ENTHALPY ANALYTICAL
TOXICITY LABORATORY & CONSULTING

Acute Toxicity Test Results for ADC Wet Weather Water Quality Monitoring

Monitoring Period: February 2023

Prepared for:	Stantec 737 Bishop St., Suite 3050 Honolulu, HI 96734
Testing Lab:	Enthalpy Analytical 4340 Vandever Avenue San Diego, CA 92120
Submitted:	April 10, 2023

Data Quality Assurance:

- Enthalpy Analytical (formerly Nautilus Environmental) is accredited in accordance with NELAP by the State of Oregon Environmental Laboratory Accreditation Program (Certificate No. 4053). It is also certified by the State of California Department of Health Services Environmental Laboratory Accreditation Program (Certificate No. 1802) and the State of Washington Department of Ecology (Lab ID C552).
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective EPA protocols, unless otherwise noted in this report.
- All results have met internal Quality Assurance Program requirements, unless otherwise noted in this report.

Data Verified by: Borelo

Barbara Orelo, Project Manager

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Introduction

Three samples were collected during a wet weather event for the ADC Kekaha Water Quality Monitoring. Samples were submitted by Stantec. Testing was conducted at the Enthalpy Analytical Laboratory in San Diego, California. Pacific topsmelt (*Atherinops affinis*), inland silverside (*Menidia beryllina*), and mysid shrimp (*Americamysis bahia*) 96-hour acute survival tests were used for the WW-2 sample. Fathead minnow (*Pimephales promelas*), water flea (*Ceriodaphnia dubia*), and freshwater amphipod (*Hyalella azteca*) 96-hour acute survival tests were used for the DW-1/WW-1 and WW-3 samples.

Materials and Methods

Sample Information

Client:	Stantec
Project Name:	ADC Kekaha Water Quality Monitoring
Sample IDs:	1. DW-1/WW-1 2. WW-2 3. WW-3
Sample Collection Dates, Times[a]:	1. 2/4/23, 18:00 2. 2/4/23, 18:32 3. 2/4/23, 19:07
Sample Receipt Dates, Times:	2/7/23, 10:05
Sample Material:	Wet weather sample
Sampling Method:	Grab

[a] Collection times adjusted to Pacific Standard Time from Hawaii Standard Time.

Table 1. Water Quality Parameters Measured upon Sample Receipt

Sample ID	pH	DO (mg/L)	Temp. (ºC)	Cond. (µS/cm)	Salinity (ppt)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as CaCO3)	Total Chlorine (mg/L)
DW-1/WW-1	7.38	9.5	2.2	883	0.4	nm	nm	nm
WW-2	7.30	7.3	2.2	nm	25.3	nm	nm	nm
WW-3	7.18	8.8	2.8	1,170	0.6	nm	nm	nm

nm = not measured

Acute Toxicity Test Methods

Testing was conducted in accordance with methods published in US Environmental Protection Agency (USEPA) guidance (2002). Test specifications for all marine tests are summarized in Table 2, and test specifications for freshwater tests are summarized in Table 3.

Table 2. 96-hr Acute Survival Test Specifications - Marine Organisms

Pacific topsmelt test: 2/8/23, 14:30 to 2/12/23, 14:35	Species: *Atherinops affinis.* Source & Age: Aquatic Biosystems (Ft. Collins, CO), 15 days
Inland silverside test: 2/9/23, 16:00 to 2/13/23, 14:20	Species: *Menidia beryllina.* Source & Age: Aquatic Biosystems (Ft. Collins, CO), 12 days
Mysid shrimp test: 2/9/23, 16:10 to 2/13/23, 14:25	Species: *Americamysis bahia.* Source & Age: Aquatic Biosystems (Ft. Collins, CO), 4 days
Protocol Used:	Acute Manual (EPA/821/R-02/012), EPA 2002
Test Acceptability Criteria:	Control mean survival ≥ 90%
Test Concentration:	100% sample (WW-2)
Sample Manipulation:	Artificial salts (Instant Ocean®) were added to bring the salinity of the sample to 30±1 parts per thousand (ppt)
Lab Control Water:	20-μm filtered seawater (Source: Scripps Institution of Oceanography [SIO] Intake); diluted to 30 ppt with deionized water
Salt Control:	Salt Control – 30 ppt artificial saltwater (Instant Ocean®)

Table 3. 96-hr Acute Survival Test Specifications – Freshwater Organisms

Fathead minnow test: 2/9/23, 16:35 to 2/13/23, 14:55	Species: *Pimephales promelas.* Source & Age: Aquatic Biosystems (Ft. Collins, CO), 6 days
Water flea test: 2/8/23, 15:20 to 2/12/23, 15:05	Species: *Ceriodaphnia dubia.* Source & Age: Internal culture, < 24 hours
Freshwater amphipod test: 2/9/23, 16:35 to 2/13/23, 15:36	Species: *Hyalella azteca.* Source & Age: Aquatic Research Organisms (Hampton, NH), 13 days
Protocol Used:	Acute Manual (EPA/821/R-02/012), EPA 2002
Test Acceptability Criteria:	Control mean survival ≥ 90%
Test Concentration:	100% sample (DW-1/WW-1 and WW-3)
Lab Control Water:	Diluted mineral water (per EPA protocol) for *P. promelas* and *C. dubia*; Carbon-filtered municipal water (Coast) for *H. azteca*

Statistical Analyses

Statistical analyses were conducted using EPA flowchart specifications as outlined in the test guidance manual (USEPA 2002). Organism performance in the sample was compared to that observed in the concurrent lab or salt control. Results were used to calculate whether a statistically significant effect was observed between the control and sample result. Comprehensive Environmental Toxicity Information System™ (CETIS) software by Tidepool Scientific Software, version 2.1.2.3.

Results

No statistically significant effects were observed to any species that was exposed the WW-2 sample compared to the respective artificial salt controls. The artificial salt control for the mysid resulted in 85 percent mean survival, below the test acceptability criterion (TAC) of 90 percent (see QA section for further details). The lab control for this species resulted in 100 percent mean survival, which meets TAC. The WW-2 sample also resulted in no statistically significant effects to mysid survival compared to the lab control. A summary of results for the marine species tests is presented in Table 4.

The freshwater lab controls all met TAC. None of the freshwater species tested resulted in statistically significant mortality in the DW-1/WW-1 and WW-3 sample tests. Due to heavy debris, the water flea test was also performed after filtering the samples through a 0.45um nylon filter. The test resulted in 100 percent survival for both samples, indicating that the debris did not cause mortality. A summary of results for the freshwater tests is presented in Table 5.

Raw datasheets and complete statistical summaries for all tests are provided in Appendix A. Sample receipt information is provided in Appendix B, and a copy of the chain of custody form is presented in Appendix C.

Table 4. Summary of Marine 96-hr Acute Survival Results

Sample ID	Species	Salt Control Result	100% Sample Result	Statistically Significant Effect? (Yes/No)	Percent Effect
WW-2	Pacific topsmelt	100	95.0	No	5.0
	Inland silverside	90.0	95.0	No	-5.6
	Mysid shrimp	85.0[a]	85.0	No	0.0

[a] The salt control did not meet minimum test acceptability criterion; see QA section.

Percent effect from control is calculated as: ((mean response in salt control - mean response in undiluted sample)/mean response in salt control) *100. A negative value results when organism performance in the sample is greater than that in the salt control.

Table 5. Summary of Freshwater 96-hr Acute Survival Results

Sample ID	Species	Lab Control Result	100% Sample Result	Statistically Significant Effect? (Yes/No)	Percent Effect
DW-1/WW-1	Fathead minnow	97.5	95.0	No	2.6
	Water Flea	100	85.0	No	15
	Freshwater amphipod	97.5	82.5	No	15
WW-3	Fathead minnow	97.5	97.5	No	0.0
	Water Flea	100	90.0	No	10
	Freshwater amphipod	97.5	100	No	-2.6

Percent effect from control is calculated as: ((mean response in lab control - mean response in undiluted sample)/mean response in lab control) *100. A negative value results when organism performance in the sample is greater than that in the lab control.

Quality Assurance

The samples were received via overnight delivery service three days after collection and within the range of 0-6 degrees Celsius (°C). Due to organism availability, all tests were initiated outside the maximum allowable holding time of 72 hours.

Mean control responses met minimum acceptability criteria for all tests, except for the mysid shrimp test. The mysid shrimp test had a mean survival of 85 percent in the artificial salt control, which is below the TAC of 90 percent. However, the lab control had 100 percent survival, indicating that the organisms were adequate for testing. There was no effect in the 100 percent samples when compared to either the salt or the lab control; therefore, the results is deemed acceptable for reporting.

Minor QA issues that were unlikely to have any bearing on the final test data, such as slight temperature deviations, are noted on the datasheets and a list of laboratory qualifier codes can be found in Appendix D.

Reference Toxicant Testing

Results for reference toxicant testing used to monitor laboratory performance and test organism sensitivity are summarized in Table 6. The reference toxicant tests for all species tested met all acceptability criteria. The median effect concentration value (EC_{50}) was within two standard deviations of the historical mean for all endpoints, indicating organisms exhibited typical sensitivity as historically observed in our laboratory. The control charts for the previous 20 reference toxicant tests are presented in Appendix E.

Table 6. Summary of 96-hr Acute Survival Reference Toxicant Test Results

Species	NOEC (µg/L copper)	LC_{50} (µg/L copper)	Historical LC_{50} ± 2 SD (µg/L copper)	CV (%)
Pacific Topsmelt	50	207	159 ± 93.2	29.3
Inland Silverside	100	198	183 ± 75.3	20.6
Mysid Shrimp	100	158	232 ± 73.5	15.9
Fathead Minnow	15	59.4	71.8 ± 62.0	43.2
Water Flea	20	26.0	18.6 ± 14.9	40.1
Freshwater Amphipod	200	619	431 ± 249	29.0

NOEC = the highest concentration tested that results in no observed effect

LC_{50} = the concentration expected to cause a lethal effect to 50 percent of the test organisms

Historical LC_{50} ± 2 SD = the mean LC_{50} from the previous 20 tests performed by Enthalpy, plus or minus two standard deviations

CV = Coefficient of Variation

References

Tidepool Scientific Software. 2000-2022. CETIS Comprehensive Environmental Toxicity Information System Software, Version 2.1.2.3.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition (EPA/821/R-02/012). US EPA Office of Water, Washington, DC.

Appendix A

Raw Data and Statistical Summaries

Marine Species

CETIS Summary Report

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	11-6995-4591	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	08 Feb-23 14:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	12 Feb-23 14:35	**Species:**	Atherinops affinis	**Brine:**	Instant Ocean
Test Length:	4d 0h	**Taxon:**		**Source:**	Aquatic Biosystems, CO **Age:** 15d

Sample ID:	16-9622-4513	**Code:**	23-0167	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:32 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-2
Sample Age:	92h (2.2 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
14-8895-3708	96h Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.5000	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
14-8895-3708	96h Survival Rate	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	0.00%
0	SC	4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	0.00%
100		4	0.950	0.791	1.110	0.800	1.000	0.050	0.100	10.53%	5.00%

96h Survival Rate Detail — MD5: 6E432F8856B9700CAC5872CB1A19C911

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	1.000	1.000
0	SC	1.000	1.000	1.000	1.000
100		1.000	1.000	0.800	1.000

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	14-8895-3708	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:11	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:11	**MD5 Hash:**	3C8871F47BE2E713C8308BB29B453A2A	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	11.20%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Salt Control		100	6	16	---	1	Exact	0.5000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0070885	0.0070885	1	1	0.3559	Non-Significant Effect
Error	0.0425309	0.0070885	6			
Total	0.0496194		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.706	0.645	0.0027	Non-Normal Distribution

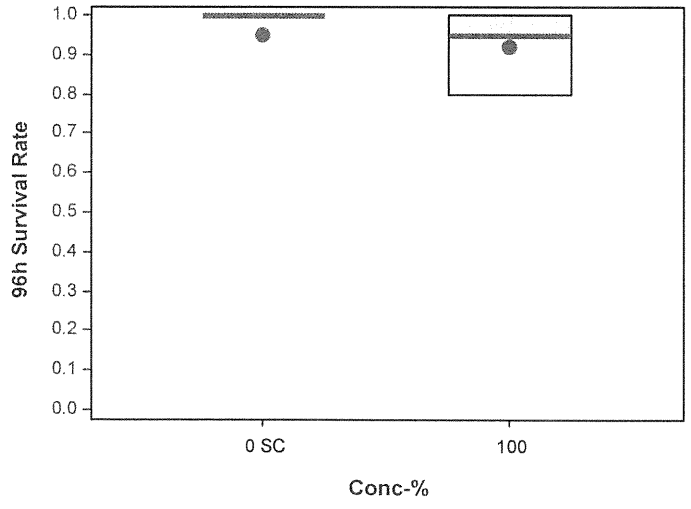
96h Survival Rate Summary

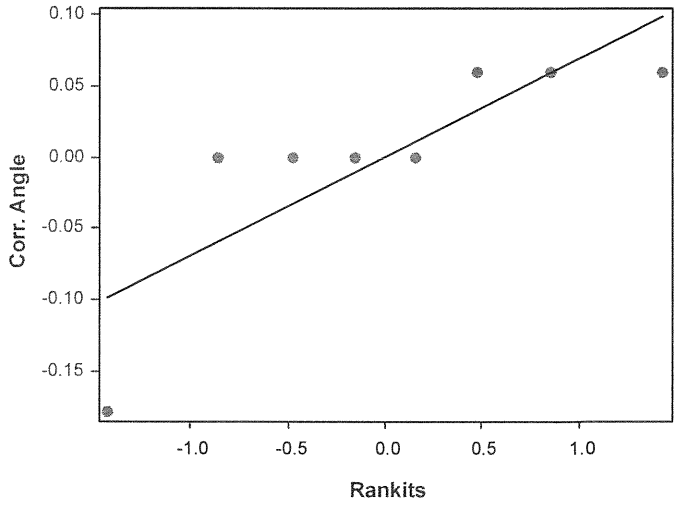
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	0.00%
100		4	0.950	0.791	1.000	1.000	0.800	1.000	0.050	10.53%	5.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	1.350	1.340	1.350	1.350	1.350	1.350	0.000	0.00%	0.00%
100		4	1.290	1.100	1.480	1.350	1.110	1.350	0.060	9.26%	4.43%

