Toxicity testing on NWTPH-Gx

Environmental Assessment Program
(EAP)

Final Report

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Submitted to: **Washington Department of Ecology**
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This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

SUMMARY

Sample Information and Test Type

Sample ID	NWTPH-Gx
Sample information	Unleaded Gasoline Composite Mix Product No. RK30206, 50,000µg/mL, 5 mL ampoules
Sample supplier	Chromatographic Specialties Inc. 300 Laurier Blvd. Brockville, ON. K6V 5W1
Sample receipt date	April 5, 2017
Sample receipt temperature	N/A
Test types	Fathead minnow *(Pimephales promelas*) survival and growth Topsmelt *(Atherinops affinis*) survival and growth *Ceriodaphnia dubia* survival and reproduction Echinoderm *(Strongylocentrotus purpuratus)* fertilization

Summary of Results

Endpoint *	mg/L gasoline (95% CL)	NOEC	LOEC
Fathead minnow			
survival LC50	2.5 (2.2 – 2.8)	1.0	2.1
biomass IC25	1.5 (1.2 – 1.7)	1.0	2.1
biomass IC50	2.1 (1.9 – 2.3)		
Topsmelt			
survival LC50	1.7 (1.5 – 2.1)	1.7	>1.7
biomass IC25	1.7 (0.4 – 2.2)	1.7	>1.7
biomass IC50	2.2 (1.1 – 2.6)		
Ceriodaphnia dubia			
survival LC50	>2.3	2.3	>2.3
reproduction IC25	1.7 (1.3 – 1.9)	1.1	2.3
reproduction IC50	>2.3		
Echinoderm			
fertilization IC25	3.0 (2.9 – 3.0)	2.5	5.0
fertilization IC50	3.6 (3.5 – 3.6)		

LC = Lethal Concentration, IC = Inhibition Concentration, NOEC = No Observed Effect Concentration, LOEC = Lowest Observed Effect Concentration, * = result was calculated using the solvent control as the negative control

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for the Washington Department of Ecology's (WDOE) Environmental Assessment Program (EAP) as part of a study to determine environmental effects-based concentrations of total petroleum hydrocarbons (TPHs) for aquatic organisms. Gasoline samples provided by the WDOE were received at the laboratory in Burnaby, BC on April 5, 2017. The following toxicity tests were performed on the gasoline sample:

- Fathead minnow survival and growth (EPA-821-R-02_013)
- Topsmelt survival and growth (EPA/600/R-95/136)
- *Ceriodaphnia dubia* survival and reproduction (EPA-821-R-02-013)
- Echinoderm fertilization (EPA/600/R-95/136)

This report describes the results of these toxicity tests conducted on the gasoline sample. Copies of laboratory data sheets and printouts of statistical analyses are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the US EPA (1995, 2002) and the Washington Department of Ecology (WDOE, 2016). To determine an appropriate concentration series that would capture NOEC and LOEC values, range-finding tests were performed for each test species prior to initiation of the definitive tests. Definitive tests using Fathead minnow and Topsmelt were initiated on May 10, 2017. Tests using *C. dubia* and Echinoderms were initiated on May 11 and 18, 2017, respectively.

2.1 Preparation of Stock Dilution Series

The nominal concentration series that was used for the definitive test were 5, 2.5, 1.25, 0.63, 0.31, 0.16 mg gasoline/L. A stock solution of 10 mg gasoline standard/L was prepared first and used to prepare the dilutions. The stock was prepared by using approximately 1.112 to 1.116 mL of the gasoline standard in approximately 5.53 to 5.58 L of dilution water. Stock solutions were made separately for each test species with respective control water. The 10 mg/L stock solutions in the aspirator bottles were stirred overnight and allowed to settle for 1 hour prior to use in preparing dilutions. Aspirator bottles were capped with rubber stoppers covered with aluminum foil to prevent evaporation. 5-L bottles were filled to the top to avoid loss of the gasoline from

volatilization. Aspirator bottles were drained using the port at the bottom of the bottle to avoid using the undissolved fraction at the top of the vessels.

Samples of test solutions were taken immediately after dilutions were prepared and were collected in 40-mL sample vials provided by the Manchester Environmental Laboratory, MEL, with no head space.

2.2 Subsampling Test Solutions

Subsamples of the fresh stock water were taken during the filling of the test chambers. Subsamples of the stale test chamber solutions were collected as a composite of the chamber replicates prior to renewal or at the end of the tests.

Test solutions were prepared by the addition of gasoline to achieve a range of test concentrations in laboratory control water specific to each test species. Test solutions were prepared and renewed daily for tests with Fathead minnow, Topsmelt and *C. dubia*; the 40 minute echinoderm test did not require renewal of test solution. In addition, a methanol control was tested concurrently with all four tests. The methanol control was used to calculate all test endpoints.

2.3 Methanol Control

A methanol control was prepared as a 0.02% solution of methanol, which is the same amount of methanol in the highest concentration tested. The methanol control was prepared in separate containers on the day that the tests were set up and for all test solution renewals. Statistical analyses were performed using the methanol control as the negative control with CETIS (Tidepool Scientific Software, 2013).

2.4 Test Lighting

Natural lighting was provided to the toxicity tests using full spectrum UV fluorescent light tubes, Ushio 3000417, F32T8/960 - 32W T8 Fluorescent 6000K 95CRI. Full spectrum fluorescent tubes were purchased from Top Bulb 5204 Indianapolis Blvd. East Chicago, IN 46312.

