample Age:	n/a	**Client:**	Internal Lab				

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	TU	PMSD	S
13-2351-3966	Fertilization Rate	Dunnett Multiple Comparison Test		18	32	24		5.52%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	TU	S
03-2843-3598	Fertilization Rate	Linear Interpolation (ICPIN)		EC5	22.01	19.57	23.27		1
				EC10	26.03	23.67	28.65		
				EC15	30.04	26.83	33.52		
				EC20	33.09	30.34	34.97		
				EC25	35.23	33	36.98		
				EC40	41.63	40.02	42.96		
				EC50	45.91	44.46	47.07		

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
03-2843-3598	Fertilization Rate	Control Resp	0.93	0.7	>>	Yes	Passes Criteria
13-2351-3966	Fertilization Rate	Control Resp	0.93	0.7	>>	Yes	Passes Criteria
13-2351-3966	Fertilization Rate	PMSD	0.05518	<<	0.25	No	Passes Criteria

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.9300	0.8956	0.9644	0.9100	0.9600	0.0108	0.0216	2.32%	0.00%
18		4	0.9475	0.8949	1.0000	0.9100	0.9800	0.0165	0.0330	3.49%	-1.88%
32		4	0.7750	0.7273	0.8227	0.7300	0.7900	0.0150	0.0300	3.87%	16.67%
56		4	0.2475	0.2077	0.2873	0.2100	0.2600	0.0125	0.0250	10.10%	73.39%
100		4	0.0850	0.0262	0.1438	0.0400	0.1300	0.0185	0.0370	43.49%	90.86%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9200	0.9600
18		0.9300	0.9800	0.9700	0.9100
32		0.7900	0.7300	0.7900	0.7900
56		0.2600	0.2600	0.2600	0.2100
100		0.0900	0.0800	0.0400	0.1300
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	92/100	96/100
18		93/100	98/100	97/100	91/100
32		79/100	73/100	79/100	79/100
56		26/100	26/100	26/100	21/100
100		9/100	8/100	4/100	13/100
180		0/100	0/100	0/100	0/100

Analyst: LM QA: Pass

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

Analysis ID:	13-2351-3966	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:33	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	18-3559-1385	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Nov-19 07:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Nov-19 07:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive **Age:**
Sample ID:	20-0125-6463	**Code:**	URC113019	**Project:**	
Sample Date:	30 Nov-19 07:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	18	32	24		5.52%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	18	-1.119	2.356	0.091	6	CDF	0.9815	Non-Significant Effect
	32*	5.94	2.356	0.091	6	CDF	5.0E-05	Significant Effect
	56*	20.42	2.356	0.091	6	CDF	7.9E-07	Significant Effect
	100*	26.4	2.356	0.091	6	CDF	7.9E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.93	0.7	>>	Yes	Passes Criteria
PMSD	0.05518	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.65065	0.912662	4	308.5	<1.0E-37	Significant Effect
Error	0.0443817	0.0029588	15			
Total	3.69503		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.451	13.28	0.4853	Equal Variances
	Levene Equality of Variance Test	1.675	4.893	0.2078	Equal Variances
	Mod Levene Equality of Variance Test	1.572	4.893	0.2327	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4969	3.878	0.2164	Normal Distribution
	D'Agostino Kurtosis Test	0.3944	2.576	0.6933	Normal Distribution
	D'Agostino Skewness Test	0.2926	2.576	0.7698	Normal Distribution
	D'Agostino-Pearson K2 Omnibus Test	0.2412	9.21	0.8864	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1661	0.2235	0.1566	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9502	0.866	0.3694	Normal Distribution

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9300	0.8956	0.9644	0.9250	0.9100	0.9600	0.0108	2.32%	0.00%
18		4	0.9475	0.8949	1.0000	0.9500	0.9100	0.9800	0.0165	3.49%	-1.88%
32		4	0.7750	0.7273	0.8227	0.7900	0.7300	0.7900	0.0150	3.87%	16.67%
56		4	0.2475	0.2077	0.2873	0.2600	0.2100	0.2600	0.0125	10.10%	73.39%
100		4	0.0850	0.0262	0.1438	0.0850	0.0400	0.1300	0.0185	43.49%	90.86%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Analyst: _____ QA: _____

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

Analysis ID:	13-2351-3966	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:33	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.306	1.234	1.377	1.294	1.266	1.369	0.02256	3.46%	0.00%
18		4	1.349	1.227	1.471	1.35	1.266	1.429	0.03835	5.69%	-3.30%
32		4	1.077	1.021	1.133	1.095	1.024	1.095	0.01759	3.27%	17.50%
56		4	0.5203	0.4733	0.5673	0.5351	0.476	0.5351	0.01476	5.67%	60.15%
100		4	0.2904	0.1805	0.4003	0.2957	0.2014	0.3689	0.03452	23.78%	77.76%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.17%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9200	0.9600
18		0.9300	0.9800	0.9700	0.9100
32		0.7900	0.7300	0.7900	0.7900
56		0.2600	0.2600	0.2600	0.2100
100		0.0900	0.0800	0.0400	0.1300
180		0.0000	0.0000	0.0000	0.0000