Graphics





Marine Acute Bioassay
Static-Renewal Conditions
DM-001

Water Quality Measurements
& Test Organism Survival

Client: Stantec
Sample ID: ~~DW-1/WW-1 and~~ WW-2
Sample Log-in No.: 23- 0167
Test No.: 2302-S102

Test Species: *A. affinis*
Start Date/Time: 2/8/23 1430
End Date/Time: 2/12/23 1435

Tech Initials	0	24	48	72	96
Counts:	KR	WF	~~RT~~ KR	WF	DR
Readings:	EG	GM	RT	WF	DR
Dilutions made by:	EG/GM		GM		

Number of Live Organisms

Concentration (%)	Rep	0	24	48	72	96
Lab Control	A	5	5	5	5	5
	B	5	5	5	5	5
	C	5	5	5	5	5
	D	5	5	5	5	5
Salt Control	A	5	5	5	5	5
	B	5	5	5	5	5
	C	5	5	5	5	5
	D	5	5	5	5	5
~~DW-1/WW-1~~	~~A~~	~~5~~				
	~~B~~	~~5~~				
	~~C~~	~~5~~				
	~~D~~	~~5~~				
WW-2	A	5	5	5	5	5
	B	5	5	5	5	5
	C	5	5	5	4	4
	D	5	5	5	5	5

Salinity (ppt) and Temperature (°C)

Concentration (%)	Rep	Sal. 0	Sal. 24	Sal. 48	Sal. 72	Sal. 96	Temp. 0	Temp. 24	Temp. 48	Temp. 72	Temp. 96
Lab Control	A	30.2	30.7	i 30.9	31.0	31.4	20.3	20.1	i 20.2	20.3	20.3
	B			f 30.6					f 20.4		
Salt Control	A	29.7	30.1	i 30.8	31.0	31.4	20.2	20.3	i 20.3	20.3	20.3
	B			f 30.3					f 20.4		
~~DW-1/WW-1~~	A			i			~~20~~ (B)	~~20~~ (C)	i		
	B			f					f		
WW-2	A	30.7	30.9	i 29.2	30.0	30.5	20.9	20.4	i 20.8	20.3	20.2
	B			f 31.1					f 20.4		

Dissolved Oxygen (mg/L) and pH (units)

Concentration (%)	Rep	DO 0	DO 24	DO 48	DO 72	DO 96	pH 0	pH 24	pH 48	pH 72	pH 96
Lab Control	A	7.6	7.0	i 7.8	7.4	6.9	7.92	7.79	i 8.03	7.93	7.92
	B			f 7.5					f 8.02		
Salt Control	A	7.4	6.6	i 7.6	7.3	6.8	8.19	8.00	i 8.12	8.07	8.11
	B			f 7.4					f 8.13		
~~DW-1/WW-1~~	A			i					i		
	B			f					f		
WW-2	A	6.8	6.6	i 7.9	7.1	6.9	7.47	7.80	i 7.39	8.03	8.00
	B			f 7.3					f 8.11		

Initial Counts QC'd by: KR / EG
Initiated by: KR

Environmental Chamber: C

Animal Source/Date Received: ABS 2/3/23
Age at Initiation: 15d

Animal Acclimation Qualifiers (circle all that apply): (Q22) / Q23 / (Q24) / none

Feeding Times	0	24	48	72	96
AM:	(B)	0900	0900	0840	0850
PM:	1615	0845			

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one ((y) / n) (A) Q18 BO 2/7/23 (B) EG Q18 2/8/23
(C) Q18 GM 2/9/23 (D) Q18 RT 2/10/23

QC Check: RL 2/23/23

Final Review: AHS 3/1/23

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CETIS Summary Report

Inland Silverside 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	07-7250-9827	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Feb-23 16:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	13 Feb-23 14:20	**Species:**	Menidia beryllina	**Brine:**	Instant Ocean
Test Length:	94h	**Taxon:**		**Source:**	Aquatic Biosystems, CO **Age:** 12d

Sample ID:	18-6314-7929	**Code:**	23-0167	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:32 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-2
Sample Age:	4d 21h (2.2 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
15-6024-4781	96h Survival Rate	Equal Variance t Two-Sample Test	0.7315	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
15-6024-4781	96h Survival Rate	Control Resp	0.9	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	0.900	0.582	1.220	0.600	1.000	0.100	0.200	22.22%	0.00%
0	SC	4	0.900	0.716	1.080	0.800	1.000	0.058	0.115	12.83%	0.00%
100		4	0.950	0.791	1.110	0.800	1.000	0.050	0.100	10.53%	-5.56%

96h Survival Rate Detail — MD5: 858B8F52D53CAD7EBDE6F6F1BF219FF8

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	0.600	1.000	1.000	1.000
0	SC	0.800	0.800	1.000	1.000
100		1.000	0.800	1.000	1.000

CETIS Analytical Report

Inland Silverside 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	15-6024-4781	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:15	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:15	**MD5 Hash:**	0A695185BB7BDA68F8BD2268B127EE9E	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	16.44%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Salt Control		100	6	-0.655	1.94	0.177	CDF	0.7315	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0070885	0.0070885	1	0.429	0.5370	Non-Significant Effect
Error	0.0992388	0.0165398	6			
Total	0.106327		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.33	47.5	0.8187	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.828	0.645	0.0570	Normal Distribution

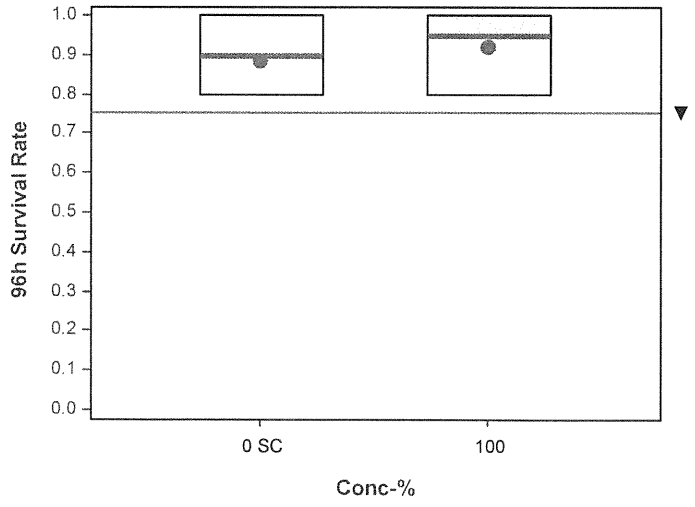
96h Survival Rate Summary

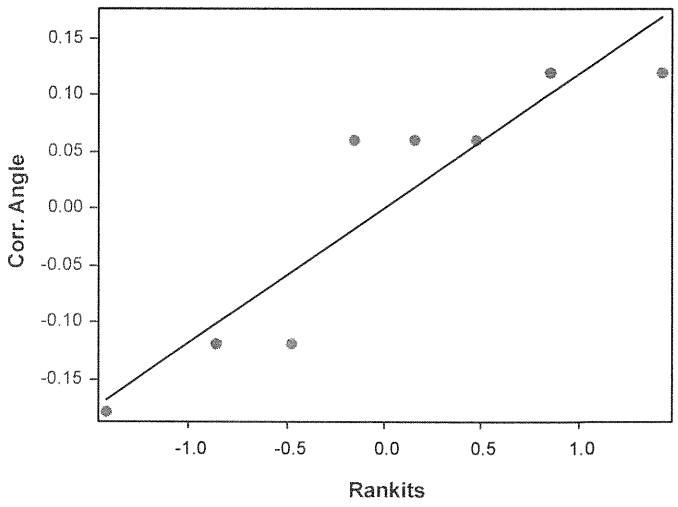
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	0.900	0.716	1.000	0.900	0.800	1.000	0.058	12.83%	0.00%
100		4	0.950	0.791	1.000	1.000	0.800	1.000	0.050	10.53%	-5.56%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	1.230	1.010	1.440	1.230	1.110	1.350	0.069	11.21%	0.00%
100		4	1.290	1.100	1.480	1.350	1.110	1.350	0.060	9.26%	-4.86%

Graphics





Marine Acute Bioassay
Static-Renewal Conditions
DM-001

Water Quality Measurements & Test Organism Survival

Client: Stantec
Sample ID: ~~DW-1/WW-1~~ @ and WW-2
Sample Log-in No.: 23- 0107
Test No.: 2302-5103

Test Species: ~~A. affinis~~ @ M. beryllina
Start Date/Time: 2/9/23 1600
End Date/Time: 2/13/23 1420

Tech Initials	0	24	48	72	96
Counts:	RL	[illegible]	RT	HM	KR
Readings:	RT	RT	WF	DR	DR
Dilutions made by:	HM		GM		

Concentration (%)	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	3	3	3	3	30.2	31.2	i 30.5	32.6	33.8	24.1	25.6	i 24.2	25.7	25.5	6.5	6.5	i 7.7	6.0	6.2	7.90	8.04	i 7.98	8.03	8.04
	B	5	5	5	5	5			f 32.6					f 25.4					f 6.3					f 8.04		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
Salt Control	A	5	4	4	4	4	29.5	30.6	i 30.6	31.3	32.5	24.7	25.6	i 24.3	25.6	25.8	7.1	6.5	i 6.7	6.2	6.0	8.14	8.16	i 8.11	8.20	8.19
	B	5	4	4	4	4			f 32.0					f 25.6					f 6.4					f 8.20		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
DW-1/WW-1	A	5							i					i					i					i		
	B	5							f					f					f					f		
	C	5		@															@							
	D	5																								
WW-2	A	5	5	5	5	5	30.0	30.7	i 30.3	31.7	32.7	24.3	25.7	i 25.7	25.8	25.8	6.7	6.5	i 8.2	6.2	6.1	7.60	8.11	i 7.99	8.13	8.10
	B	5	4	4	4	4			f 31.7					f 25.8					f 6.4					f 8.12		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		

Initial Counts QC'd by: BO
Initiated by: RL

Environmental Chamber: A

Animal Source/Date Received: 2/8/23 / ABS

Age at Initiation: 12d

Animal Acclimation Qualifiers (circle all that apply): Q22 / (Q23) / Q24 / none

Feeding Times	0	24	48	72	96
AM:		0900	0840	0850	
PM:	1750				

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one (y) / n) @ 1818 BO 2/6/23

QC Check: RL 2/23/23

Final Review: AS 3/1/23

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Mysid 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	02-4784-8958	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Feb-23 16:10	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	13 Feb-23 14:25	**Species:**	Americamysis bahia	**Brine:**	Instant Ocean
Test Length:	94h	**Taxon:**		**Source:**	Aquatic Biosystems, CO **Age:** 4d

Sample ID:	17-5375-7853	**Code:**	23-0167	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:32 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-2
Sample Age:	4d 22h (2.2 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
11-8047-4833	96h Survival Rate	Equal Variance t Two-Sample Test	0.4207	100% passed 96h survival rate	1
05-0517-0465	96h Survival Rate	Unequal Variance t Two-Sample Test	0.2113	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
05-0517-0465	96h Survival Rate	Control Resp	1	0.9	<<	Yes	Passes Criteria
11-8047-4833	96h Survival Rate	Control Resp	0.85	0.9	<<	Yes	Below Criteria 215

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	0.00%
0	SC	4	0.850	0.691	1.010	0.800	1.000	0.050	0.100	11.76%	15.00%
100		4	0.850	0.373	1.330	0.400	1.000	0.150	0.300	35.29%	15.00%

96h Survival Rate Detail — MD5: 17632A778C5A4D9D26E6DDBEC1F5CE9A

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	1.000	1.000
0	SC	0.800	1.000	0.800	0.800
100		1.000	1.000	0.400	1.000

QIS: Salt control did not meet test acceptability criteria of 90% survival. Lab control did meet test acceptability criteria AIS 3/1/23

Mysid 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	11-8047-4833	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	17 Feb-23 9:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	17 Feb-23 9:47	**MD5 Hash:**	441C957C14FBA6238B023DA03CF1BA77	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	43.08%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Salt Control		100	5	0.211	2.02	0.397	CDF	0.4207	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0029649	0.0029649	1	0.0445	0.8413	Non-Significant Effect
Error	0.333427	0.0666854	5			
Total	0.336392		6			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	10.3	49.8	0.0911	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.842	0.563	0.1045	Normal Distribution