Table 1. Summary of test conditions: 7-d fathead minnow (*Pimephales promelas*) survival and growth test.

Test species	*Pimephales promelas*
Organism source	Commercial supplier
Organism age	<24 hours post-hatch
Test type	Static-renewal
Test duration	7 days
Test vessel	375-mL glass container with lid
Test volume	375 mL
Test concentrations	Six concentrations, plus laboratory and methanol control
Test replicates	4 per treatment
Number of organisms	10 per replicate
Control/dilution water	Moderately-hard reconstituted water
Test solution renewal	Daily (80% renewal)
Test temperature	25 ± 1°C
Feeding	Twice a day with approximately 1500-2250 newly hatched brine shrimp nauplii (*Artemia sp.*) in each test container
Light intensity	100 to 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None, unless dissolved oxygen falls to <40% saturation
Test measurements	Temperature, dissolved oxygen, pH and conductivity measured daily; hardness and alkalinity of undiluted sample measured at test initiation; survival checked daily
Test protocol	EPA-821-R-02_013
Statistical software	CETIS Version 1.8.7
Test endpoints	Survival and biomass
Test acceptability criteria for controls	≥80% survival; ≥250 µg mean dry weight
Reference toxicant	Sodium chloride (NaCl)

Table 2. Summary of test conditions: 7-d topsmelt (*Atherinops affinis*) survival and growth test.

Test species	*Atherinops affinis*
Organism source	Commercial supplier
Organism age	9-to 15-days post-hatch
Test type	Static-renewal
Test duration	7 days
Test vessel	500-mL glass container with lid
Test volume	500 mL
Test concentrations	Six concentrations, plus laboratory and methanol control
Test replicates	5 per treatment
Number of organisms	5 per replicate
Control/dilution water	Natural seawater
Test solution renewal	Daily (80% renewal)
Test temperature	20 ± 1°C
Test salinity	30 ± 2 ppt; sample salinity adjusted by addition of H_2Ocean Pro+ marine salts
Feeding	Twice a day with newly hatched brine shrimp nauplii (*Artemia sp.*)
Light intensity	Ambient laboratory lighting
Photoperiod	16 hours light / 8 hours dark
Aeration	None, unless dissolved oxygen falls below 4.0 mg/L
Test measurements	Temperature, dissolved oxygen, pH and salinity measured daily; survival checked daily
Test protocol	EPA/600/R-95/136
Statistical software	CETIS Version 1.8.7
Test endpoints	Survival and biomass
Test acceptability criteria for controls	≥80% survival; ≥0.85 mg mean dry weight
Reference toxicant	Copper (added as $CuCl_2$)

Table 3. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test species	*Ceriodaphnia dubia*
Organism source	In-house culture
Organism age	<24 hour old neonates, produced within a 8 hour window
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20-mL glass test tube with snap cap
Test volume	20 mL
Test concentrations	Six concentrations, plus laboratory and methanol control
Test replicates	10 per treatment
Number of organisms	1 per replicate
Control/dilution water	20% Perrier water and 80% deionized water + 5 µg/L Se and 2 µg/L vitamin B12
Test solution renewal	Daily (100% renewal)
Test temperature	25 ± 1°C
Feeding	Daily with *Pseudokirchneriella subcapitata* and YCT (3:1 ratio)
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test measurements	Temperature, dissolved oxygen, pH and conductivity measured daily; hardness and alkalinity of undiluted sample measured at test initiation; survival and reproduction checked daily
Test protocol	EPA-821-R-02-013
Statistical software	CETIS Version 1.8.7
Test endpoints	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods; no ephippia present
Reference toxicant	Sodium chloride (NaCl)

Table 4. Summary of test conditions: 40-min echinoderm fertilization test.

Test species	*Strongylocentrotus purpuratus*
Organism source	Commercial supplier
Organism age	< 3 hours post gamete collection
Test type	Static
Test duration	10 minutes sperm exposure; 10 minutes egg fertilization
Test vessel	30-mL glass vials with snap cap
Test volume	30 mL
Test concentrations	Six concentrations, plus laboratory and methanol control
Test replicates	4 per treatment
Number of organisms	2000 eggs per replicate
Control/dilution water	Natural seawater
Test solution renewal	None
Test temperature	12 ± 1°C
Test salinity	30 ± 2 ppt; sample salinity adjusted by addition of H_2Ocean Pro+ marine salts
Feeding	None
Light intensity	Ambient laboratory lighting
Photoperiod	None
Aeration	None
Test measurements	Temperature, dissolved oxygen, pH and salinity measured at test initiation
Test protocol	EPA/600/R-95/136
Statistical software	CETIS Version 1.8.7
Test endpoint	Fertilization
Test acceptability criterion for controls	≥60% and <98% mean fertilization
Reference toxicant	Copper (added as $CuCl_2$)

3.0 RESULTS

3.1 Analytical Results

Samples of the fresh and "stale" test solutions were analyzed by the Manchester Environmental Laboratory. The nominal and measured concentrations are presented in Tables 5 to 8.

Table 5. Results: Fathead minnow nominal and measured test concentrations (mg gasoline/L).