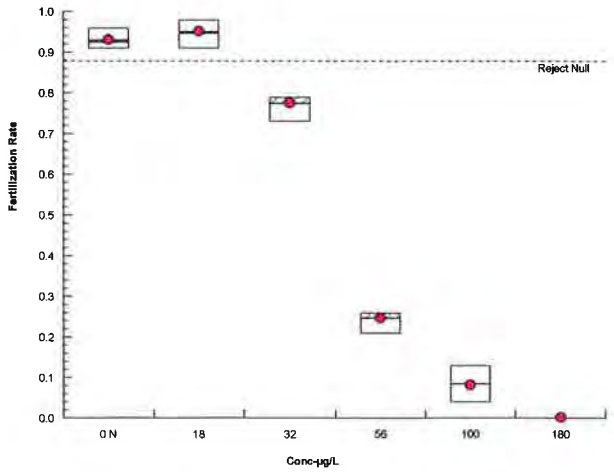
Angular (Corrected) Transformed Detail

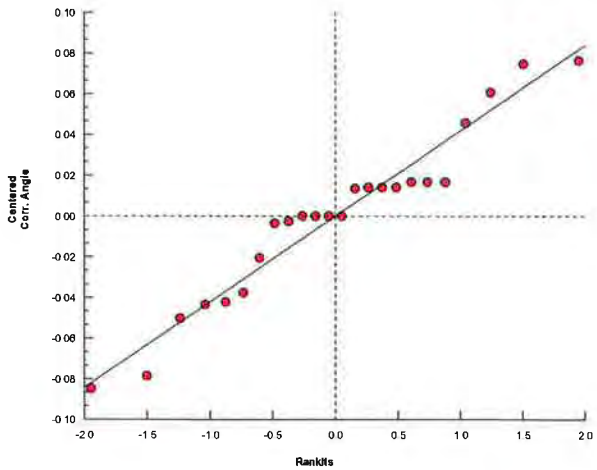
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.266	1.303	1.284	1.369
18		1.303	1.429	1.397	1.266
32		1.095	1.024	1.095	1.095
56		0.5351	0.5351	0.5351	0.476
100		0.3047	0.2868	0.2014	0.3689
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	92/100	96/100
18		93/100	98/100	97/100	91/100
32		79/100	73/100	79/100	79/100
56		26/100	26/100	26/100	21/100
100		9/100	8/100	4/100	13/100
180		0/100	0/100	0/100	0/100

Graphics





Analyst:_____ QA:_____

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

Analysis ID:	03-2843-3598	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	18-3559-1385	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	30 Nov-19 07:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Nov-19 07:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive **Age:**
Sample ID:	20-0125-6463	**Code:**	URC113019	**Project:**	
Sample Date:	30 Nov-19 07:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.93	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	22.01	19.57	23.27
EC10	26.03	23.67	28.65
EC15	30.04	26.83	33.52
EC20	33.09	30.34	34.97
EC25	35.23	33	36.98
EC40	41.63	40.02	42.96
EC50	45.91	44.46	47.07

Fertilization Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	N	4	0.9300	0.9100	0.9600	0.0216	2.32%	0.0%	372/400	0.9388	0.0%
18		4	0.9475	0.9100	0.9800	0.0330	3.49%	-1.88%	379/400	0.9388	0.0%
32		4	0.7750	0.7300	0.7900	0.0300	3.87%	16.67%	310/400	0.775	17.44%
56		4	0.2475	0.2100	0.2600	0.0250	10.10%	73.39%	99/400	0.2475	73.64%
100		4	0.0850	0.0400	0.1300	0.0370	43.49%	90.86%	34/400	0.085	90.95%
180		4	0.0000	0.0000	0.0000	0.0000		100.0%	0/400	0	100.0%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9200	0.9600
18		0.9300	0.9800	0.9700	0.9100
32		0.7900	0.7300	0.7900	0.7900
56		0.2600	0.2600	0.2600	0.2100
100		0.0900	0.0800	0.0400	0.1300
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

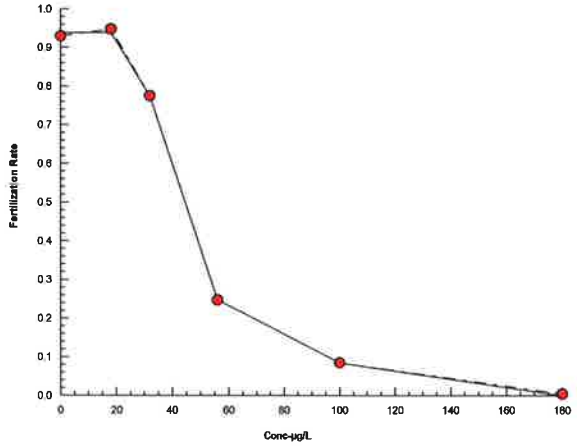
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	92/100	96/100
18		93/100	98/100	97/100	91/100
32		79/100	73/100	79/100	79/100
56		26/100	26/100	26/100	21/100
100		9/100	8/100	4/100	13/100
180		0/100	0/100	0/100	0/100

Analyst:_____ QA:_____

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

Analysis ID:	03-2843-3598	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	18 Dec-19 11:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



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

Batch ID:	18-3559-1385	**Test Type:**	Fertilization	**Analyst:**		
Start Date:	30 Nov-19 07:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater	
Ending Date:	30 Nov-19 07:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable	
Test Length:	40m	**Taxon:**	Echinoidea	**Source:**	Ventura Dive	**Age:**

Sample ID:	20-0125-6463	**Code:**	URC113019	**Project:**		
Sample Date:	30 Nov-19 07:00	**Material:**	Copper chloride	**Source:**	Reference Toxicant	
Receipt Date:		**CAS (PC):**		**Station:**	REF TOX	
Sample Age:	n/a	**Client:**	Internal Lab			

Parameter Acceptability Criteria

Parameter	Min	Max	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.7	14.8	11	13	Yes	Above Criteria

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
18		2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
32		2	6.5	5.229	7.771	6.4	6.6	0.1	0.1414	2.18%	0
56		2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
100		2	6.6	2.788	10.41	6.3	6.9	0.3	0.4243	6.43%	0
180		2	6.5	2.688	10.31	6.2	6.8	0.3	0.4243	6.53%	0
Overall		12	6.525	6.343	6.707	6.1	6.9	0.08269	0.2864	4.39%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
56		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		12	7.9	7.9	7.9	7.9	7.9	0	0	0.00%	0 (0%)