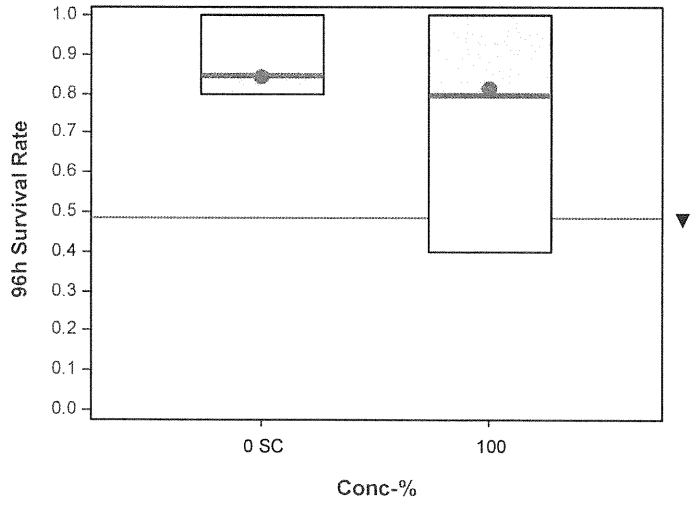
96h Survival Rate Summary

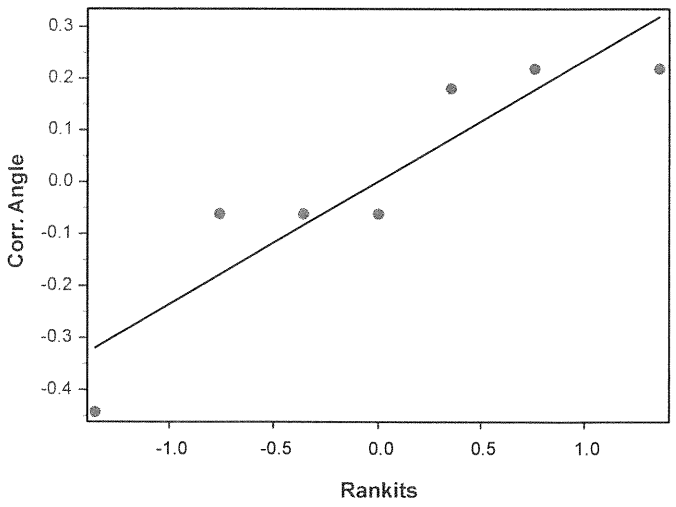
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	0.850	0.691	1.000	0.800	0.800	1.000	0.050	11.76%	0.00%
100		3	0.800	0.000	1.000	1.000	0.400	1.000	0.200	43.30%	5.88%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	4	1.170	0.977	1.360	1.110	1.110	1.350	0.060	10.21%	0.00%
100		3	1.130	0.178	2.070	1.350	0.685	1.350	0.220	33.90%	3.56%

Graphics





Mysid 96-h Acute Survival Test					Nautilus Environmental (CA)
Analysis ID:	05-0517-0465	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	17 Feb-23 9:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	17 Feb-23 9:47	**MD5 Hash:**	71839308E2CAF0FDF74BD90609FE7825	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	58.27%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control		100	2	1	2.92	0.643	CDF	0.2113	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0831132	0.0831132	1	1.43	0.2856	Non-Significant Effect
Error	0.290896	0.0581793	5			
Total	0.37401		6			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.787	0.563	0.0300	Normal Distribution

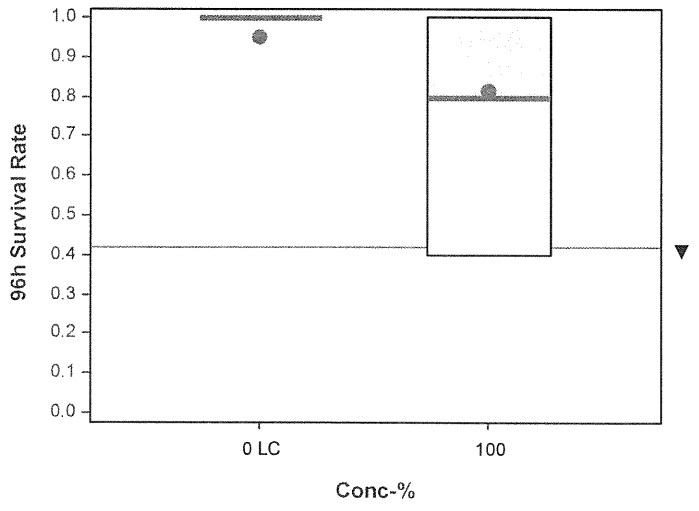
96h Survival Rate Summary

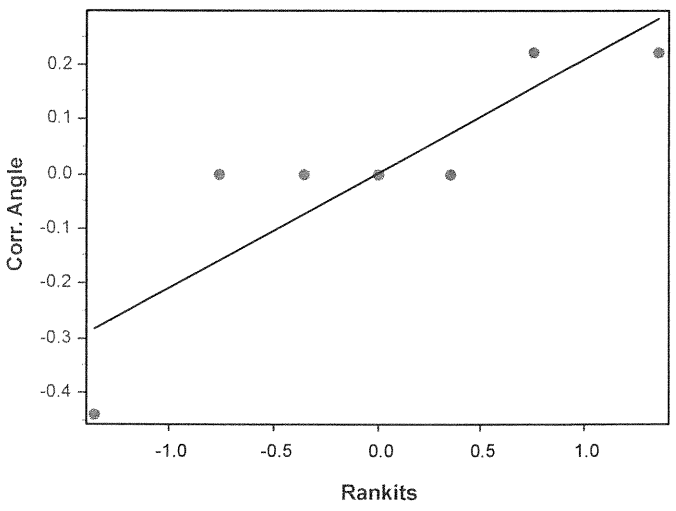
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	0.00%
100		3	0.800	0.000	1.000	1.000	0.400	1.000	0.200	43.30%	20.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.350	1.340	1.350	1.350	1.350	1.350	0.000	0.00%	0.00%
100		3	1.130	0.178	2.070	1.350	0.685	1.350	0.220	33.90%	16.37%

Graphics





Marine Acute Bioassay
Static-Renewal Conditions
DM-001

Water Quality Measurements & Test Organism Survival

Client: Stantec
Sample ID: ~~DW-1/WW-1 and~~ WW-2 @
Sample Log-in No.: 23- 0167
Test No.: 230A-5104

Test Species: *A. bahia*
Start Date/Time: 2/9/23 1610
End Date/Time: 2/13/23 1425

	Tech Initials				
	0	24	48	72	96
Counts:	WF	GM	RT	HM	KP
Readings:	RT	RT	WF	HM DO DR	DR
Dilutions made by:	HM		GM		

Sample ID (100%)	Rep	Number of Live Organisms					Salinity (ppt)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	5	5	5	5	5	30.1	30.4	i 30.6	31.3	31.4	24.2	24.9	i 24.1	25.1	25.3	6.6	6.7	i 7.4	6.3	6.2	7.93	8.05	i 7.98	8.03	8.02
	B	5	5	5	5	5			f 31.0					f 24.8					f 6.4					f 8.01		
	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
Salt Control	A	5	5	5	5	4	29.4	30.0	i 29.7	30.6	31.2	24.2	25.0	i 24.8	25.0	25.2	7.1	6.5	i 6.5	6.2	6.3	8.15	8.21	i 8.19	8.16	8.17
	B	5	5	5	5	5			f 31.0					f 24.7					f 6.6					f 8.14		
	C	5	5	5	5	4																				
	D	5	5	4	4	4																				
~~DW-1/WW-1~~	A	5							i					i					i					i		
	B	5			@				f					f					f					f		
	C	5															@									
	D	5																								
WW-2	A	5	Q23 5	5	5		30.4	30.8	i 29.5	30.4	31.0	24.3	25.0	i 25.0	25.3	25.2	7.1	6.6	i 7.3	6.1	6.2	7.56	8.11	i 7.95	8.06	8.06
	B	5	|	5	5	5			f 31.5					f 25.2					f 6.3					f 8.10		
	C	5	|	4	4	2																				
	D	5	↓	5	5	5																				
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		

Initial Counts QC'd by: KP
Initiated by: WF

Environmental Chamber: B

Animal Source/Date Received: ABS 2/9/23
Age at Initiation: 4 day

Animal Acclimation Qualifiers (circle all that apply): Q22 / (Q23) / (Q24) / none

	Feeding Times				
	0	24	48	72	96
AM:		0940	0840	0850	0850
PM:	1750	1700	1725	1710	/

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one (y / n) (Q23) BO 2/7/23

QC Check: RL 2/23/23

Final Review: AES 3/1/23

Freshwater Species

CETIS Summary Report

Fathead Minnow 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	11-1841-9659	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Feb-23 16:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	13 Feb-23 14:55	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**		**Source:**	Aquatic Biosystems, CO **Age:** 6d

Sample ID:	09-6539-3596	**Code:**	23-0166	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:08 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	DW-1/WW-1
Sample Age:	4d 22h (2.2 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
00-9849-8196	96h Survival Rate	Equal Variance t Two-Sample Test	0.2685	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
00-9849-8196	96h Survival Rate	Control Resp	0.975	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	0.975	0.895	1.050	0.900	1.000	0.025	0.050	5.13%	0.00%
100		4	0.950	0.858	1.040	0.900	1.000	0.029	0.058	6.08%	2.56%

96h Survival Rate Detail — MD5: 8CB94471DC72497BA06707AF175083F0

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	0.900	1.000
100		1.000	1.000	0.900	0.900

CETIS Analytical Report

Fathead Minnow 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	00-9849-8196	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:34	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:34	**MD5 Hash:**	8CB94471DC72497BA06707AF175083F0	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	7.61%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control		100	6	0.655	1.94	0.121	CDF	0.2685	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0033199	0.0033199	1	0.429	0.5370	Non-Significant Effect
Error	0.0464788	0.0077465	6			
Total	0.0497987		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.33	47.5	0.8187	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.828	0.645	0.0570	Normal Distribution

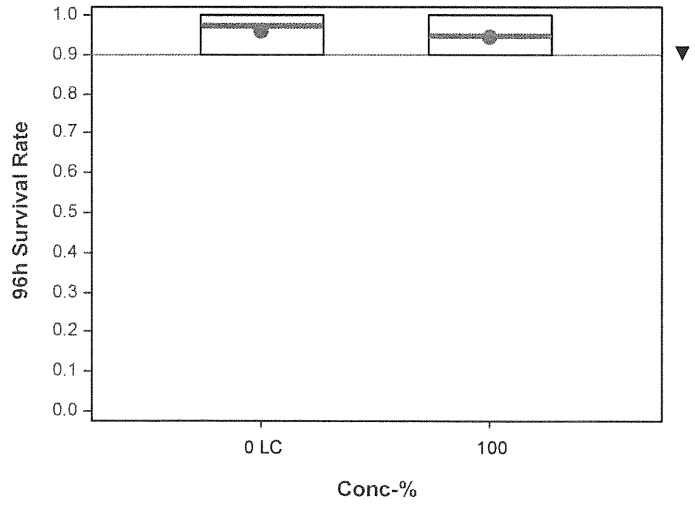
96h Survival Rate Summary

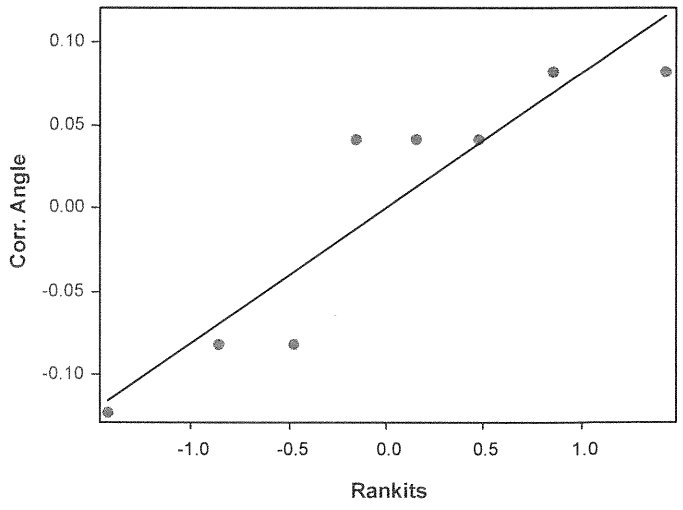
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	0.975	0.895	1.000	1.000	0.900	1.000	0.025	5.13%	0.00%
100		4	0.950	0.858	1.000	0.950	0.900	1.000	0.029	6.08%	2.56%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.370	1.240	1.500	1.410	1.250	1.410	0.041	5.94%	0.00%
100		4	1.330	1.180	1.480	1.330	1.250	1.410	0.047	7.07%	2.97%

Graphics





CETIS Summary Report

Fathead Minnow 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	14-2547-8115	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Feb-23 16:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	13 Feb-23 14:55	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Test Length:	94h	**Taxon:**		**Source:**	Aquatic Biosystems, CO **Age:** 6d

Sample ID:	15-7629-0666	**Code:**	23-0168	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 19:07 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-3
Sample Age:	4d 21h (2.8 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
20-9374-5368	96h Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.7857	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
20-9374-5368	96h Survival Rate	Control Resp	0.975	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	0.975	0.895	1.050	0.900	1.000	0.025	0.050	5.13%	0.00%
100		4	0.975	0.895	1.050	0.900	1.000	0.025	0.050	5.13%	0.00%

96h Survival Rate Detail — MD5: 277C749B01BD93E1E12B4D7B74D79A20

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	0.900	1.000
100		0.900	1.000	1.000	1.000

CETIS Analytical Report

Fathead Minnow 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	20-9374-5368	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:35	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:35	**MD5 Hash:**	277C749B01BD93E1E12B4D7B74D79A20	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	7.07%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Lab Control		100	6	18	---	2	Exact	0.7857	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.039839	0.0066398	6			
Total	0.039839		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1	47.5	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.566	0.645	6.3E-05	Non-Normal Distribution