Nominal (mg/L)	Measured (mg/L)									
	t=0	t=24		t=48	t=72	t=96		t=120	t=144	t=168
	fresh	stale	fresh	fresh	fresh	stale	fresh	fresh	fresh	stale
5	-	-	-	-	-	-	-	-	-	-
2.5	1.97	0.174*	2.18	2.79	1.83	0.07[1]	1.94	2.08	1.69	0.437
1.25	-	-	-	-	-	-	-	-	-	-
0.63	0.531	0.226	0.443	0.445	0.447	0.130	0.467	0.567	0.533	0.042[1]
0.63 duplicate	-	-	0.450	-	0.440	-	0.476	-	0.544	-
0.31	0.259	-	-	-	-	-	-	-	-	-
0.31 duplicate	0.249	-	-	-	-	-	-	-	-	-
0.16	0.120	0.051[1]	0.070[1]	0.089	0.081	0.070[1]	0.094	0.164	0.130	0.07[1]

* Result of reanalysed sample, t = time, [1] = results below the reporting limit

Table 6. Results: Topsmelt nominal and measured test concentrations (mg gasoline/L).

Nominal (mg/L)	Measured (mg/L)									
	t=0	t=24		t=48	t=72	t=96		t=120	t=144	t=168
	fresh	stale	fresh	fresh	fresh	stale	fresh	fresh	fresh	stale
5	-	-	-	-	-	-	-	-	-	-
2.5	1.86	0.635	1.75	2.16	1.10	0.208	1.25	2.00	1.90	0.06[1]
1.25	-	-	-	-	-	-	-	-	-	-
0.63	0.522	0.171	0.416	0.384	0.472	0.07[1]	0.417	0.599	0.633	0.07[1]
0.31	0.253	0.077[1]	0.188	0.174	0.22	0.07[1]	0.188	0.297	0.314	0.07[1]
0.31 duplicate	0.252	-	0.186	-	0.217	-	0.19	-	0.315	-
0.16	0.119[1]	0.055[1]	0.082[1]	0.082[1]	0.092[1]	0.07[1]	0.083[1]	0.159	0.167	0.07[1]

t = time, [1] = results below the reporting limit

Table 7. Results: *Ceriodaphnia dubia* nominal and measured test concentrations (mg gasoline/L).

Nominal (mg/L)	Measured (mg/L)									
	t=0	t=24		t=48	t=72	t=96		t=120	t=144	t=168
	fresh	stale	fresh	fresh	fresh	stale	fresh	fresh	fresh	stale
5	-	-	-	-	-	-	-	-	-	-
2.5	0.057*	0.252	1.17	0.817	0.504	0.343	0.769	1.80	1.70	1.19
1.25	-	-	-	-	-	-	-	-	-	-
0.63	0.07	0.07	0.209	0.26	0.158	0.091	0.284	0.524	0.425	0.526
0.63 duplicate	0.07	-	0.209	-	0.168	-	0.297	-	0.455	-
0.31	-	-	-	-	-	-	-	-	-	-
0.16	0.07	0.07	0.066	0.065	0.04[1]	0.036[1]	0.100	0.135	0.132	0.126

*Result of reanalysed sample, t = time, [1] = results below the reporting limit

Table 8. Results: Echinoderm nominal and measured test concentrations (mg gasoline/L).

Nominal (mg/L)	Measured (mg/L)
	t=0
	fresh
5	-
2.5	2.31
1.25	-
0.63	0.61
0.31	0.322
0.31 duplicate	0.316
0.16	0.159

t = time

3.2 Calculation of Test Solution Concentrations

Most of the measured concentrations for the Fathead minnow, Topsmelt and *C. dubia* tests were >20% lower than nominal concentrations. Therefore, nominal concentrations could not be used to calculate test endpoints. In order to calculate the average measured test concentrations over the duration of the test and to estimate non-measured test concentrations, nominal and measured concentrations were regressed for each test. Test concentrations were calculated from the nominal concentrations using the equation of the regression line plotted for each definitive test. The echinoderm test had separate measured test concentrations that were within 10% of nominal concentrations. Therefore, nominal concentrations were used for calculating the echinoderm test endpoints.

Figures 1 to 3 show the regression lines and equations used to calculate the test concentrations, which were used to calculate the test endpoints for the Fathead minnow, Topsmelt and *C. dubia* tests. Table 9 provides a summary of the calculated gasoline test concentrations from the regression equations.

Table 9. Results: Summary of nominal and calculated gasoline test concentrations (mg gasoline/L).

Nominal (mg/L)	Calculated concentration (mg/L)		
	Fathead minnow	Topsmelt	*C. dubia*
5	4.17	3.42	2.27
2.5	2.06	1.72	1.13
1.25	1.00	0.88	0.56
0.63	0.48	0.45	0.28
0.31	0.21	0.24	0.13
0.16	0.08	0.14	0.06