Salinity-ppt

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
56		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
18		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
32		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
56		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
180		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75	14.72	14.78	14.7	14.8	0.01508	0.05222	0.35%	0 (0%)

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

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		6.8					
18				6.8					
32				6.6					
56				6.8					
100				6.9					
180				6.8					
0	N	2		6.3					
18				6.1					
32				6.4					
56				6.3					
100				6.3					
180				6.2					

pH-Units

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
18				7.9					
32				7.9					
56				7.9					
100				7.9					
180				7.9					
0	N	2		7.9					
18				7.9					
32				7.9					
56				7.9					
100				7.9					
180				7.9					

Salinity-ppt

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		34					
18				34					
32				34					
56				34					
100				34					
180				34					
0	N	2		34					
18				34					
32				34					
56				34					
100				34					
180				34					

Analyst: _____ QA: _____

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

Temperature-°C

Conc-µg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
18				14.8					
32				14.8					
56				14.8					
100				14.8					
180				14.8					
0	N	2		14.7					
18				14.7					
32				14.7					
56				14.7					
100				14.7					
180				14.7					

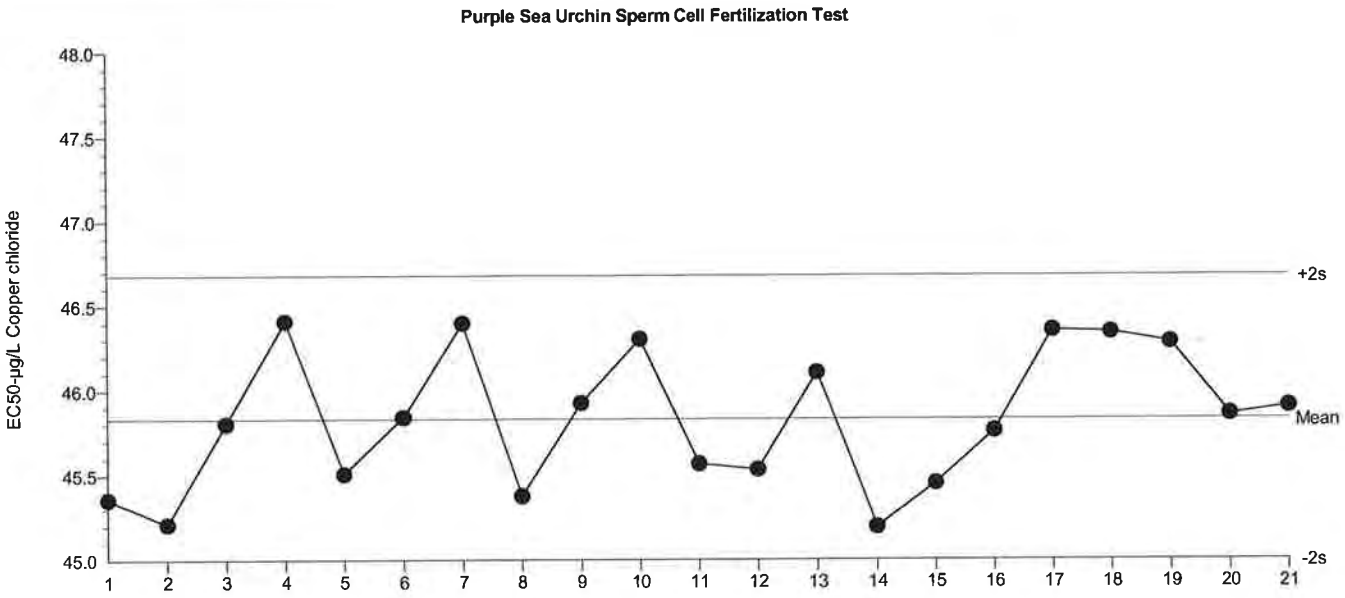
Analyst: _____ QA: _____

CETIS QC Plot

Report Date: 18 Dec-19 14:38 (1 of 1)

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

Test Type:	Fertilization	**Organism:**	Strongylocentrotus purpuratus (Purpl	**Material:**	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Fertilization Rate	**Source:**	Reference Toxicant-REF



Mean:	45.83	**Count:**	20	**-2s Warning Limit:**	45	**-2s Action Limit:**	45
Sigma:	n/a	**CV:**	0.92%	**+2s Warning Limit:**	46.68	**+2s Action Limit:**	46.68

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Jul	10	14:00	45.36	-0.4753	-1.139			15-7461-0298	03-3783-6547
2			12	14:01	45.21	-0.6218	-1.492			17-2308-1276	13-3736-3957
3			16	16:01	45.81	-0.02725	-0.06498			19-8747-1339	15-2875-7177
4			18	15:00	46.41	0.5787	1.371			06-3163-7239	08-9084-2043
5		Aug	7	15:00	45.51	-0.3254	-0.7786			03-3923-7426	02-6220-2844
6			13	14:00	45.84	0.01124	0.02678			00-8755-6532	20-0557-6890
7			15	16:01	46.4	0.5672	1.344			13-9757-3316	11-4255-6820
8			27	16:00	45.38	-0.4544	-1.089			13-8352-3243	18-1630-5503
9			28	15:00	45.93	0.09381	0.2234			06-2248-6248	18-1375-3404
10		Sep	6	15:00	46.3	0.4705	1.116			12-8574-8538	15-1399-2653
11			10	15:00	45.57	-0.2652	-0.6342			17-6078-0130	17-8851-1597
12			12	13:00	45.53	-0.2992	-0.7156			16-7991-3964	10-3069-4852
13			17	15:00	46.11	0.273	0.6488			18-7789-8960	08-7999-1969
14			18	16:00	45.19	-0.6384	-1.533			03-6683-5135	17-0993-4446
15		Oct	8	14:00	45.45	-0.3799	-0.9094			18-1199-2167	12-5173-7500
16			10	14:00	45.76	-0.06977	-0.1664			12-2676-5398	04-8701-7614
17			15	15:00	46.36	0.5223	1.238			18-7085-2743	10-9171-0735
18			16	14:00	46.34	0.5114	1.212			06-4749-9588	00-1638-0789
19			22	15:00	46.29	0.4529	1.074			02-6779-8752	00-3761-4387
20		Nov	19	15:00	45.86	0.02635	0.06281			13-1556-2330	19-4343-0923
21			30	7:00	45.91	0.07241	0.1725			09-1870-1451	03-2843-3598