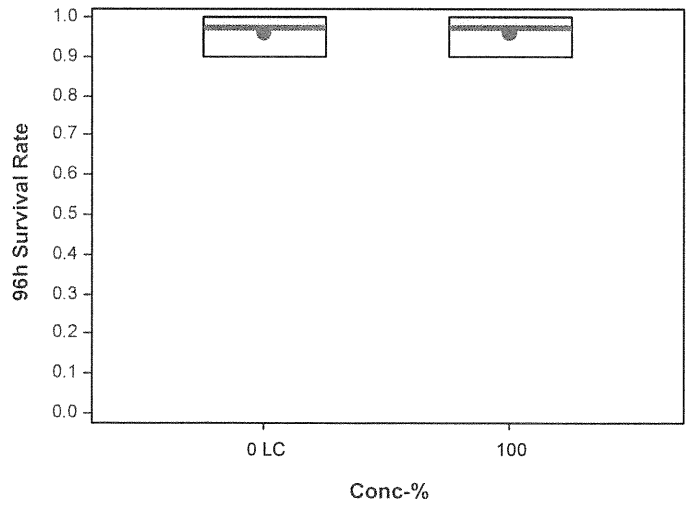
96h Survival Rate Summary

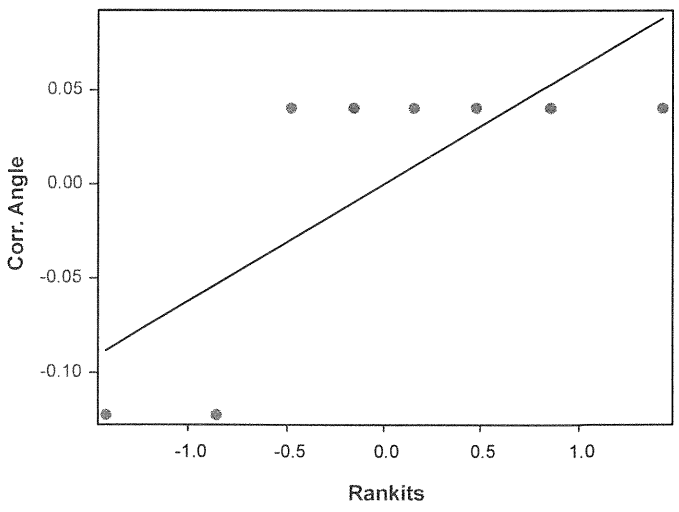
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	0.975	0.895	1.000	1.000	0.900	1.000	0.025	5.13%	0.00%
100		4	0.975	0.895	1.000	1.000	0.900	1.000	0.025	5.13%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.370	1.240	1.500	1.410	1.250	1.410	0.041	5.94%	0.00%
100		4	1.370	1.240	1.500	1.410	1.250	1.410	0.041	5.94%	0.00%

Graphics





96-hour Freshwater Acute Bioassay
Static-Renewal Conditions
DF-006

Water Quality Measurements & Test Organism Survival

Client: Stantec
Sample ID: WW-3 + DW-1/WW-1
Sample Log-in No's.: 23-0166, 23-0168
Test No's.: 2302-S099 a S105

Test Species: *P. promelas*
Start Date/Time: 2/9/23 1635
End Date/Time: 2/13/23 1455

Tech Initials	0	24	48	72	96
Counts:	WF	KR	RT	DR	KL
Readings:	RT	RT	WF	DR	KR
Dilutions made by:	HH		[illegible]		

Sample ID (100%)	Rep	Number of Live Organisms					Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0 (Q14)	24	48 (Q14)	72	96 (Q14)	0	24	48	72	96
Lab Control	A	10	10	10	10	10	190	195	i 179	220	234	20.6	19.7	i 19.7	20.4	20.1	8.0	9.0	i 8.5	8.7	9.1	8.16	8.20	i 8.23	7.86	8.24
	B	10	10	10	10	10			f 197					f 20.1					f 9.0					f 8.22		
	C	10	10	10	10	9																				
	D	10	10	10	10	10																				
100% DW-1/WW-1	A	10	Q13	Q13	Q13	10	876	845	i 842	917	915	20.0	19.9	i 19.6	20.4	20.2	9.4	9.0	i 9.4	8.7	9.1	7.41	7.82	i 7.51	7.49	7.82
	B	10	↓	↓	↓	10			f 831					f 20.1					f 8.9					f 7.91		
	C	10	↓	↓	↓	~~10~~ 9																				
	D	10	↓	↓	↓	9																				
100% WW-3	A	10	Q13	Q13	Q13	9	1164	1131	i 1107	1211	1192	20.1	19.9	i 19.6	20.4	20.2	9.2	9.0	i 9.4	8.7	9.1	7.25	7.75	i 7.35	7.46	7.77
	B	10	↓	↓	↓	10			f 1118					f 20.0					f 8.9					f 7.85		
	C	10	↓	↓	↓	10																				
	D	10	↓	↓	↓	10																				
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		

Initial Counts QC'd by: KR/WF
Initiated by: WF/KR

Environmental Chamber: C

Animal Source/Date Received: ABS 2/9/23

Age at Initiation: 6 day

Animal Acclimation Qualifiers (circle all that apply): Q22 / Q23 / Q24 / (none)

Feeding Times	0	24	48	72	96
AM:	--	--	0840	--	--
PM:	--	--	--	--	--

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one (y) n) (A) 0181 KL 2/13/23

QC Check: AS 2/22/23

Final Review: SO 4/6/23

CETIS Summary Report

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	06-5366-9439	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	08 Feb-23 15:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	12 Feb-23 15:05	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Test Length:	96h	**Taxon:**		**Source:**	In-House Culture **Age:** <24h

Sample ID:	07-6002-3547	**Code:**	23-0166	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:08 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	DW-1/WW-1
Sample Age:	93h (2.2 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
19-6025-9258	96h Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.5000	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
19-6025-9258	96h Survival Rate	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	0.00%
100		4	0.850	0.373	1.330	0.400	1.000	0.150	0.300	35.29%	15.00%

96h Survival Rate Detail — MD5: 89F7FC7E57578493A2E816F20933D2F8

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	1.000	1.000
100		1.000	1.000	0.400	1.000

CETIS Analytical Report

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	19-6025-9258	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:39	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:31	**MD5 Hash:**	89F7FC7E57578493A2E816F20933D2F8	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	27.00%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Lab Control		100	6	16	---	1	Exact	0.5000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.054543	0.054543	1	1	0.3559	Non-Significant Effect
Error	0.327258	0.054543	6			
Total	0.381801		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.706	0.645	0.0027	Non-Normal Distribution

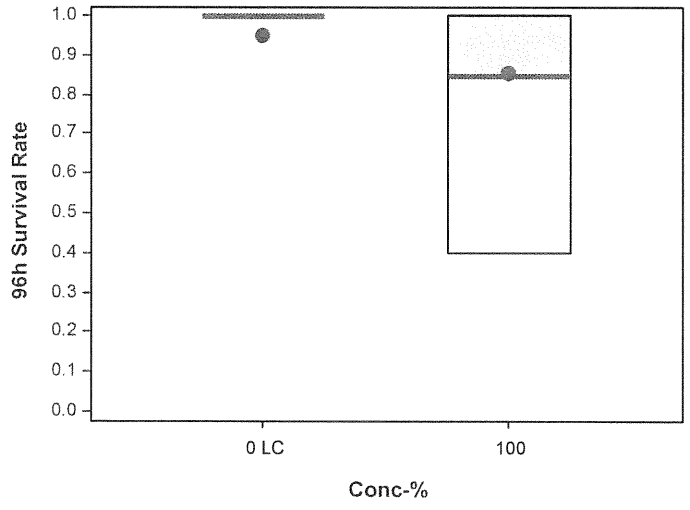
96h Survival Rate Summary

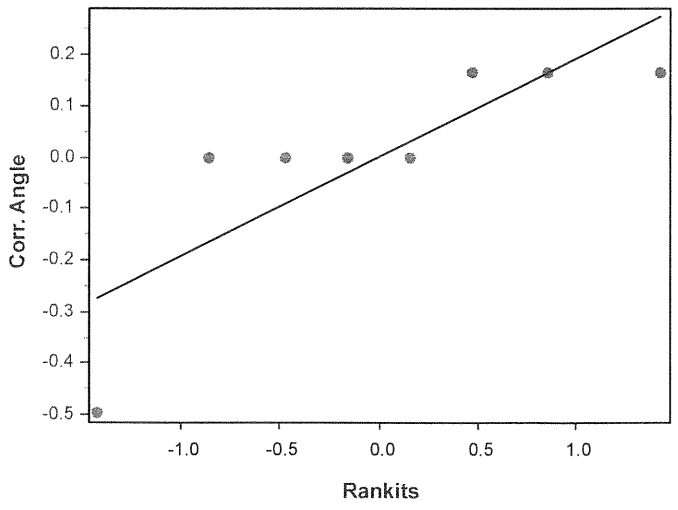
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	0.00%
100		4	0.850	0.373	1.000	1.000	0.400	1.000	0.150	35.29%	15.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.350	1.340	1.350	1.350	1.350	1.350	0.000	0.00%	0.00%
100		4	1.180	0.655	1.710	1.350	0.685	1.350	0.165	27.99%	12.28%

Graphics





CETIS Summary Report

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	08-9994-6704	**Test Type:**	Survival (96h)	**Analyst:**			
Start Date:	08 Feb-23 15:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable		
Ending Date:	12 Feb-23 15:05	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable		
Test Length:	96h	**Taxon:**		**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	06-1076-7431	**Code:**	23-0168	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 19:07 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-3
Sample Age:	92h (2.8 °C)	**Client:**	Stantec		

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
00-6012-8177	96h Survival Rate	Unequal Variance t Two-Sample Test	0.0908	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
00-6012-8177	96h Survival Rate	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	0.00%
100		4	0.900	0.716	1.080	0.800	1.000	0.058	0.115	12.83%	10.00%

96h Survival Rate Detail — MD5: 8EFCB7A73F934AC933DE98E2ED07BB4F

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	1.000	1.000	1.000	1.000
100		0.800	1.000	1.000	0.800

CETIS Analytical Report

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	00-6012-8177	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:40	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:32	**MD5 Hash:**	8EFCB7A73F934AC933DE98E2ED07BB4	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	14.26%

Unequal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control		100	3	1.73	2.35	0.162	CDF	0.0908	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.028354	0.028354	1	3	0.1340	Non-Significant Effect
Error	0.0567079	0.0094513	6			
Total	0.0850619		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.849	0.645	0.0929	Normal Distribution

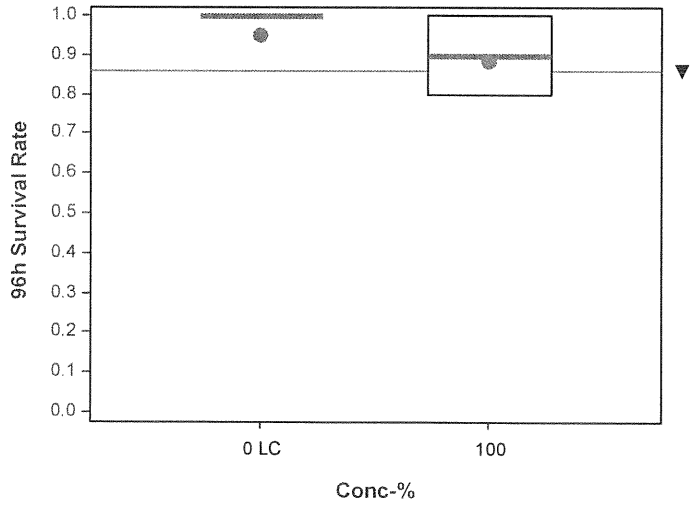
96h Survival Rate Summary

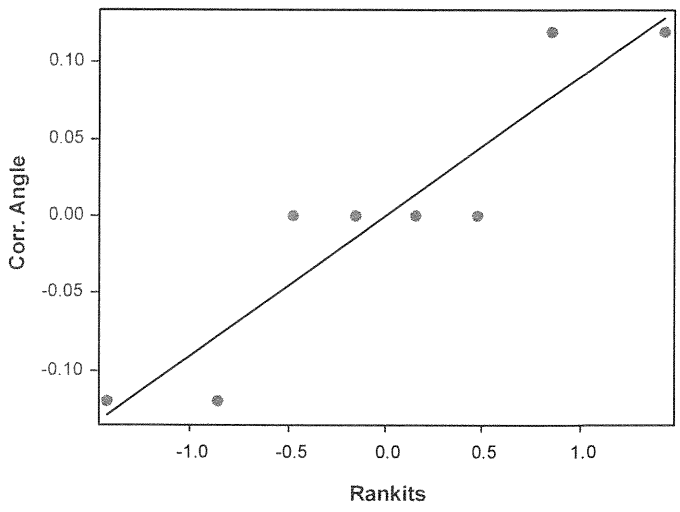
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	0.00%
100		4	0.900	0.716	1.000	0.900	0.800	1.000	0.058	12.83%	10.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.350	1.340	1.350	1.350	1.350	1.350	0.000	0.00%	0.00%
100		4	1.230	1.010	1.440	1.230	1.110	1.350	0.069	11.21%	8.85%

Graphics





96-hour Freshwater Acute Bioassay
Static-Renewal Conditions
DF-002

Water Quality Measurements & Test Organism Survival

Client: Stantec
Sample ID: DW-1/WW-1 and WW-3
Sample Log-in No.: 23-0166, 23-0168
Test No.: 2302-S100 & S106

Test Species: *C.dubia*
Start Date/Time: 2/8/23 1520
End Date/Time: 2/12/23 1505

Tech Initials	0	24	48	72	96
Counts:	HH	HH	RT	GM	HH
Readings:	HH	RT	RT	RT	RR
Dilutions made by:	GM		GM		