Figure 1. Regression of Nominal vs. Measured Concentrations - Fathead minnow

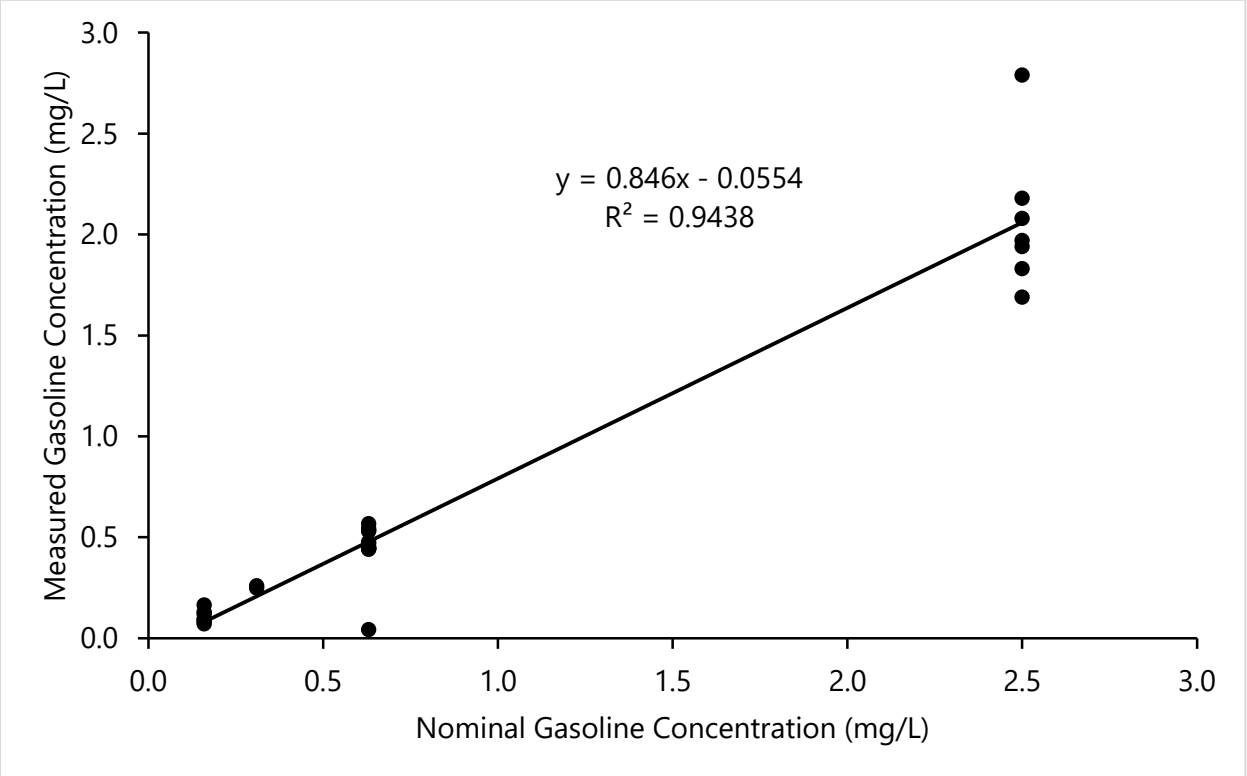


Figure 2. Regression of Nominal vs. Measured Concentrations – Topsmelt

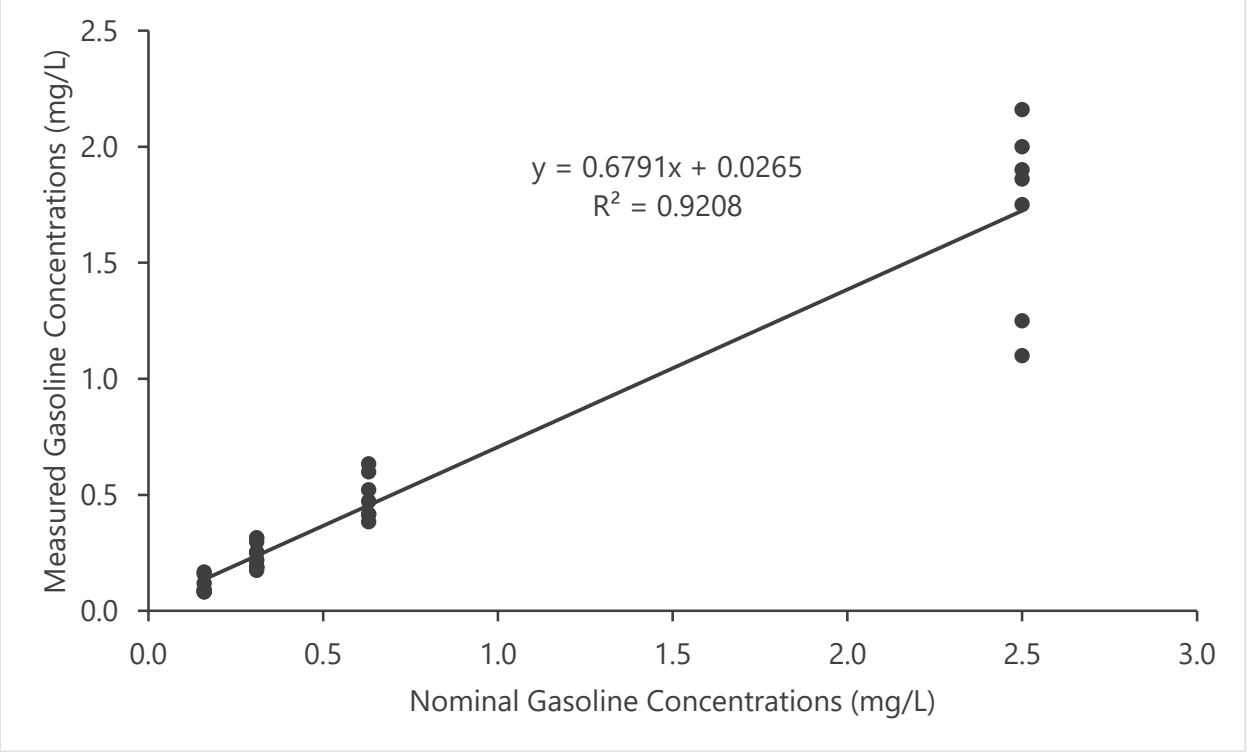
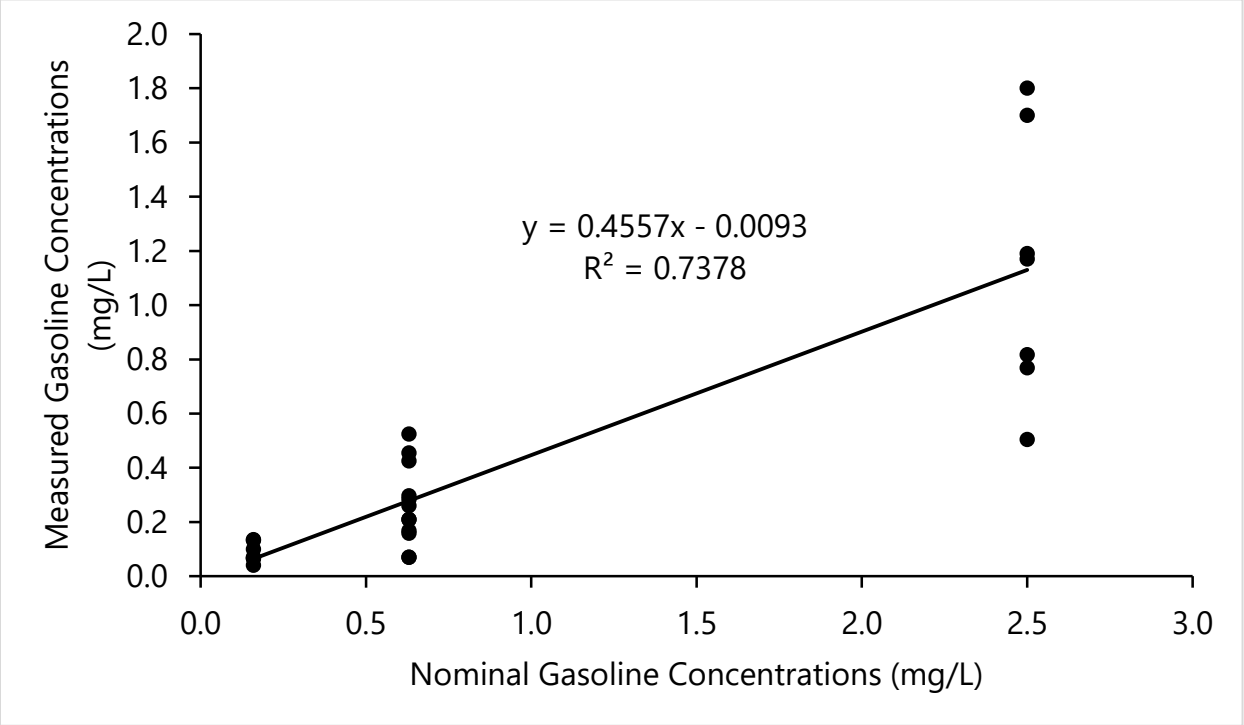


Figure 3. Regression of Nominal vs. Measured Concentrations – *C. dubia*



3.3 Toxicity Test Results

The results of the toxicity tests are summarized in Tables 5 to 8. All endpoints were calculated in CETIS using the solvent control as the negative control.

The results of the 7-day Fathead minnow test are shown in Table 5. The median lethal concentration (LC50) estimate for survival was 2.5 mg/L gasoline, and the 25% inhibitive concentration (IC25) estimate for biomass was 1.5 mg/L gasoline. The resulting LOEC for both endpoints was 2.1 mg/L gasoline.

The results of the 7-day Topsmelt test are shown in Table 6. The LC50 estimate for survival was 1.7 mg/L gasoline and the IC25 estimate for biomass was 1.7 mg/L gasoline. The resulting LOEC estimate was >1.7 mg/L gasoline.

The results of the *C. dubia* survival and reproduction test are shown in Table 7. There were no adverse effects on survival, resulting in an LC50 of >2.3 mg/L gasoline. An inhibitory effect was observed on reproduction, resulting in an IC25 estimate of 1.7 mg/L gasoline, and an LOEC of 2.3 mg/L gasoline.

The results of the Echinoderm fertilization test are shown in Table 8. The IC25 estimate was 3.0 mg/L gasoline, and a resulting LOEC of 5 mg/L gasoline.

Table 9. Results: Fathead minnow 7-day survival and growth test.