Analyst: QA:

Appendix J. Dry-Weather Analytical Monitoring Results

	Site ID	Port Hueneme-3	Unincorporated-4	Camarillo-1	Fillmore-1
		DRY-HUE3	DRY-UNI4	MO-CAM	MO-FIL
	At Major Outfall?	No	No	Yes	Yes
	Location	Bubbling Springs @ RR xing	Arroyo Santa Rosa at Box Canyon confluence	Camarillo Hills Drain	North Fillmore Drain
	Date	08/10/20	08/11/20	08/11/20	08/10/20
	Time	14:10	10:00	8:00	11:00
Site Description	**Conveyence Type**	Natural channel	Box culvert	Box culvert	Box culvert
	Dimensions	N/A	N/A	8' x 24'	N/A
	Dominant Land Use	Commercial & residential	Residential & rural	Commercial & residential	Residential
	Site Elevation	0	257	104	430
Weather	**Weather**	Clear	Partly Cloudy	Overcast	Clear
	Wind Condtion	Calm	Slight Breeze	Slight breeze	Slight breeze
	Air Temp. (ºC)	26	21	15.5	27
Trash	**Trash (general area)**	None	Light	Light	Light
	Trash (stream banks)	Light	None	Light	Moderate
Observations	**Water Clarity**	Cloudy	Clear	Clear	Clear
	Water Color	Clear	Clear	Clear	Clear
	Odors	None	None	None	None
	Floatables	Other	None	None	None
	Foam	None	None	None	None
	Stains/ deposits	None	None	Dark algae on channel	None
	Structural condition	Natural channel	Concrete channel	Concrete channel	Rip rap with concrete bottom
	Vegetation Condition	Grass on banks, weeds	Reeds/aquatic plants	Grasses	Small grasses and reeds
	Biology	Many ducks (~100) in area and at sample site	Tadpole/aquatic snails	Aquatic snails	Aquatic snails
	Algae (suspended)	None	Green 40%	None	Green 40%
	Algae (substrate)	None	Green 40%	Green 5%	Green 100%
Water Chemistry (Field)	**Dissolved Oxygen (%)**	27.4	132.3	117.2	263.9
	Dissolved Oxygen (mg/L)	2.25	13.40	10.89	19.22
	Conductivity (µS)	7470	1212	796	1483
	Specific Conductance (µS)	7540	1359	901	1415
	Salinity (ppt)	4.1	0.7	0.4	0.7
	Water Temp. (ºC)	24.7	19.3	18.9	27.5
	Water Temp. (ºF)	76.5	66.7	66.0	81.5
	pH	7.40	8.57	8.40	8.73
	Turbidity (NTU)	27.5	2.88	8.45	1.11
Water Chemistry (Lab)	**Total Organic Carbon (mg/L)**	6.4	12	6.1	4.6
	Total Hardness as $CaCO_3$ (mg/L)	1,410	518	320	591
	Total Calcium (mg/L)	286	76.2	83.8	151
	Total Magnesium (mg/L)	168	79.7	26.8	52.3
	Dissolved Copper (µg/L)	0.35	5.1	3.3	4.0
	Dissolved Lead (µg/L)	0.12	0.031	0.049	<0.031
	Dissolved Zinc (µg/L)	<1.9	4.8	2.4	2.8
	Total Coliform (MPN/100 mL)	8,600	579,400	>2,419,600	8,164
	***E. coli* (MPN/100 mL)**	24,196	5,172	9,208	809
Estimated Flow	**Flow Status**	Flowing	Flowing	Flowing	Flowing
	Water Width (ft.)	20.0	8.0	3.0	3.0
	Water Depth (ft.)	Unknown	0.20	0.01	0.10
	Flow Velocity (ft/s)	Unmeasurable (upstream from wind)	<0.1	0.50	0.60
	Flow Rate (ft^3/s)	<0.1	0.15	<0.1	0.20
	Comments	Floatables sheen and solids - bird poop/sloughed biofilm?	pH avg (8.56,8.58)		pH avg (8.73,8.73)