Concentration (%)	RAND #	Number of Live Organisms					Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L) QC14 QC14					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	12	5	5	5	5	5	202	197	i 184	176	220	19.9	20.6	i 20.3	20.8	20.7	8.2	8.5	i 8.8	8.9	9.0	8.06	8.13	i 8.22	8.09	8.28
	3	5	5	5	5	5			f 189					f 19.7					f 8.8					f 8.13		
	2	5	5	5	5	5																				
	6	5	5	5	5	5																				
100%	1	5	5	5	5	5	908	871	i 848	842	909	19.5	20.3	i 19.8	20.0	20.1	9.1	8.9	i 9.2	9.0	8.9	7.27	7.58	i 7.45	7.66	7.87
DW-1/WW-1	11	5	5	5	5	5			f 833					f 19.9					f 9.0					f 7.83		
	9	5	2	2	2	2																				
	8	5	5	5	5	5																	(B)	7.34		
100%	10	5	4	4	4	4	1208	1152	i 1129	1125	1225	19.7	20.0	i 19.4	19.9	20.1	9.4	8.9	i 9.4	8.9	8.9	7.00	7.48	i ~~7.00~~	7.55	7.80
WW-3	4	5	5	5	5	5			f 1129					f 19.8					f 9.0					f 7.75		
	5	5	5	5	5	5																				
	7	5	4	4	4	4																				
100%	A	5	5	5	5	5	903	879	i 845	862	943	19.6	19.5	i 19.3	19.9	20.1	9.2	9.0	i 9.4	9.0	8.8	7.36	7.65	i 7.60	7.75	7.80
DW-1/WW-1	B	5	5	5	5	5			f 826					f 19.8					f 8.9					f 7.75		
Filtered	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
100%	A	5	5	5	5	5	1199	1153	i 1140	1146	1304	19.5	19.9	i 19.1	19.3	20.1	9.5	8.9	i 9.3	9.0	8.8	7.19	7.70	i 7.34	7.69	7.79
~~WW-3~~ ~~DW-1/WW-1~~ (A)	B	5	5	5	5	5			f 1104					f 19.8					f 9.0					f 7.69		
Filtered	C	5	5	5	5	5																				
	D	5	5	5	5	5																				
									i					i					i					i		
									f					f					f					f		
									i					i					i					i		
									f					f					f					f		

Initial Counts QC'd by: KR
Initiated by: HH

Environmental Chamber: C

Animal Source/Date Received: Internal N/A

Age at Initiation: 44 hrs

Feeding Times	0	24	48	72	96
	--	--	1440	--	--
	--	--	--	--	--

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one (y) / n) (A) QC8 HH 2/8/23 (B) QC8 KR 2/10/23

QC Check: ACS 2/22/23

Final Review: BO 4/10/23

CETIS Summary Report

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Batch ID:	04-6621-0920	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Feb-23 16:35	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	(A) Not Applicable ~~Coast Filtered Water~~
Ending Date:	13 Feb-23 ~~15:35~~ 1536 (A)	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Test Length:	95h	**Taxon:**		**Source:**	Aquatic Research Organis **Age:** 13d

Sample ID:	02-6411-0739	**Code:**	23-0166	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 18:08 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	DW-1/WW-1
Sample Age:	4d 22h (2.2 °C)	**Client:**			

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
05-8974-9213	96h Survival Rate	Equal Variance t Two-Sample Test	0.0654	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
05-8974-9213	96h Survival Rate	Control Resp	0.975	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	0.975	0.895	1.050	0.900	1.000	0.025	0.050	5.13%	0.00%
100		4	0.825	0.553	1.100	0.600	1.000	0.085	0.171	20.70%	15.38%

96h Survival Rate Detail — MD5: 3D81862AE343D12395456D20012F02C4

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	0.900	1.000	1.000	1.000
100		0.600	0.800	0.900	1.000

(A) GWRA 3/1/23

CETIS Analytical Report

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	05-8974-9213	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	17 Feb-23 9:52	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	17 Feb-23 9:51	**MD5 Hash:**	3D81862AE343D12395456D20012F02C4	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	15.28%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control		100	6	1.75	1.94	0.231	CDF	0.0654	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0862799	0.0862799	1	3.06	0.1308	Non-Significant Effect
Error	0.169137	0.0281895	6			
Total	0.255417		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.49	47.5	0.1323	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.95	0.645	0.7154	Normal Distribution

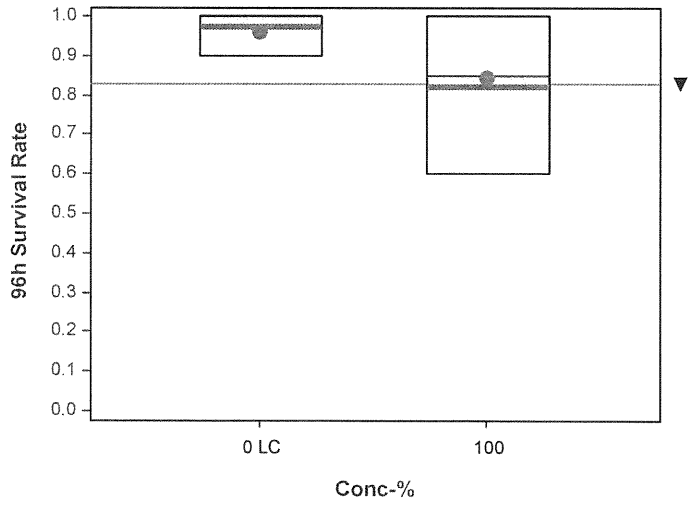
96h Survival Rate Summary

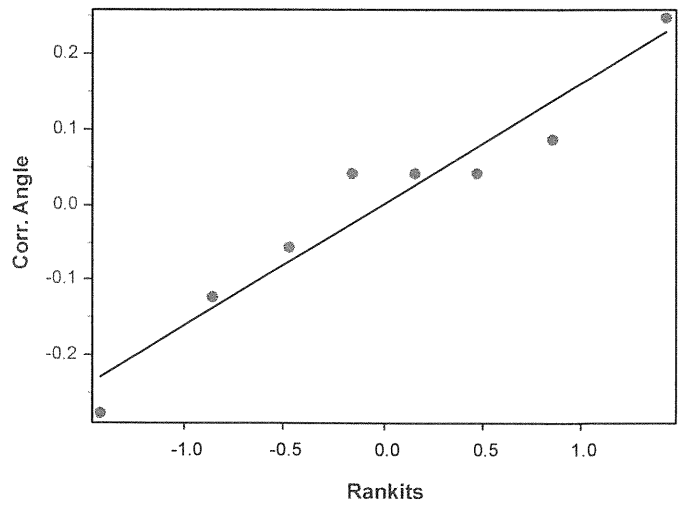
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	0.975	0.895	1.000	1.000	0.900	1.000	0.025	5.13%	0.00%
100		4	0.825	0.553	1.000	0.850	0.600	1.000	0.085	20.70%	15.38%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.370	1.240	1.500	1.410	1.250	1.410	0.041	5.94%	0.00%
100		4	1.160	0.809	1.520	1.180	0.886	1.410	0.112	19.17%	15.15%

Graphics





CETIS Summary Report

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Batch ID:	19-1557-7333	**Test Type:**	Survival (96h)	**Analyst:**	Not Applicable
Start Date:	09 Feb-23 16:35	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	(A) ~~Coast Filtered Water~~
Ending Date:	13 Feb-23 ~~15:35~~ (A) 15:36	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Test Length:	95h	**Taxon:**		**Source:**	Aquatic Research Organis **Age:** 13d

Sample ID:	13-7433-2775	**Code:**	23-0168	**Project:**	ADC Kekaha WQ Monitoring
Sample Date:	04 Feb-23 19:07 PST	**Material:**	Wet Weather Sample	**Source:**	Stantec
Receipt Date:	07 Feb-23 10:05 PST	**CAS (PC):**		**Station:**	WW-3
Sample Age:	4d 21h (2.8 °C)	**Client:**			

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
18-2754-1073	96h Survival Rate	Wilcoxon Rank Sum Two-Sample Test	1.0000	100% passed 96h survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
18-2754-1073	96h Survival Rate	Control Resp	0.975	0.9	<<	Yes	Passes Criteria

96h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	LC	4	0.975	0.895	1.050	0.900	1.000	0.025	0.050	5.13%	0.00%
100		4	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.00%	-2.56%

96h Survival Rate Detail — MD5: 21D268C47692D55E146784CC9C677FF0

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	LC	0.900	1.000	1.000	1.000
100		1.000	1.000	1.000	1.000

(A) QC'd AMS 3/1/23

CETIS Analytical Report

Test Code/ID: 2302-S107 / 14-5156-0287

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	18-2754-1073	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv2.1.2
Analyzed:	23 Feb-23 13:23	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	23 Feb-23 13:23	**MD5 Hash:**	21D268C47692D55E146784CC9C677FF0	**Editor ID:**	007-803-386-7

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed 96h survival rate endpoint	5.20%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Lab Control		100	6	20	---	1	Exact	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0033199	0.0033199	1	1	0.3559	Non-Significant Effect
Error	0.0199195	0.0033199	6			
Total	0.0232394		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.706	0.645	0.0027	Non-Normal Distribution

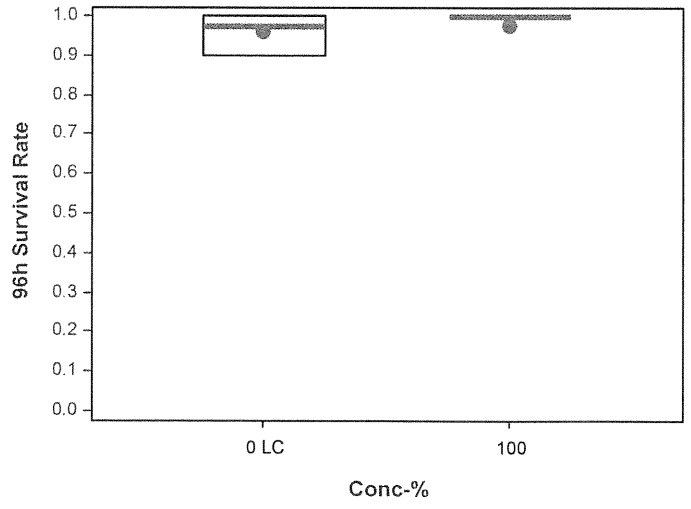
96h Survival Rate Summary

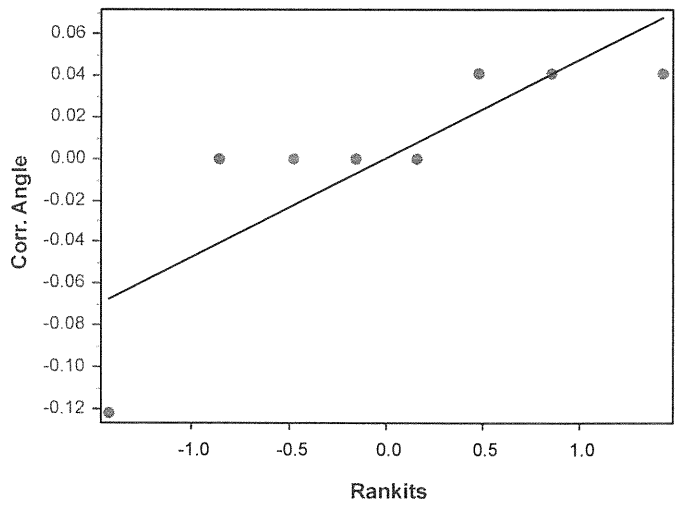
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	0.975	0.895	1.000	1.000	0.900	1.000	0.025	5.13%	0.00%
100		4	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.00%	-2.56%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	LC	4	1.370	1.240	1.500	1.410	1.250	1.410	0.041	5.94%	0.00%
100		4	1.410	1.410	1.410	1.410	1.410	1.410	0.000	0.00%	-2.97%

Graphics





Analyst: RL QA: RCS 3/1/23

96-hour Freshwater Acute Bioassay
Static-Renewal Conditions
DF-006

Water Quality Measurements & Test Organism Survival

Client: Stantec
Sample ID: WW-3 + DW-1/WW-1
Sample Log-in No's.: 23-0166, 23-0168
Test No's.: 2302-S101 & S107

Test Species: *H. azteca*
Start Date/Time: 2/9/23 1635
End Date/Time: 2/13/23 1536

Tech Initials	0	24	48	72	96
Counts:	KL	KR	RT	DR	KL
Readings:	RT	RT	WF	DR	KR
Dilutions made by:	HH		CM		

Sample ID (100%)	Rep	Number of Live Organisms					Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L) Q14 … Q14					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	10	10	9	9	9	924	922	i 886	990	904	19.6	19.8	i 20.0	20.2	20.2	9.0	9.0	i 7.3	8.7	9.1	8.41	8.20	i 8.38	8.45	8.37
(COAST)	B	10	10	10	10	10			f 907					f 20.0					f 9.0					f 8.27		
	C	10	10	10	10	10																				
	D	10	10	10	10	10																	7.84			
100%	A	10	(A) ~~10~~ Q13	Q13	Q13	6	882	873	i 834	932	910	19.9	20.0	i 19.4	20.3	20.4	9.4	9.0	i 9.0	8.6	9.0	7.41	~~8.07~~	i 7.43	7.90	7.82
DW-1/WW-1	B	10	↓	↓	Q13	8			f 855					f 20.2					f 9.0				(A)	f 7.93		
	C	10	↓	↓	Q13	9																				
	D	10	↓	↓	↓	10																				
100%	A	10	Q13	Q13	Q13	(B) ~~9~~ 10	1168	1152	i 1113	1240	1211	19.9	20.0	i 19.3	20.3	20.3	9.5	9.0	i 9.0	8.6	9.0	7.21	7.72	i 7.25	7.86	7.84
WW-3	B	10	↓	↓	↓	10			f 1132					f 20.1					f 8.9					f 7.75		
	C	10	↓	↓	↓	10																				
	D	10	↓	↓	↓	10																				

Initial Counts QC'd by: RT
Initiated by: KL

Environmental Chamber: C

Animal Source/Date Received: ARO 2/8/23
Age at Initiation: 13 days

Animal Acclimation Qualifiers (circle all that apply): Q22 / (Q23) / Q24 / none

Feeding Times	0	24	48	72	96
AM:	--	--	0840	--	--
PM:	--	--	--	--	--

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal
Organisms fed prior to initiation, circle one ((y) / n) (A) Q18 RT 2/10/23
(B) Q18 KL 2/13/23

QC Check: ACS 2/22/23

Final Review: BO 4/10/23

Appendix B

Sample Check-In Information

Enthalpy Analytical
4340 Vandever Avenue
San Diego, CA 92120

Client: Stantec (previously Cardno)
Sample ID: See Below
Test ID No(s).: 2302-5099 to 5107

Sample Check-In Information
DC-005

Sample Description:
DW-1/WW-1: dark orange, opaque, no odor, heavy debris
WW-2: light orange, slightly opaque, no odor, light debris
WW-3: dark orange, opaque, no odor, light debris