Gasoline Concentrations		Survival (%) (Mean ± SD)	Biomass (mg) (Mean ± SD)	Dry Weight (mg) (Mean ± SD)
Nominal (mg/L)	Test solutions (mg/L)			
Laboratory control	0	97.5 ± 5.0	0.9 ± 0.1	0.9 ± 0.0
Methanol control	0	100 ± 0.0	0.7 ± 0.0 [1]	0.7 ± 0.0 [1]
0.16	0.08	100 ± 0.0	0.8 ± 0.1	0.8 ± 0.1
0.31	0.21	97.5 ± 5.0	0.7 ± 0.1	0.7 ± 0.1
0.63	0.48	97.5 ± 5.0	0.7 ± 0.1	0.7 ± 0.0
1.25	1.0	92.5 ± 9.6	0.6 ± 0.1	0.7 ± 0.1
2.5	2.1	75.0 ± 10.0	0.4 ± 0.1	0.5 ± 0.0
5.0	4.17	5.0 ± 10.0	0.0 ± 0.1	0.6 ± 0.0
Test endpoint (mg/L) *				
LC50 (95% CL)		2.5 (2.2 – 2.8)	--	--
IC25 (95% CL)		--	1.5 (1.2 – 1.7)	1.9 (1.2 – N/A)
IC50 (95% CL)		--	2.1 (1.9 – 2.3)	>4.17
NOEC		1.0	1.0	1.0
LOEC		2.1	2.1	2.1

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Available, NOEC = No Observed Effect Concentration, LOEC = Lowest Observed Effect Concentration
[1] = result was significantly different than the laboratory control, * = result was calculated using the solvent control as the negative control

Table 10. Results: Topsmelt 7-day survival and growth test.

Gasoline Concentrations		Survival (%) (Mean ± SD)	Biomass (mg) (Mean ± SD)	Dry Weight (mg) (Mean ± SD)
Nominal (mg/L)	Test solutions (mg/L)			
Laboratory control	0	100 ± 0.0	1.5 ± 0.3	1.5 ± 0.3
Methanol control	0	96.0 ± 8.9	1.2 ± 0.1 [1]	1.2 ± 0.0
0.16	0.14	96.0 ± 8.9	1.4 ± 0.2	1.4 ± 0.2
0.31	0.24	100 ± 0.0	1.5 ± 0.2	1.5 ± 0.2
0.63	0.45	92.0 ± 11.0	1.4 ± 0.4	1.5 ± 0.3
1.25	0.88	84.0 ± 26.1	1.3 ± 0.4	1.6 ± 0.2
2.5	1.72	68.0 ± 39.0	1.0 ± 0.7	1.5 ± 0.3
5.0	3.42	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
Test endpoint (mg/L) *				
LC50 (95% CL)		1.7 (1.5 – 2.1)	--	--
IC25 (95% CL)		--	1.7 (0.4 – 2.2)	>1.7
IC50 (95% CL)		--	2.2 (1.1 – 2.6)	>1.7
NOEC		1.7	1.7	1.7
LOEC		>1.7	>1.7	>1.7

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, NOEC = No Observed Effect Concentration, LOEC = Lowest Observed Effect Concentration

[1] = result was significantly different than the laboratory control, * = result was calculated using the solvent control as the negative control

Table 11. Results: *C. dubia* survival and reproduction test.

Gasoline Concentrations		Survival (%)	Reproduction (Mean ± SD)
Nominal (mg/L)	**Test solutions (mg/L)**		
Laboratory control	0	90	15.8 ± 5.2
Methanol control	0	90	12.7 ± 5.2 [1]
0.16	0.06	100	16.5 ± 3.7
0.31	0.13	90	14.8 ± 4.9
0.63	0.28	100	18.6 ± 4.2
1.25	0.56	100	14.2 ± 4.8
2.5	1.13	100	15.0 ± 2.6
5.0	2.27	100	9.1 ± 1.7
Test endpoint (mg/L) *			
LC50		>2.3	--
IC25 (95% CL)		--	1.7 (1.3 – 1.9)
IC50		--	>2.3
NOEC		2.3	1.1
LOEC		>2.3	2.3

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, NOEC = No Observed Effect Concentration, LOEC = Lowest Observed Effect Concentration

[1] = result was significantly different than the laboratory control, * = result was calculated using the solvent control as the negative control

Table 12. Results: Echinoderm (*Strongylocentrotus purpuratus)* fertilization test.

Gasoline Concentrations		Fertilized eggs (%) (Mean ± SD)
Nominal (mg/L)	**Test solutions (mg/L)**	
Laboratory control	0	93.8 ± 2.6
Methanol control	0	95.8 ± 0.5
0.16	0.16	92.2 ± 3.0
0.31	0.31	94.2 ± 1.7
0.63	0.62	94.2 ± 2.2
1.25	1.25	95.8 ± 2.2
2.5	2.5	92.5 ± 3.1
5.0	5.0	2.5 ± 1.0
Test endpoint (mg/L) *		
IC25 (95% CL)		3.0 (2.9 – 3.0)
IC50 (95% CL)		3.6 (3.5 – 3.6)
NOEC		2.5
LOEC		5.0

SD = Standard Deviation, IC = Inhibition Concentration, CL = Confidence Limits, NOEC = No Observed Effect Concentration, LOEC = Lowest Observed Effect Concentration, * = result was calculated using the solvent control as the negative control

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the US EPA protocols. For tests with Fathead minnow, Topsmelt and *C. dubia,* there was a statistically significant difference between the laboratory control and the solvent control for most of the growth endpoints. Therefore, the solvent control was used for statistical analyses to calculate endpoints in all four tests.