	Site ID	Moorpark-2	Ojai-6	Oxnard-2	Santa Paula-4
		DRY-MPK2	DRY-OJA6	DRY-OXN2	DRY-SPA4
	At Major Outfall?	No	No	No	No
	Location	Gabbert Drain	Tributary to Fox Barranca	Stroube Drain	Richmond Rd Drain
	Date	08/11/20	08/10/20	08/10/20	08/18/20
	Time	8:45	12:15	9:00	8:05
Site Description	Conveyence Type	Box culvert	Natural channel	Natural channel	Epoxy coated metal pipe
	Dimensions	5' x 12'	N/A	N/A	1'6"
	Dominant Land Use	Commercial & residential	Residential	Commercial & residential	Residential
	Site Elevation	445	720	70	343
Weather	Weather	Overcast	Clear	Overcast	Partly Cloudy
	Wind Condtion	Slight Breeze	Calm	Calm	Calm
	Air Temp. (ºC)	17	27	18	26
Trash	Trash (general area)	Moderate	Light	High	None
	Trash (stream banks)	Light	Light	Moderate	Light
Observations	Water Clarity	Clear	Clear	Clear	Clear
	Water Color	Clear	Clear	Clear	Clear
	Odors	None	None	None	None
	Floatables	None	None	None	None
	Foam	None	None	None	None
	Stains/ deposits	None	None	None	None
	Structural condition	Concrete channel	Natural channel	Concrete channel to rip rap	Pipe to concreted rip rap
	Vegetation Condition	None	Tree shade, small grasses	Watercress 80%	Some grasses
	Biology	None	Brown crayfish, small fish	Aquatic snails	None
	Algae (suspended)	None	None	Green 40%	None
	Algae (substrate)	Green 10%	None	Green 40%	Green 5%
Water Chemistry (Field)	Dissolved Oxygen (%)	107.8	78.9	86.8	N/A
	Dissolved Oxygen (mg/L)	10.15	7.18	8.07	N/A
	Conductivity (µS)	427.2	1244	1342	N/A
	Specific Conductance (µS)	487.8	1387	1526	N/A
	Salinity (ppt)	0.2	0.7	0.8	N/A
	Water Temp. (ºC)	18.8	19.6	18.7	23.5
	Water Temp. (ºF)	65.8	67.3	65.7	74.3
	pH	8.90	7.98	8.33	8.35
	Turbidity (NTU)	2.12	0.88	1.58	0.65
Water Chemistry (Lab)	Total Organic Carbon (mg/L)	7.1	1.8	6	3.9
	Total Hardness as $CaCO_3$ (mg/L)	144	575	591	617
	Total Calcium (mg/L)	34.4	156	152	161
	Total Magnesium (mg/L)	14.1	44.7	51.4	52.3
	Dissolved Copper (µg/L)	4.7	0.33	2.9	3.1
	Dissolved Lead (µg/L)	0.17	<0.031	<0.031	<0.031
	Dissolved Zinc (µg/L)	2.8	<0.94	4.8	6.2
	Total Coliform (MPN/100 mL)	141,360	3,076	6,370	9,804
	E. coli (MPN/100 mL)	1,374	404	2,755	<10
Estimated Flow	Flow Status	Flowing	Flowing	Flowing	Flowing
	Water Width (ft.)	4.0	4.0	10.0	0.3
	Water Depth (ft.)	<0.05	0.20	0.10	0.01
	Flow Velocity (ft/s)	<0.1	0.10	0.25	0.50
	Flow Rate (ft^3/s)	<0.1	<0.1	0.25	<0.01
	Comments	pH avg (8.90,8.89)			Flow too low for YSI 85 meter to read DO/conductivity/salinity

	Site ID	Simi Valley-1	Thousand Oaks-1	Ventura-5
		MO-SIM	MO-THO	DRY-VEN5
	At Major Outfall?	Yes	Yes	No
	Location	Bus Canyon Drain	North Fork Arroyo Conejo at Hill Canyon WWTP	Dent Drain
	Date	08/11/20	08/11/20	08/10/20
	Time	9:20	10:35	13:20
Site Description	Conveyence Type	Box culvert	Natural channel	Natural channel
	Dimensions	7' x 16'	N/A	7.5' x 20'(toe) x 35'(top)
	Dominant Land Use	Commercial & residential	Commercial, residential & rural	Residential & rural
	Site Elevation	757	283	66
Weather	Weather	Clear	Clear	Clear
	Wind Condtion	Slight Breeze	Slight Breeze	Slight breeze
	Air Temp. (ºC)	20	24	29
Trash	Trash (general area)	Light	Light	Moderate
	Trash (stream banks)	Light	Light	Light
Observations	Water Clarity	Clear	Clear	Clear
	Water Color	Clear	Clear	Clear
	Odors	Other	None	None
	Floatables	None	None	Other
	Foam	None	None	None
	Stains/ deposits	None	None	None
	Structural condition	Concrete channel	Rip-rap with natural bottom	Flap gate RCP to natural channel
	Vegetation Condition	None	Grasses/reeds on banks	River primrose and reeds
	Biology	Aquatic snail (1)	None	Small fish? Dragonflies
	Algae (suspended)	None	None	Green 50%
	Algae (substrate)	Green/brown 60%	Green <1%/Brown (dead) 70%	20%
Water Chemistry (Field)	Dissolved Oxygen (%)	116.4	93.4	41.5
	Dissolved Oxygen (mg/L)	10.60	8.79	4.57
	Conductivity (µS)	2597	1727	937
	Specific Conductance (µS)	2893	1992	948
	Salinity (ppt)	1.5	1.0	0.5
	Water Temp. (ºC)	19.7	18.1	24.2
	Water Temp. (ºF)	67.5	64.6	75.6
	pH	8.06	8.29	7.6
	Turbidity (NTU)	1.04	2.53	19.20
Water Chemistry (Lab)	Total Organic Carbon (mg/L)	2.7	4.3	12
	Total Hardness as $CaCO_3$ (mg/L)	1,190	764	434
	Total Calcium (mg/L)	295	118	122
	Total Magnesium (mg/L)	110	114	31.3
	Dissolved Copper (µg/L)	0.52	0.82	0.92
	Dissolved Lead (µg/L)	<0.031	<0.031	<0.031
	Dissolved Zinc (µg/L)	1.1	1.1	1.7
	Total Coliform (MPN/100 mL)	38,730	51,720	12,997
	E. coli (MPN/100 mL)	201	908	63
Estimated Flow	Flow Status	Flowing	Flowing	Flowing
	Water Width (ft.)	8.0	6.0	12.0
	Water Depth (ft.)	0.05	0.30	1.00
	Flow Velocity (ft/s)	0.50	1.000	~0
	Flow Rate (ft^3/s)	0.20	1.80	<0.1
	Comments	Urine odor		Floatables a little scum

Appendix K. Formulas for WQO determination

BASIN PLAN and CALIFORNIA TOXICS RULE OBJECTIVES: FORMULAS

AMMONIA (BASIN PLAN)