Sample (A, B, C): (IDS)	DW-1/WW-1	WW-2	WW-3	
Log-in No. (23-xxxx): (B)	0166	0167	0168	
Sample Collection Date & Time:	2/4/23 1900 BST	2/4/23 1932 BST	2/4/23 1907 BST	
Sample Receipt Date & Time:	2/7/23 1005	2/7/23 1005	2/7/23 1005 (C)	
Number of Containers & Container Type:	2, 4L cubes	2, 4L cubes	2, 4L cubes	
Approx. Total Volume Received (L):	8	8	8	
Check-in Temperature (°C)	2.2	2.2	2.8	
Temperature OK? [1]	(Y) N	(Y) N	(Y) N	Y N
DO (mg/L)	9.5	(A) ~~4~~ 7.3	8.8	
pH (units)	7.38	7.30	7.18	
Conductivity (µS/cm)	4883	(A) ~~25~~ —	1170	
Salinity (ppt)	0.4	25.3	0.6	
Alkalinity (mg/L) [2]	nm	nm	nm	
Hardness (mg/L) [2, 3]	nm	nm	nm	
Total Chlorine (mg/L)	nm	nm	nm	
Technician Initials	KL	KL	KL	

~~DW-1/WW-1~~ + © WW-2

Test Performed: Acute topsmelt, Menidia, mysid — Control/Dilution Water: 8:2 / Lab SW / (Lab ART) Other: _____
Alkalinity: (B) ~~77~~ 177 Hardness or Salinity: 30ppt
Additional Control? (Y) N = LabSW Alkalinity: (B) ~~87~~ 107 Hardness or Salinity: 30ppt

DW-1/WW-1 + WW-3

Test Performed: Acute fathead, Ceriodaphnia, Hyalella — Control/Dilution Water: (8:2) / Lab SW / Lab ART Other: Coast (hyalella)
Alkalinity: 110 / 124 Hardness or Salinity: 90 / 260
Additional Control? Y (N) = _____ Alkalinity: _____ Hardness or Salinity: _____

Test Performed: _____ — Control/Dilution Water: 8:2 / Lab SW / Lab ART Other: _____
Alkalinity: _____ Hardness or Salinity: _____
Additional Control? Y N = _____ Alkalinity: _____ Hardness or Salinity: _____

COC Complete (Y/N)?
A Y B____ C____

Filtration? (Y) N
Initials: A) AGS 020080 B)_____ C) AGS 020080 Tested filtered & unfiltered
Pore Size: 0.45 um
Organisms or (Debris)
Salinity Adjustment? Y (N)
Test: Source: Target ppt:
Test: Source: Target ppt:
Test: Source: Target ppt:
pH Adjustment? Y (N)

	A	B	C
Initial pH:			
Amount of HCl added:			
Final pH:			

Cl_2 Adjustment? Y (N)

	A	B	C
Initial Free Cl_2:			
STS added:			
Final Free Cl_2:			

Sample Aeration? Y (N)

	A	B	C
Initial D.O.			
Duration & Rate			
Final D.O.			

Measure NH3 via test strip (circle one)? Y (N)
NH3 Strip Result* A:_____ B:_____ C:_____
*(if 6 or more, notify PM)

Subsamples for Additional Chemistry Required? Y (N)
NH3 Other _____
Tech Initials A_____ B_____ C_____

Notes: [1] Temperature of sample should be 0-6°C, if received more than 24 hours past collection time.
[2] mg/L as CaCO3, [3] Measured for freshwater samples only, NA = Not Applicable

Additional Comments: nm = not measured; Sample too dark and opaque to detect.
(A) QA to MK 2/7/23 @QB BO 2/7/23 (B) QA/AS 2/22/23
(C) All samples arrived out of holding time; tested per client's request AS 2/22/23

QC Check: AS 2/22/23

Final Review: BO 4/10/23

Appendix C

Chain-of-Custody Form

Enthalpy Analytical - Environmental Toxicology

4340 Vandever Avenue
San Diego, CA 92120
Phone 858.587.7333
infoSD@enthalpy.com

Chain of Custody

Date 2/6/2023 Page 1 of 1

Sample Collection By:

Report to:		Invoice To:	Same as Report to [X]
Company	Cardno-GS	Company	
Address	737 Bishop St Suite 3050	Address	
City/State/Zip	Honolulu, HI 96734	City/State/Zip	
Contact	Benjamin Berridge	Contact	
Phone	808-476-0067	Phone	
Email	benjamin.berridge@cardno-gs.com	Email	

	SAMPLE ID	SAMPLE Date	Time	Type (G or C)	MATRIX CODE (FW, SW, Sed, STRM, GW, WW, O)	Container Type	Qty	COMMENTS	ANALYSES REQUIRED: *P. promelas* 96-hr Acute Survival	*C. dubia* 96-hr Acute Survival	*H. azteca* 96-hr Acute Survival	*A. affinis* 96-hr Acute Survival	*M. beryllina* 96-hr Acute Survival	A. bahia 6-hr Acute Survival	Receipt Temperature (°C)
1	DW-1/WW-1	2-4-2023	16:00 HST	G	STRM - SW 1.81 PPT	2.5 Gal Plastic	2	Analyze outside of holding time.	X	X	X	X	X	X	2.2
2	WW-2	2-4-2023	16:32 HST	G	STRM - SW 23.58 PPT	2.5 Gal Plastic	2	Analyze outside of holding time.				X	X	X	2.2
3	WW-3	2-4-2023	17:07 HST	G	STRM - FW 0.47 PPT	2.5 Gal Plastic	2	Analyze outside of holding time.	X	X	X				2.8
4															
5															
6															
7															
8															
9															
10															

Enthalpy Matrix Codes:
G = Grab
C = Composite
FW = Freshwater
SW = Seawater
Sed = Sediment
STRM = Stormwater
GW = Groundwater
WW = Wastewater
O = Other (specify)

PROJECT INFORMATION		SAMPLE RECEIPT	
Project Name:	ADC Water Quality Monitoring	Total No. of Containers	6
PO No.:		Received Good Condition?	Y
Shipped Via:	FedEx	Matches Test Schedule?	Y

SPECIAL INSTRUCTIONS/COMMENTS:
@ Sample salinity <1.0ppt; Therefore, freshwater species tested BO 2/7/23

1) RELINQUISHED BY (CLIENT)		2) RECEIVED BY (COURIER)	
(Signature)	(Time) 14:00	(Signature)	(Time)
(Printed Name) Ben Berridge	(Date) 2/6/2023	(Printed Name)	(Date)
(Company) Cardno/Stantec		(Company) FedEx - See Shipping Information	

3) RELINQUISHED BY (COURIER)		4) RECEIVED BY (LABORATORY)	
(Signature)	(Time)	(Signature)	(Time) 1005
(Printed Name)	(Date)	(Printed Name) Kira LaFace	(Date) 2/7/23
(Company)		(Company) EA SD	(Log-in #s) 23-0166, 0167, 0168

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.
Shaded areas are for lab use only
Report turn-around-time varies depending on length of test; please inquire with your project manager.

http://enthalpy.com/environmental-toxicology-2/

Appendix D

Qualifier Code Glossary

Glossary of Qualifier Codes

Q1 - Temperature out of recommended range; corrective action taken and recorded in Test Temperature Correction Log

Q2 - Temperature out of recommended range; no action taken, test terminated same day

Q3 - Sample pH adjusted to within range of 6-9 with reagent grade NaOH or HCl, as needed

Q4 - Test aerated; D.O. levels dropped below 4.0 mg/L

Q5 - Test initiated with continuous aeration due to an anticipated drop in D.O.

Q6 - Airline obstructed or fell out of replicate and replaced; drop in D.O. occurred

Q7 - Salinity out of recommended range

Q8 - Spilled test chamber/ Unable to recover test organism(s)

Q9 - Inadequate sample volume remaining, partial renewal performed

Q10 - Inadequate sample volume remaining, no renewal performed

Q11 - Sample out of holding time; refer to QA section of report

Q12 - Replicate(s) not initiated; excluded from data analysis

Q13 - Survival counts not recorded due to poor visibility or heavy debris

Q14 - D.O. percent saturation was checked and was ≤ 110%

Q15 - Did not meet minimum test acceptability criteria. Refer to QA section of report.

Q16 - Percent minimum significant difference (PMSD) was below the lower bound limit for acceptability. This indicates that statistics may be over-sensitive in detecting a difference from the control due to low variability in the data set. Test results were reviewed and reported in accordance with guidance found in EPA-833-R-00-003, 2000 unless otherwise specified.

Q17 - Percent minimum significant difference (PMSD) was above the upper bound limit for acceptability. This indicates that statistics may be under-sensitive in detecting a difference from the control due to high variability in the data set. Test results were reviewed and reported in accordance with EPA-833-R-00-003, 2000 guidance unless otherwise specified.

Q18 - Incorrect or illegible Entry

Q19 - Miscalculation

Q20 - PMSD criteria do not apply to the test of significant toxicity (TST) analysis

Q21 - Other (provide reason in comments section)

Q22 - Greater than 10% batch mortality observed upon receipt and/or in holding prior to test initiation. Organisms acclimated to test conditions at Enthalpy and ultimately deemed fit to use for testing.

Q23 - Test organisms experienced a temperature shift greater than 3°C within 1 day or were received at a temperature greater than 3°C outside the recommended test temperature range and had minimal time to acclimate prior to test initiation. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate test(s). Organisms were ultimately deemed fit to use for testing.

Q24 - Test organisms experienced a salinity shift greater than 3 ppt within 1 day or were received at a salinity greater than 3 ppt outside the recommended test salinity range and had minimal time to acclimate prior to test initiation. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate test(s). Organisms were ultimately deemed fit to use for testing.

Appendix E

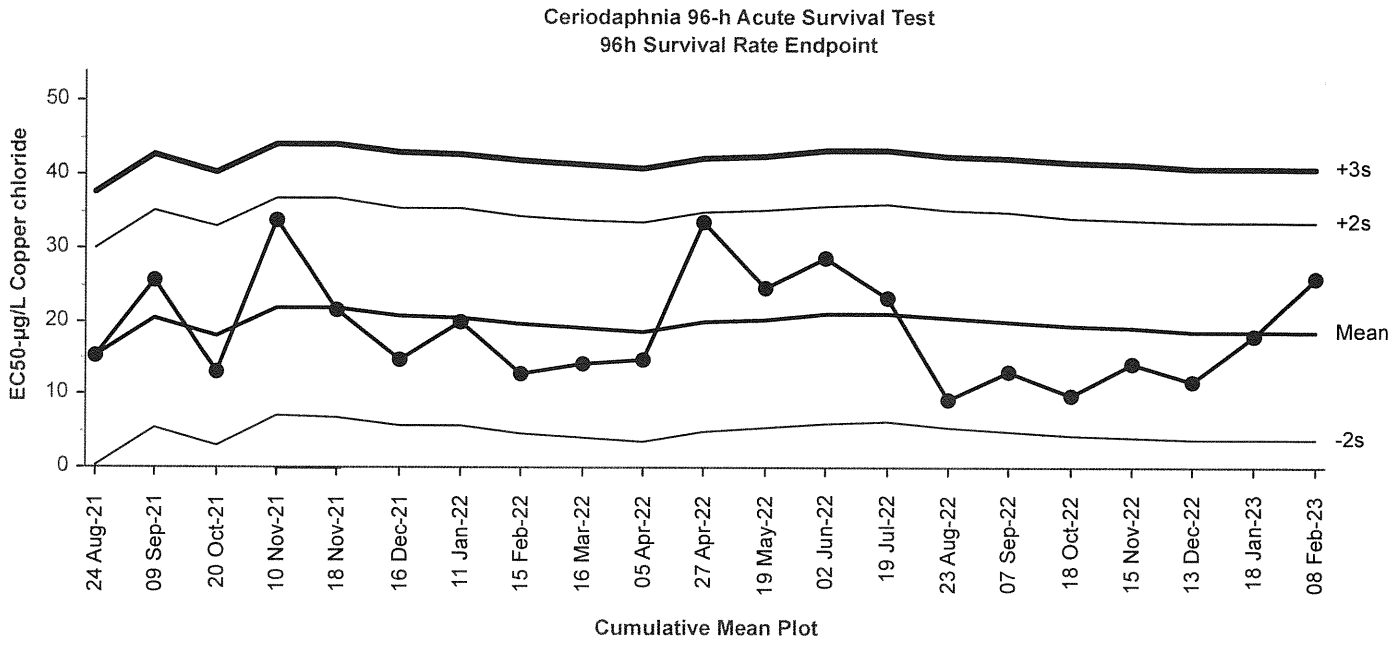
Reference Toxicant Test Control Charts

CETIS QC Plot

Report Date: 13 Feb-23 09:31 (1 of 1)

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Ceriodaphnia dubia	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	18.58	**Count:**	20	**-2s Warning Limit:**	3.69	**-3s Action Limit:**	-3.75
Sigma:	7.443	**CV:**	40.10%	**+2s Warning Limit:**	33.5	**+3s Action Limit:**	40.9