Water quality parameters remained within ranges specified in the protocol throughout the tests, with the exception of dissolved oxygen in tests with Fathead minnow and Topsmelt. On Day 2, dissolved oxygen fell below 40% saturation in test solutions. Therefore, aeration was initiated at a rate of 50-100 bubbles per minute for the remaining duration of the tests. With aeration, dissolved oxygen remained above 40% saturation for the duration of both tests. To determine if dissolved oxygen contributed any observed toxicity in tests, statistical analysis were conducted with Day 2 survival results; the resulting LOEC values on Day 2 and Day 7 were the same, and therefore; low dissolved oxygen was not expected to affect results. There were no other deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence intervals around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 13. Results for these tests fell within the range for organism performance of the mean and two standard deviations, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate. The reference toxicant tests were performed under the same conditions as those used for the tests.

Table 13. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Number[1]	Test Date
P. promelas	Survival (EC50): 5.3 g/L NaCl	4.8 (3.7 – 6.4)	15	118	May 10, 2017
	Growth (IC50): 4.8 g/L NaCl	4.3 (2.8 – 6.8)	25		
A. affinis	Survival (EC50): 118.5 µg/L Cu	101.8 (64.4 – 160.9)	26	27	May 10, 2017
	Growth (IC50): 105.0 µg/L Cu	96.2 (59.8 – 155.1)	27		
C. dubia	Survival (LC50): 2.0 g/L NaCl	2.0 (1.8 – 2.2)	5	160	May 25, 2017
	Reproduction (IC50): 1.1 g/L NaCl	1.5 (1.1 – 2.1)	17		
S. purpuratus	Fertilization (IC50): 28.8 µg/L Cu	16.4 (7.1 – 38.1)	52	4	May 18, 2017

SD = Standard Deviation, CV = Coefficient of Variation, LC = Lethal Concentration, IC = Inhibition Concentration, EC = Effect Concentration, 1= number of tests used to calculate historical mean and standard deviation

5.0 REFERENCES

USEPA. 2002. Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA-821-R-02-014.

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Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 275 pp.

WDOE. 2016. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised June 2016.

APPENDIX A – Fathead minnow Toxicity Test Data

Fathead Minnow Test Summary Sheet

Client: WDCE Start Date & Time: May 10/17 @ 1550

Work Order No.: 17053 Test Species: *Pimephales promelas*

Sample Information:

Sample ID: NWTPH-GX
Sample Date: Apr 5/17
Date Received: Apr 5/17
Sample Volume: 50x5mL

Dilution Water:

Type: Moderately - hard water
Hardness (mg/L $CaCO_3$): 106
Alkalinity (mg/L $CaCO_3$): 76

Test Organism Information:

Batch No.: C510A
Source: Aquatic BioSystems, CO
Loading Density: 10/375mL

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP118
Stock Solution ID: NaCl
Date Initiated: May 10/17
7-d EC50 (95% CL): 5.3 (4.6-6.0) g/L NaCl
7-d IC50 (95% CL): 4.8 (4.2-5.7) g/L NaCl

Survival:
Reference Toxicant Mean ± 2 SD: 4.8 (3.7-6.4) g/L NaCl CV (%): 15

Biomass
Reference Toxicant Mean ± 2 SD: 4.3 (2.8-6.8) g/L NaCl CV (%): 25

Test Results: (1)

	Survival	Biomass	Dry Weight
NOEC % (v/v)	1.0	1.0	1.0
LOEC % (v/v)	2.06	2.06	2.06
EC25 % (v/v) (95% CL)	n/a		—
EC50 % (v/v) (95% CL)	2.5 (2.2-2.8)		—
IC25 % (v/v) (95% CL)		1.5 (1.2-1.7)	1.9 (1.2-n/a)
IC50 % (v/v) (95% CL)		2.1 (1.9-2.3)	>4.17

(1) result calculated using solvent control as negative control

Reviewed by: Date reviewed: July 5, 2017

7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: WDOE
Sample ID: NWTPH-Gx
Work Order #: 170513

Start Date & Time: May 10/17 1550h
Stop Date & Time: May 17/17 1630h
Test Species: *Pimephales promelas*

mg/L gasoline Concentration Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.5	24.5	24.5	25.0	24.5	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.2	5.0	8.1	5.9	8.2	7.0	8.2	6.9	8.2	6.4	8.2	6.4	8.1	5.7
pH	8.0	7.5	7.9	7.4	7.9	7.6	7.8	7.8	7.8	7.2	7.9	7.6	7.9	7.4
Cond. (µS/cm)	355	350		354		350		352		351		368	370	
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration Methanol Cont	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.5	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.0	5.4	8.2	5.6	7.9	7.0	8.2	7.0	8.2	6.9	8.2	6.3	8.2	5.7
pH	7.9	7.5	7.9	7.4	7.9	7.6	7.8	7.5	7.8	7.2	7.8	7.8	7.9	7.3
Cond. (µS/cm)	346	347		347		349		353		353		354	363	
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 0.6	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.5	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.0	4.8	8.2	4.6	8.1	6.9	8.2	6.8	8.2	6.8	8.2	6.7	8.1	5.9
pH	7.9	7.6	7.9	7.4	7.9	7.6	7.8	7.6	7.8	7.5	7.8	7.7	7.8	7.5
Cond. (µS/cm)	360	357		349		350		352		353		355	364	
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 0.31	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.5	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	7.9	5.4	8.2	4.6	8.1	6.9	8.2	6.9	8.2	6.3	8.1	6.9	8.1	6.2
pH	7.9	7.6	7.9	7.4	7.9	7.6	7.8	7.5	7.8	7.6	7.8	7.6	7.9	7.7
Cond. (µS/cm)	351	351		349		350		353		351		350	365	
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 4 **pH meter:** 4 **Conductivity meter:** 4