Basin Plan Ammonia Objective formula selection is based on wet or dry event, COLD/MIGR designation status, early life stages (ELS) status, and salinity.
See the flow charts below to determine which formula to use:

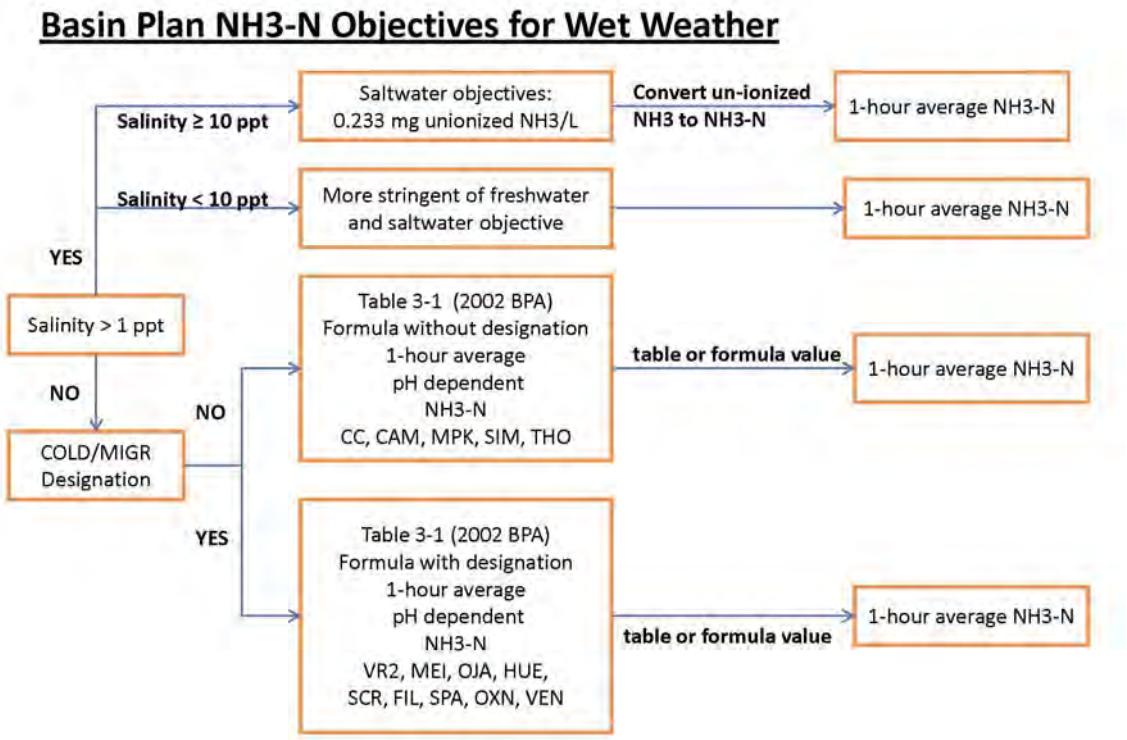


Table 3-1: One hour Average Objective for Ammonia-N for Freshwaters (mg N/L)

COLD and/or MIGR:

$$= \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

NOT COLD and/or MIGR:

$$= \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

Saltwater 1-hour objective for Ammonia-N

$$= 0.233 * (1 + 10^{\left[\left(9.245+0.116*\frac{19.9273*S}{1000-1.005109*S}\right)+0.0324(298-T)+\frac{(0.0415)P}{T}-pH\right]})$$

Where T= temperature expressed in °K (Note: Kelvin = Celsius + 273)
S = salinity (ppt)
P = pressure (assumed to be 1 atm)