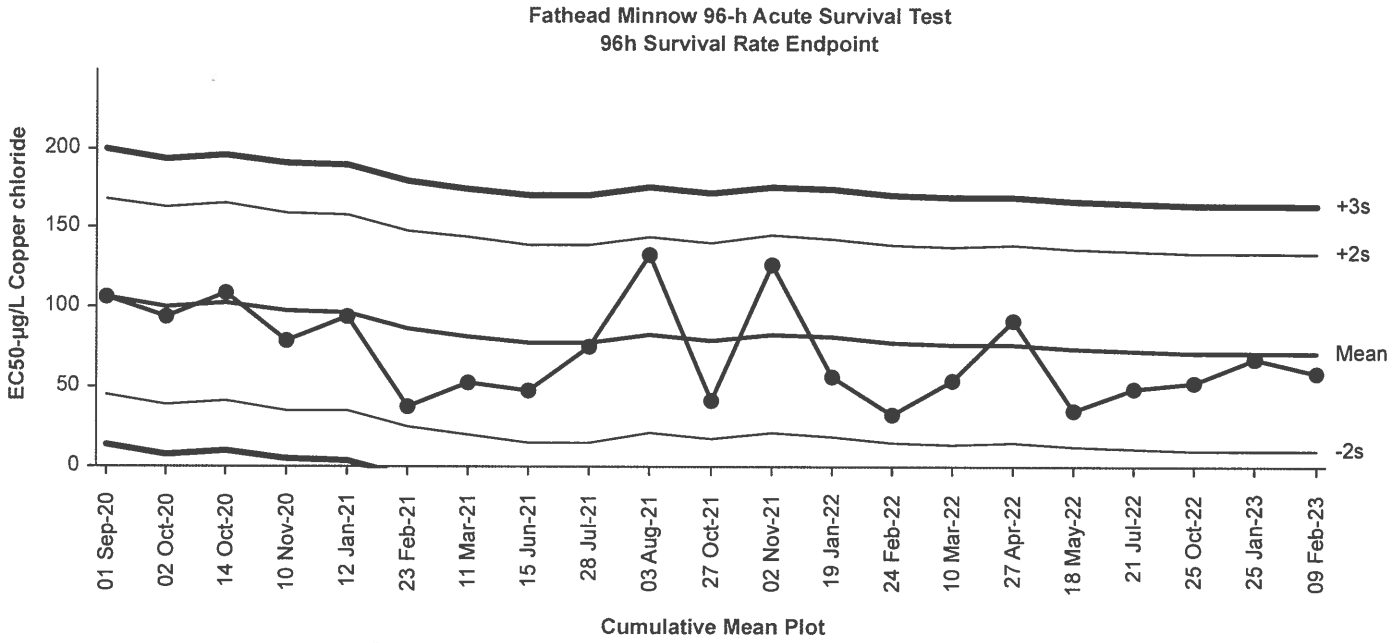
Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2021	Aug	24	14:30	15.16	-3.423	-0.4599			16-7751-9851	12-8178-8398
2		Sep	9	16:10	25.49	6.911	0.9286			20-4067-7008	08-9042-7975
3		Oct	20	15:35	13.2	-5.385	-0.7235			05-1097-3999	04-4068-7551
4		Nov	10	16:15	33.71	15.13	2.033	(+)		13-9846-9861	13-7049-3150
5			18	14:30	21.44	2.855	0.3836			17-9444-3715	09-3342-3577
6		Dec	16	17:20	14.6	-3.977	-0.5343			14-6159-9603	07-8985-1975
7	2022	Jan	11	15:00	20	1.42	0.1908			16-5501-6237	05-0045-3257
8		Feb	15	15:20	12.91	-5.674	-0.7623			19-8470-5266	12-1776-6242
9		Mar	16	15:00	14.14	-4.438	-0.5962			08-4939-9657	04-1675-6253
10		Apr	5	16:55	14.64	-3.939	-0.5292			15-6426-3206	15-2718-9221
11			27	15:15	33.64	15.06	2.023	(+)		08-4806-4027	01-7719-2285
12		May	19	15:15	24.62	6.035	0.8109			15-0414-1498	09-1011-4307
13		Jun	2	15:40	28.57	9.986	1.342			13-6497-5171	08-6278-4122
14		Jul	19	15:45	23.16	4.584	0.6158			03-1124-9631	00-8098-2495
15		Aug	23	15:50	9.33	-9.25	-1.243			20-3988-3287	11-6761-6164
16		Sep	7	15:00	13.2	-5.385	-0.7235			01-7106-9553	05-0730-6008
17		Oct	18	15:25	9.862	-8.718	-1.171			00-3320-6805	04-6100-3813
18		Nov	15	15:05	14.14	-4.438	-0.5962			00-5461-1467	19-6868-6561
19		Dec	13	15:05	11.7	-6.878	-0.9241			12-0086-6428	08-7195-5995
20	2023	Jan	18	13:55	18.03	-0.555	-0.07457			09-7538-0685	07-8161-1407
21		Feb	8	15:20	25.96	7.378	0.9912			17-7377-6097	02-7722-6792

CETIS QC Plot

Fathead Minnow 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Pimephales promelas	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	71.79	**Count:**	20	**-2s Warning Limit:**	9.83	**-3s Action Limit:**	-21.1
Sigma:	30.98	**CV:**	43.20%	**+2s Warning Limit:**	134	**+3s Action Limit:**	165

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2020	Sep	1	18:00	106.8	35.03	1.131			05-5925-4870	11-8222-6308
2		Oct	2	14:35	94.56	22.77	0.735			10-6788-7581	10-0094-1709
3			14	15:55	108.9	37.12	1.198			16-9476-4319	04-8332-8963
4		Nov	10	15:50	79.05	7.26	0.2343			10-0925-3953	05-0925-4459
5	2021	Jan	12	16:10	93.54	21.75	0.7021			10-2818-5435	19-4959-1498
6		Feb	23	16:00	37.5	-34.29	-1.107			00-7897-7348	07-5099-8101
7		Mar	11	16:25	52.64	-19.15	-0.6182			20-0307-6488	03-1985-7497
8		Jun	15	17:10	47.63	-24.16	-0.78			13-1662-1659	03-5455-1927
9		Jul	28	17:30	75.92	4.127	0.1332			04-8837-0734	00-2418-4039
10		Aug	3	15:30	133.2	61.39	1.982			01-5905-1678	06-9846-1307
11		Oct	27	17:55	41.65	-30.14	-0.9729			04-8454-9323	21-2291-3266
12		Nov	2	14:55	126.6	54.78	1.768			02-5381-8973	13-3748-9296
13	2022	Jan	19	14:00	56.14	-15.65	-0.505			20-2049-9334	07-9545-0483
14		Feb	24	16:10	32.6	-39.19	-1.265			17-0760-7068	11-1555-4113
15		Mar	10	15:55	54.03	-17.76	-0.5733			12-1339-4334	02-2933-1085
16		Apr	27	15:10	91.63	19.84	0.6403			04-5378-2545	07-8420-2882
17		May	18	16:55	35.22	-36.57	-1.18			18-5661-4183	07-3447-2353
18		Jul	21	17:45	48.45	-23.34	-0.7535			07-1587-3363	06-2880-7627
19		Oct	25	15:50	52.4	-19.39	-0.626			06-6314-9915	03-2187-1829
20	2023	Jan	25	18:01	67.41	-4.379	-0.1413			19-0784-2205	08-9150-6242
21		Feb	9	16:50	59.42	-12.37	-0.3993			06-2469-6093	00-8217-4012

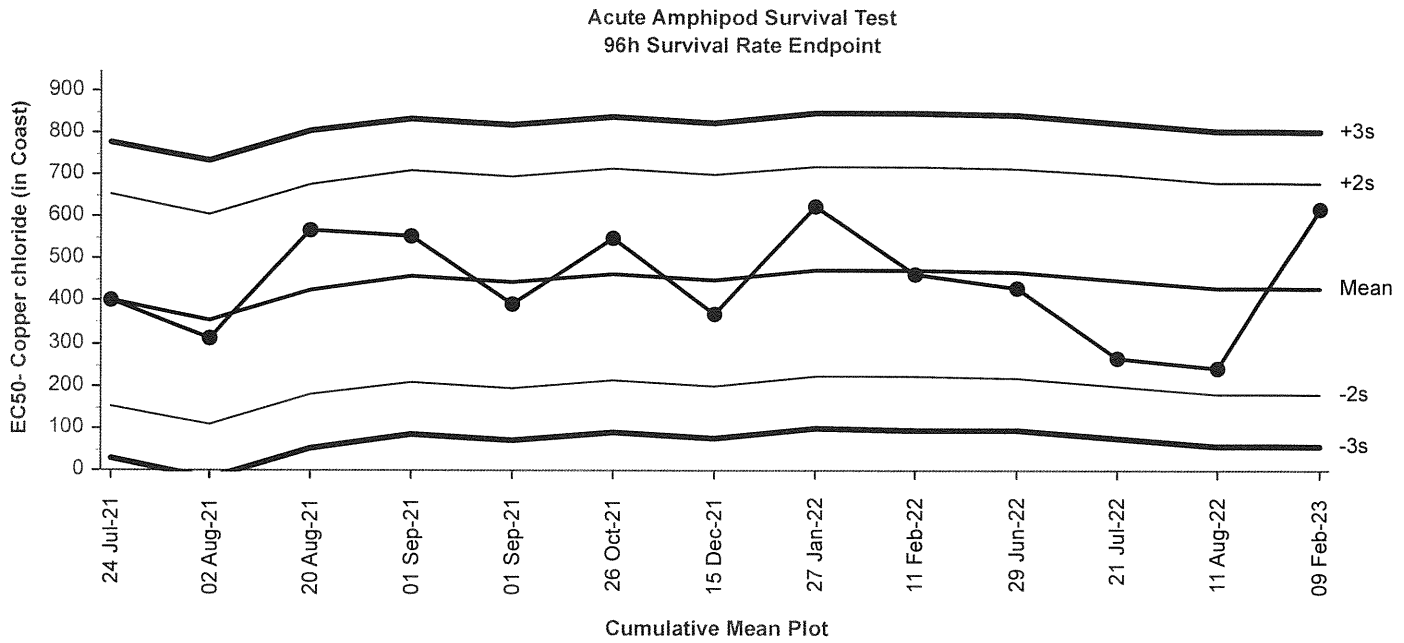
Analyst: RL QA: MS 2/22/23

CETIS QC Plot

Report Date: 15 Feb-23 13:27 (1 of 1)

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Hyalella azteca	**Material:**	Copper chloride (in Coast)
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	430.7	**Count:**	12	**-2s Warning Limit:**	181	**-3s Action Limit:**	56.6
Sigma:	124.7	**CV:**	29.00%	**+2s Warning Limit:**	680	**+3s Action Limit:**	805

Quality Control Data

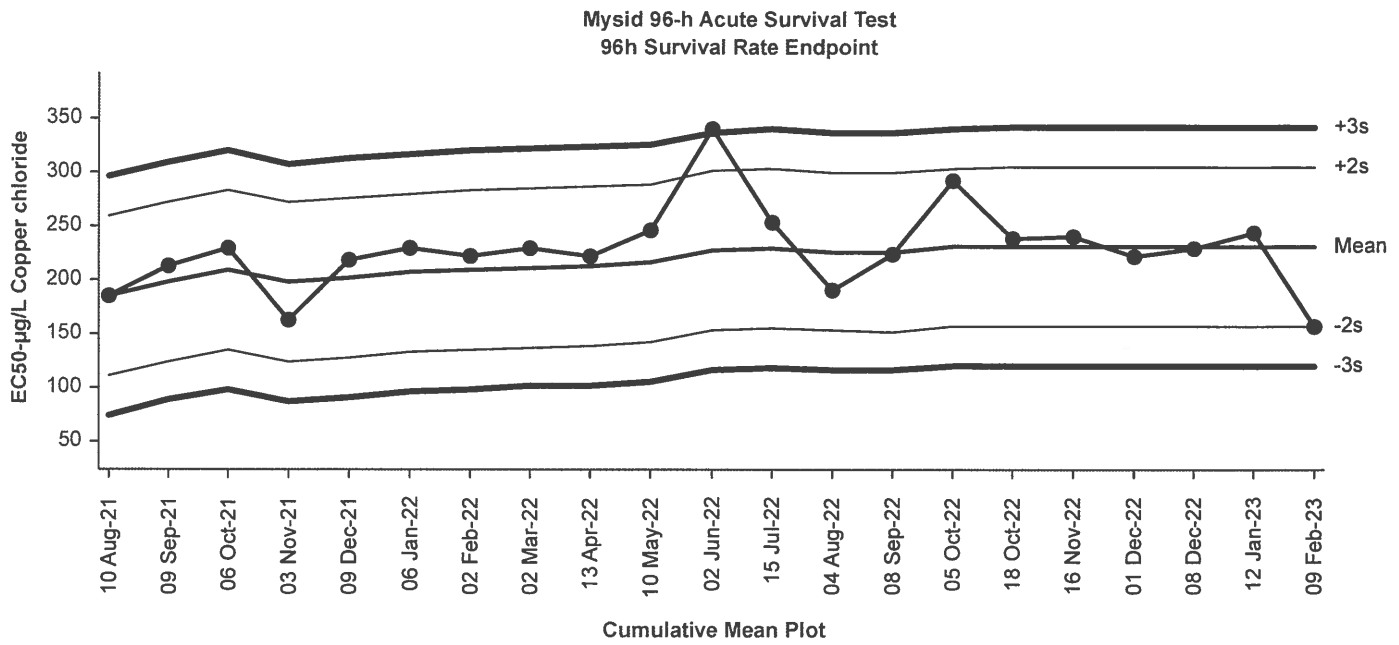
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2021	Jul	24	10:35	402.1	-28.64	-0.2297			01-9158-2894	04-9657-5582
2		Aug	2	18:10	311.1	-119.6	-0.9588			12-1293-8948	18-5258-0274
3			20	16:45	568.8	138.1	1.107			13-6419-6120	05-7250-0573
4		Sep	1	14:40	551	120.3	0.9649			16-9611-9317	12-1127-8026
5			1	16:00	393.8	-36.91	-0.296			05-5529-3044	09-1102-6160
6		Oct	26	19:00	549.6	118.9	0.9533			18-1063-1366	05-2379-1035
7		Dec	15	18:25	366.8	-63.9	-0.5124			20-2781-7958	18-9516-9975
8	2022	Jan	27	17:30	625.4	194.7	1.561			18-9392-5843	01-5172-6206
9		Feb	11	17:35	463.8	33.14	0.2658			14-7873-5968	19-5575-1394
10		Jun	29	17:00	431	0.3464	0.002778			03-3409-7356	15-5020-6688
11		Jul	21	16:27	264.5	-166.2	-1.333			05-1323-0021	05-5852-2990
12		Aug	11	18:55	240.4	-190.3	-1.526			20-9606-1183	03-0306-6180
13	2023	Feb	9	17:15	619.4	188.7	1.514			20-3293-9827	10-5332-3305

CETIS QC Plot

Report Date: 14 Feb-23 10:42 (1 of 1)

Mysid 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Americamysis bahia	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Cumulative Mean Plot

Mean:	231.6	**Count:**	20	**-2s Warning Limit:**	158	**-3s Action Limit:**	121
Sigma:	36.77	**CV:**	15.90%	**+2s Warning Limit:**	305	**+3s Action Limit:**	342

Quality Control Data

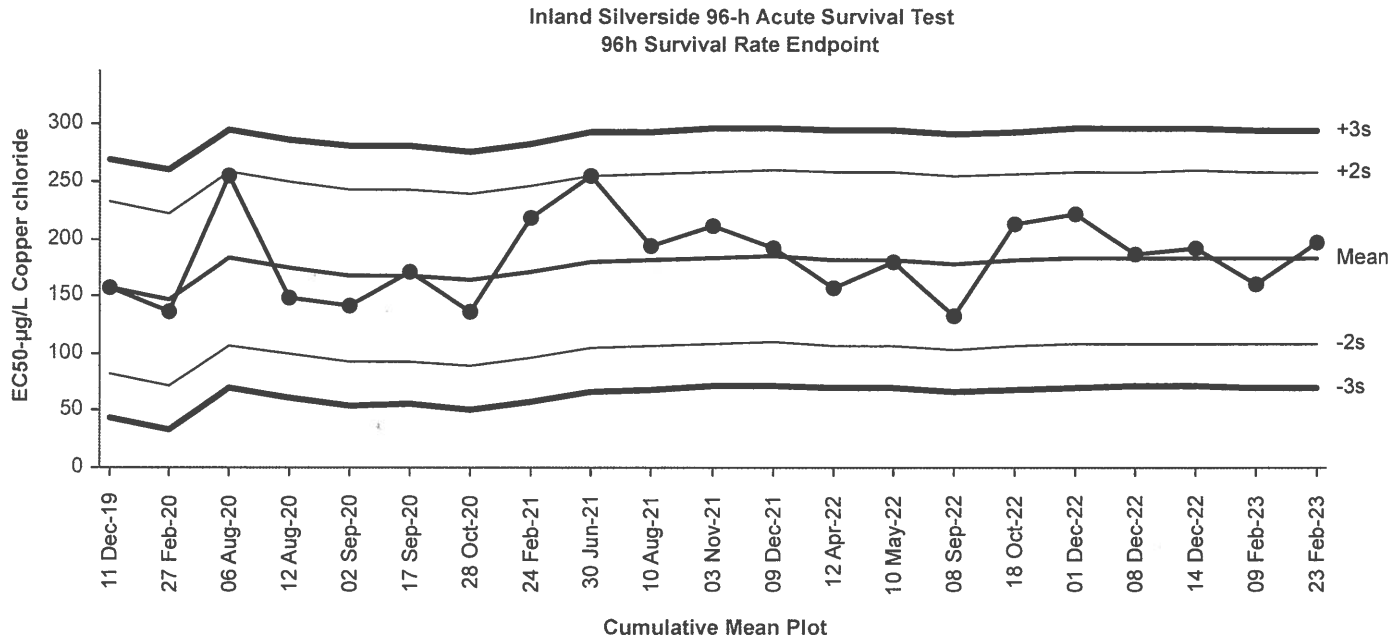
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2021	Aug	10	17:15	184.6	-46.97	-1.277			01-4163-2041	16-5453-9162
2		Sep	9	16:50	212.2	-19.37	-0.5267			19-9503-3728	00-7298-1641
3		Oct	6	17:00	229.4	-2.204	-0.05995			21-3339-5883	18-5433-4447
4		Nov	3	17:40	163.6	-67.96	-1.848			03-0676-2868	02-4632-6423
5		Dec	9	16:55	219.1	-12.5	-0.34			14-6810-7407	12-0239-6176
6	2022	Jan	6	18:35	229.7	-1.86	-0.05059			08-4763-9809	17-4517-5950
7		Feb	2	15:43	221.9	-9.686	-0.2634			02-9039-0198	04-3775-7572
8		Mar	2	17:00	229.7	-1.86	-0.05059			19-5561-3648	03-3054-6534
9		Apr	13	14:15	221.2	-10.42	-0.2833			18-2705-2426	19-3047-8671
10		May	10	16:15	246.2	14.63	0.3978			14-0311-5896	14-7347-1987
11		Jun	2	15:42	339.4	107.8	2.933	(+)		02-6130-3312	02-8523-9304
12		Jul	15	20:05	253.5	21.92	0.5962			19-2711-8068	20-2053-7857
13		Aug	4	17:10	191.2	-40.42	-1.099			16-8325-4713	08-3952-4218
14		Sep	8	19:03	223.6	-7.985	-0.2172			10-7782-8177	04-6329-1845
15		Oct	5	17:45	292.8	61.22	1.665			04-2099-3213	17-6129-8612
16			18	15:35	237.8	6.241	0.1697			14-3446-1621	00-3715-4792
17		Nov	16	16:26	239.9	8.346	0.227			10-5407-6865	04-4771-5512
18		Dec	1	17:15	221.9	-9.686	-0.2634			12-7728-2441	03-3819-4975
19			8	17:00	229.7	-1.86	-0.05059			10-3057-7335	14-3192-0583
20	2023	Jan	12	16:40	243.5	11.88	0.323			06-4134-1621	13-1048-4946
21		Feb	9	16:00	158	-73.57	-2.001	(-)		20-3360-0175	15-2448-4691

CETIS QC Plot

Report Date: 28 Feb-23 11:11 (1 of 1)

Inland Silverside 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Menidia beryllina	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	183	**Count:**	20	**-2s Warning Limit:**	108	**-3s Action Limit:**	70.1
Sigma:	37.66	**CV:**	20.60%	**+2s Warning Limit:**	258	**+3s Action Limit:**	296

Quality Control Data

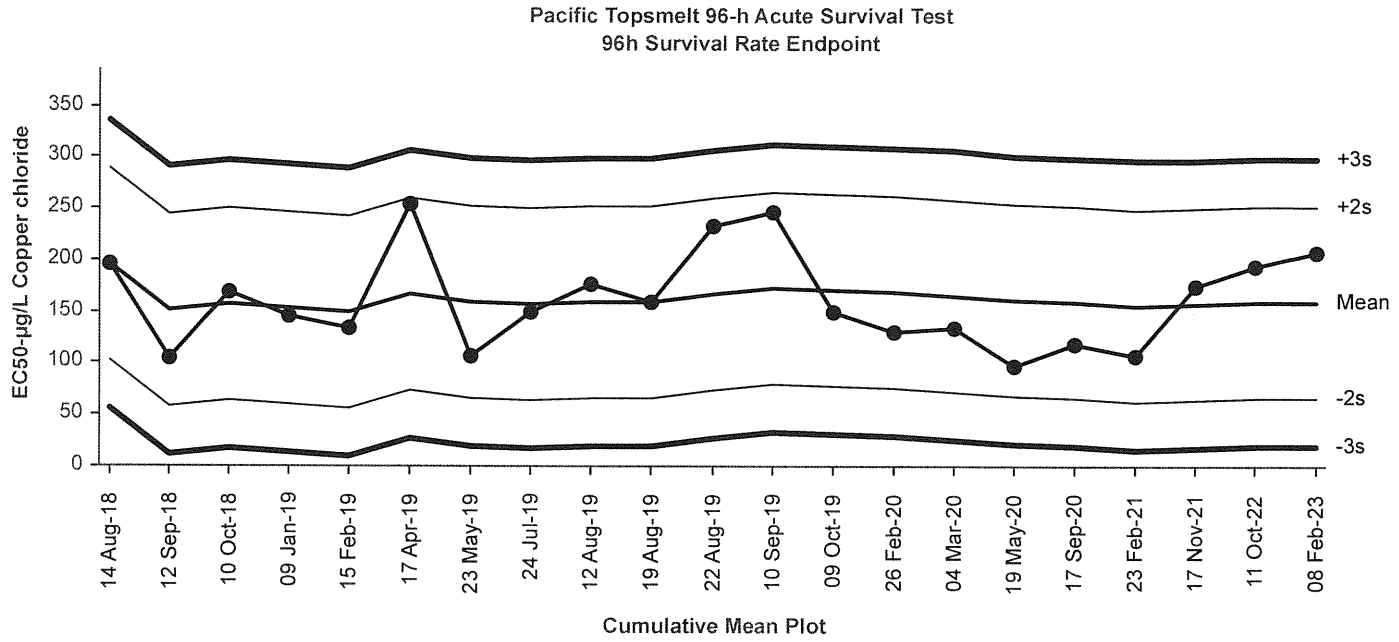
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Dec	11	16:30	156.9	-26.08	-0.6926			11-0566-6524	14-4935-0865
2	2020	Feb	27	17:15	136.4	-46.64	-1.239			00-2639-4829	10-5059-8408
3		Aug	6	16:00	254.9	71.91	1.91			13-3377-6823	09-5433-0150
4			12	15:20	148.4	-34.64	-0.9199			02-5307-3356	11-5066-6205
5		Sep	2	15:25	141.4	-41.58	-1.104			09-8373-9144	18-7650-2455
6			17	14:45	172	-11.04	-0.2932			07-8442-4358	02-9347-5784
7		Oct	28	16:35	136.6	-46.4	-1.232			10-9446-3954	10-4215-8111
8	2021	Feb	24	17:30	218.2	35.19	0.9344			11-4316-4077	02-1492-4727
9		Jun	30	16:05	254.9	71.91	1.91			01-4075-9626	19-2668-9340
10		Aug	10	14:30	193.2	10.19	0.2705			20-1130-3481	09-5748-8802
11		Nov	3	17:15	211.2	28.25	0.7501			01-2577-3416	13-6085-8539
12		Dec	9	17:20	192.4	9.445	0.2508			15-9690-9061	01-9685-6201
13	2022	Apr	12	17:35	156.9	-26.08	-0.6926			07-5453-0338	19-2336-1516
14		May	10	17:15	180.3	-2.75	-0.07302			13-4082-2694	00-0925-3219
15		Sep	8	18:45	132	-51.05	-1.356			01-2610-4728	13-4659-9428
16		Oct	18	15:45	213.3	30.27	0.8037			04-3098-2404	19-6506-1409
17		Dec	1	18:15	221.9	38.91	1.033			10-3325-3262	00-5431-5878
18			8	16:42	186.6	3.607	0.09577			14-7600-8927	07-7357-4624
19			14	17:05	192.4	9.445	0.2508			05-3190-6319	15-9199-6379
20	2023	Feb	9	15:55	160.8	-22.15	-0.5882			10-2868-1341	17-9597-6471
21			23	16:20	198.2	15.23	0.4044			20-7336-4922	10-8152-4222

CETIS QC Plot

Report Date: 15 Feb-23 11:27 (1 of 1)

Pacific Topsmelt 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test Type: Survival (96h) **Organism:** Atherinops affinis **Material:** Copper chloride
Protocol: EPA/821/R-02-012 (2002) **Endpoint:** 96h Survival Rate **Source:** Reference Toxicant-REF



Mean:	158.9	**Count:**	20	**-2s Warning Limit:**	65.7	**-3s Action Limit:**	19.1
Sigma:	46.61	**CV:**	29.30%	**+2s Warning Limit:**	252	**+3s Action Limit:**	299

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2018	Aug	14	16:00	196.4	37.48	0.8042			15-6494-9229	17-8173-7294
2		Sep	12	14:00	105.6	-53.28	-1.143			16-1211-7168	05-2683-6884
3		Oct	10	16:55	168.2	9.279	0.1991			03-4460-7421	02-8297-4115
4	2019	Jan	9	16:00	146.4	-12.49	-0.268			16-8541-8400	01-0716-9806
5		Feb	15	16:10	134	-24.9	-0.5342			08-0425-5661	18-0762-3864
6		Apr	17	17:50	253.5	94.65	2.031	(+)		05-1475-1452	18-1058-7085
7		May	23	15:30	106.6	-52.27	-1.121			03-2154-6851	19-3512-2662
8		Jul	24	16:25	150.4	-8.491	-0.1822			02-4547-9337	03-4444-2456
9		Aug	12	16:15	176.5	17.57	0.377			05-6999-0080	19-2452-0933
10			19	19:30	158.7	-0.1599	-0.00343			00-1616-6988	16-4823-3084
11			22	16:45	232	73.13	1.569			14-6253-4066	09-6589-6472
12		Sep	10	11:15	246.2	87.33	1.874			01-3190-7470	00-5901-5932
13		Oct	9	15:40	149.6	-9.303	-0.1996			12-2483-9958	16-7314-6828
14	2020	Feb	26	15:20	129.7	-29.22	-0.6268			04-4275-3329	19-1366-8841
15		Mar	4	17:15	134.1	-24.82	-0.5325			09-0186-0501	09-2347-5750
16		May	19	17:20	96.59	-62.31	-1.337			09-8977-8612	01-6220-7123
17		Sep	17	14:25	118.9	-39.98	-0.8577			07-7701-0607	03-4458-7869
18	2021	Feb	23	16:10	107.2	-51.72	-1.11			15-2183-5128	00-7227-8818
19		Nov	17	17:00	174.1	15.21	0.3263			10-0193-2387	14-5680-1838
20	2022	Oct	11	16:07	193.2	34.29	0.7356			02-7625-1264	21-0421-1281
21	2023	Feb	8	14:45	207.1	48.15	1.033			19-6999-8482	14-7115-7109