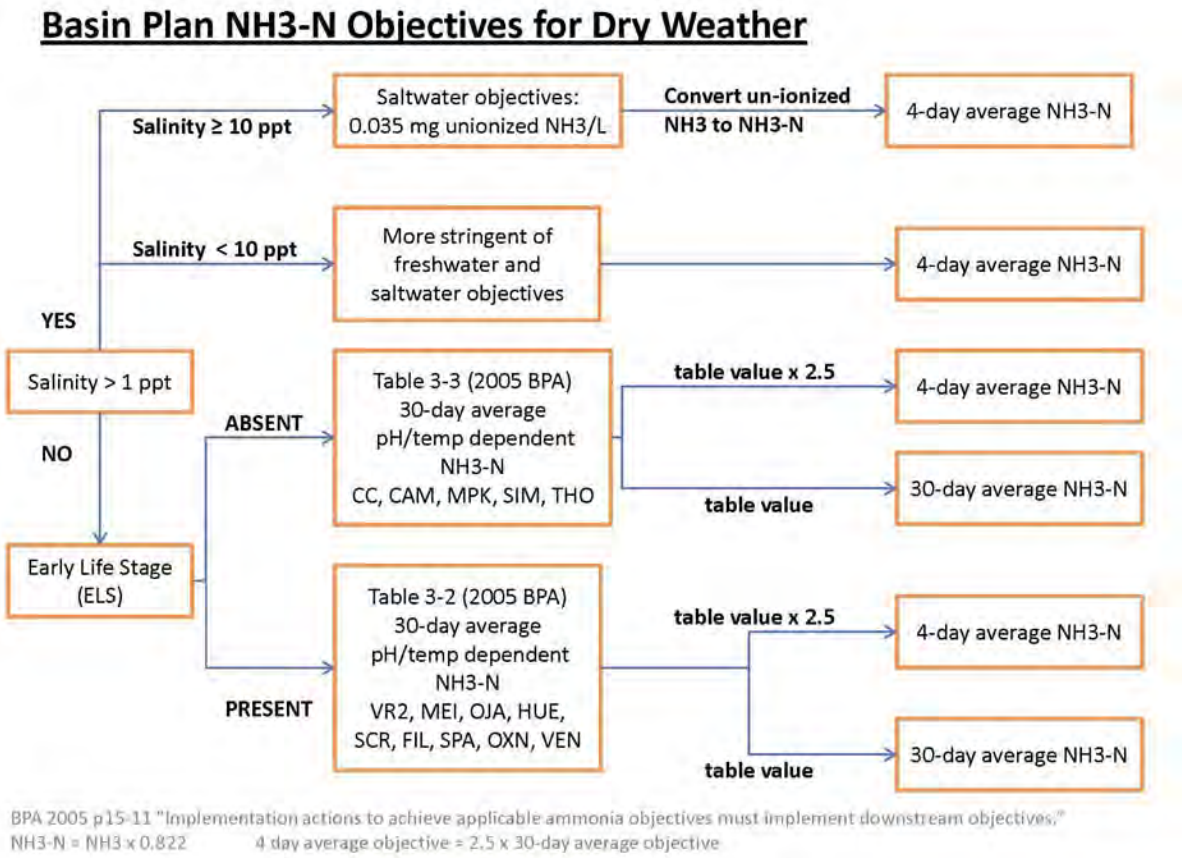


Table 3-2: 30-Day Average Objective for Ammonia-N for Freshwaters Applicable to Waters Subject to the "Early Life Stage Present" Condition (mg N/L)

$$= \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) * MIN\left(2.85, 1.45 * 10^{0.028*(25-T)}\right)$$

Where T= temperature expressed in °C.
Highest four-day average within the 30-day period shall not exceed 2.5 times the 30-day average objective as calculated above.

Table 3-3: 30-Day Average Objective for Ammonia-N for Freshwaters Applicable to Waters Subject to the "Early Life Stage Absent" Condition (mg N/L)

$$= \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) * 1.45 * 10^{0.028*(25-MAX(T,7))}$$

Where T= temperature expressed in °C.
Highest four-day average within the 30-day period shall not exceed 2.5 times the 30-day average objective as calculated above.

Saltwater 4-day objective for Ammonia-N

$$= 0.035 * (1 + 10^{\left[\left(9.245+0.116*\frac{19.9273*S}{1000-1.005109*S}\right)+0.0324(298-T)+\frac{(0.0415)P}{T}-pH\right]})$$

Where T= temperature expressed in °K (Note: Kelvin = Celsius + 273)
S = salinity (ppt)
P = pressure (assumed to be 1 atm)

PENTACHLOROPHENOL (CTR)

$$CMC = \exp(1.005(pH) - 4.869)$$
$$CCC = \exp(1.005(pH) - 5.134)$$

METALS (CTR)

[cadmium, chromium, copper, lead, nickel, silver, zinc]

$$CMC = WER * (Acute\ Conversion\ Factor) * (\exp\{m_A[1n(hardness)] + b_A\})$$
$$CCC = WER * (Chronic\ Conversion\ Factor) * (\exp\{m_C[1n(hardness)] + b_C\})$$

Note1: CCC formula contains error in CTR (says “Acute” not “Chronic” for Conversion Factor).
Note2: see note to Table 2 of Paragraph (b)(2) in the CTR, “The term conversion factor represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.”
Note3: Conversion factors (CF) are provided as values in a table for chromium, copper, nickel, silver, and zinc. CF for cadmium and lead are calculated based on hardness, i.e.

$$Cadmium\ Acute\ CF = 1.136672 - [(\ln\{hardness\})\ (0.041838)]$$
$$Cadmium\ Chronic\ CF = 1.101672 - [(\ln\{hardness\})\ (0.041838)]$$
$$Lead\ Acute\ and\ Chronic\ CF = 1.46203 - [(\ln\{hardness\})\ (0.145712)]$$

Note4: Only two WER in Ventura County and no stations discharge within the applicable reaches - Lower Calleguas Creek (Reach 2 which is Portrero Rd south to Mugu Lagoon) has a WER for copper of 3.69 and Mugu Lagoon copper WER is 1.51.

Appendix L. Sulfate Elevated Levels Notification Letter

PUBLIC WORKS
VENTURA COUNTY

county of ventura

Jeff Pratt
Agency Director

Central Services **Joan Araujo**, Director | Engineering Services **Christopher Cooper**, Director | Roads & Transportation **David Fleisch**, Director | Water & Sanitation **Joseph Pope**, Director | Watershed Protection **Glenn Shephard**, Director

July 27, 2020

VIA EMAIL

Ms. Renee Purdy
Executive Officer
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: Notification of Special Study Sulfate Results Above Water Quality Objectives Not Identified in Past Reports, Ventura Countywide Stormwater Quality Management Program NPDES (National Pollutant Discharge Elimination System) Permit No. CAS004002, Order No. R4-2010-0108

Dear Ms. Purdy:

The Ventura Countywide Stormwater Quality Management Program (Program) recently discovered a programming error in how the water quality database was comparing special study sample results to the sulfate site-specific water quality objectives (SSO) identified in Table 3-10 of the Basin Plan (BP). The database performs these calculations by comparing sample results to pre-programmed reference values for the Reach that each monitoring station is in and identifies results that are above SSOs. It is used for these comparisons to reduce the likelihood of human error.

In 2007, based on the latest available scientific information on the toxicity of copper to aquatic organisms, USEPA (United States Environmental Protection Agency) revised its freshwater copper criteria from a hardness-based approach to a metal bioavailability approach that uses a predictive model – the Biotic Ligand Model (BLM). USEPA found the revised criteria will provide improved guidance on the concentrations of copper that will be protective of aquatic life. Understanding that this new approach may have an impact to Ventura County Permittees, the Program started a special study at all mass emission and major outfall stations in 2016 as part of the data collection process to prepare for the BLM approach.

Sulfate monitoring is not required by the NPDES Permit but was reported in the Program's Annual Reports. In June this year, the Program determined that the sulfate results were not being flagged by the database when present at levels above the SSOs. The issue was due to a discrepancy between the "fraction" programmed by our third-party database contractor for storing the environmental results as "Total" and the "fraction" programmed for the SSO reference values as "n/a" (it is thought "n/a" was used because as an anion sulfate is highly soluble in water making the total and dissolved fractions virtually

indistinguishable). The database does not correct for, nor highlight, the fraction differences and as a result the values were not compared. The discrepancy has been corrected and sulfate results are now compared to the SSO.

The Program reports constituents detected above water quality objectives in elevated levels reports within 90 days of sampling. Reports submitted prior to the discovery of the discrepancy did not identify when sulfate was above the applicable SSO. Of the 245 samples taken, 11 wet and 16 dry weather samples were above the SSO and not included in the elevated levels reports. Samples in which sulfate was present above SSO but were not flagged in the relevant event's elevated levels report are included in the table below.

Salts, including sulfate, in the Calleguas Creek Watershed are being addressed by the Calleguas Creek Watershed Salts Total Maximum Daily Load (TMDL). The TMDL sets an interim dry weather sulfate waste load allocation (WLA) of 1289 mg/L for permitted stormwater dischargers. The interim dry weather WLA apply in the receiving water at the base of each subwatershed (RW Interim WLA) until December 2, 2023. All measured levels at ME-CC are well below the interim WLAs. The TMDL does not have a WLA for wet weather.

Table 1. Sulfate Elevated Levels

Site ID*	Event ID	Sample Date	Event Type	Sign	Result	Units	SSO
ME-CC	2015/16-5	6/23/2016	Dry	=	260**	mg/L	250 (SSO) 1289 (RW Interim WLA)
ME-CC	2016/17-6	5/18/2017	Dry	=	280**	mg/L	250 (SSO) 1289 (RW Interim WLA)
ME-CC	2018/19-5	5/14/2019	Dry	=	270**	mg/L	250 (SSO) 1289 (RW Interim WLA)
ME-SCR	2015/16-3	2/1/2016	Wet	=	830	mg/L	650
ME-SCR	2015/16-5	6/21/2016	Dry	=	990**	mg/L	650
ME-SCR	2016/17-4	1/5/2017	Wet	=	720	mg/L	650
ME-SCR	2016/17-6	5/4/2017	Dry	=	870	mg/L	650
ME-SCR	2017/18-1	1/9/2018	Wet	=	1100	mg/L	650
ME-SCR	2017/18-2	3/3/2018	Wet	=	1100	mg/L	650
ME-SCR	2017/18-5	6/6/2018	Dry	=	780	mg/L	650
MO-FIL	2015/16-5	6/21/2016	Dry	=	660**	mg/L	650
MO-MPK	2016/17-6	5/18/2017	Dry	=	270**	mg/L	250
MO-OJA	2016/17-6	5/23/2017	Dry	=	510	mg/L	300
MO-OJA	2018/19-5	5/8/2019	Dry	=	450	mg/L	300
MO-SIM	2015/16-5	6/23/2016	Dry	=	1600**	mg/L	250 1289 (RW Interim WLA)
MO-SIM	2016/17-6	5/18/2017	Dry	=	1100**	mg/L	250 1289 (RW Interim WLA)
MO-SIM	2017/18-5	5/30/2018	Dry	=	940	mg/L	250 1289 (RW Interim WLA)
MO-SIM	2018/19-5	5/14/2019	Dry	=	960**	mg/L	250 1289 (RW Interim WLA)

MO-SIM	2019/20-1	11/27/2109	Wet	=	1800	mg/L	250
MO-SIM	2019/20-3	3/11/2020	Wet	=	550	mg/L	250
MO-THO	2016/17-1	10/29/2016	Wet	=	340	mg/L	250
MO-THO	2016/17-2	11/21/2016	Wet	=	260	mg/L	250
MO-THO	2016/17-6	5/18/2017	Dry	=	360**	mg/L	250 1289 (RW Interim WLA)
MO-THO	2018/19-1	11/22/2018	Wet	=	290	mg/L	250
MO-THO	2018/19-5	5/14/2019	Dry	=	340**	mg/L	250 1289 (RW Interim WLA)
MO-THO	2019/20-1	11/27/2019	Wet	=	280	mg/L	250
MO-THO	2019/20-2	1/17/2020	Wet	=	330	mg/L	250

*ME-CC=Calleguas Creek, ME-SCR=Santa Clara River Mass Emission Stations, MO-FIL=Fillmore, MO-MPK=Moorpark, MO-OJA=Ojai, MO-SIM=Simi Valley, MO-THO=Thousand Oaks Major Outfalls
**Elevated levels were observed at the mass emission station and at least one of its major outfalls during the same monitoring event.

MO-SIM and MO-THO are in the Calleguas Creek Watershed and elevated levels of sulfate above the SSO but not the interim WLA (except for one instance above the WLA at MO-SIM) have occurred at these sites concurrently with those at ME-CC, which indicates there could be a cause or contribute association between the outfalls and the receiving waters in the Calleguas Creek watershed if there was not an interim WLA. Except for a single small elevated level at MO-FIL in June 2016, there does not appear to be a cause or contribute relationship in the Santa Clara River or Ventura River watersheds. This new information will be used by the Program to prioritize sulfate along with the other pollutants of concern and direct program activities accordingly.

We apologize for the error and any inconvenience this may have caused. If you have questions or comments regarding this letter, please contact David Laak at (805) 477-7139 or me at (805) 654-3942.

Sincerely,

Arne Anselm
Deputy Director, Watershed Protection

Cc: Ms. Jenny Newman, Assistant Executive Officer, RWQCB-LA
Mr. Ivar Ridgeway, Stormwater Unit Chief, RWQCB-LA
Ms. Erum Razzak, Stormwater Permitting, RWQCB-LA
Mr. Glenn Shephard, Director, VCWPD
Ventura Countywide Stormwater Quality Program Permittees

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