	Control			
Hardness*	106			
Alkalinity*	76			

* mg/L as CaCO3

Analysts: KJL, AmD

Reviewed by:

Date reviewed: June 23, 2017

Sample Description: Test treatments prepared from NWTPH-Gx (Standard)

Comments:

7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: WDOE
Sample ID: NWTPH-Gx
Work Order #: 170513

Start Date & Time: May 10/17 1550h
Stop Date & Time: May 17/17 1630h
Test Species: *Pimephales promelas*

mg/L gasoline Concentration 0.63	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	~~7.8~~	4.7	8.2	~~5.3~~	7.8	6.8	8.2	6.7	8.2	~~6.2~~ 6.3	8.1	6.4	8.1	5.9
pH	7.9	7.5	7.9	7.4	7.9	7.6	7.8	7.6	7.8	~~7.0~~	7.8	7.6	8.0	7.5
Cond. (µS/cm)	351	350		347		350		353		7.1 351		353		360
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 1.25	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.1	4.7	8.2	~~5.3~~ 7.0	8.1	6.7	8.2	6.8	8.2	6.3	8.1	6.2	8.1	6.1
pH	7.9	7.5	7.9	7.4	7.9	7.5	7.8	7.6	7.8	7.7	7.8	7.6	8.0	7.3
Cond. (µS/cm)	359	351		349		350		353		352		351		359
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

03.7

Concentration 2.5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.2	4.9	8.2	~~5.3~~ 7.0	8.1	6.8	8.2	6.7	8.2	6.5	8.0	5.8	8.1	6.1
pH	7.9	7.5	7.9	7.4	7.9	7.5	7.8	7.7	7.8	7.96	7.8	7.6	8.0	7.2
Cond. (µS/cm)	357	352		348		350		353		353		350		360
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

03.7

Concentration 5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.5	24.5	25.0	24.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	8.2	5.2	8.2	~~5.3~~ 7.0	8.1	6.8	8.2	6.9	8.2	6.4	8.1	5.5	8.1	5.9
pH	7.9	7.5	7.9	7.2	7.9	7.5	7.8	7.6	7.8	7.6	7.8	7.5	8.0	7.3
Cond. (µS/cm)	357	353		350		351		354		352		351		356
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 4 **pH meter:** 4 **Conductivity meter:** 4

	Control			
Hardness*	106			
Alkalinity*	76			

* mg/L as CaCO3

Analysts: KJL, AWD

Reviewed by:

Date reviewed: June 23, 2017

Sample Description:

Comments: Project manager notified of low DO on Day 2; aeration initiated at 1600h

7-d Fathead Minnow Toxicity Test
Daily Survival

Client: WDOE
Sample ID: NWTPH-GX
Work Order #: 170153

Start Date & Time: May 10/17 1550h
Stop Date & Time: May 17/17 1630h
Test Species: *Pimephales promelas*

Concentration mg/L gasoline	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	9	9	9	9	9	
	B	10	10	10	10	10	10	10	
	C	10	10			10	10	10	
	D	10	10			10	10	10	
Methanol Control	A	10	10			10	10	10	
	B	10	10			10	10	10	
	C	10	10			10	10	10	
	D	10	10			10	10	10	
0.16	A	10	10			10	10	10	
	B	10	10			10	10	10	
	C	10	10			10	10	10	
	D	10	10			10	10	10	
0.31	A	10	10			10	10	10	
	B	10	10	—	—	10	10	10	
	C	10	10	9	9	9	9	9	
	D	10	10	10	10	10	10	10	
0.63	A	10	9	9	9	9	9	9	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
	D	10	10	10	10	10	10	10	
1.25	A	10	~~10~~ 10	10	10	10	10	10	
	B	10	~~8~~ 10	10	10	10	10	9	
	C	10	~~8~~ 10	9	9	8	8	8	
	D	10	10	10	10	10	10	10	
2.5	A	10	6	6	6	6	6	6	
	B	10	8	8	8	8	8	8	
	C	10	8	8	8	8	8	8	
	D	10	9	8	8	8	8	8	
5	A	7	1	0	—	—	—		
	B	9	1	0	—	—	—		
	C	6	1	1	1	1	0		
	D	7	3	2	2	2	2	2	
Tech Initials		KJL	KJL	KJL	KJL	KJL	KJL	KJL	

Comments:

Reviewed by: [signature]

Date reviewed: June 23, 2017

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: WDOE

Start Date & Time: May 10/17 1550h

Sample ID: NWTPH-Gx

Termination Date & Time: May 17/17 1630h

Work Order No.: 170513

Sample ID mg/L gasoline	Rep	Pan No. (G red)	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	9	KJ	1030.99	1038.61	9	NY
	B	2	10		993.91	1003.09	10	
	C	3	10		1005.17	1013.85	10	
	D	4	10		1004.88	1013.53	10	
Methanol control	A	5	10		988.28	995.63	10	
	B	6	10		1032.49	1039.76	10	
	C	7	10		1036.97	1044.30	10	
	D	8	10		1012.76	1019.55	10	
0.16	A	9	10		1021.09	1028.92	10	
	B	10	10		1015.57	1023.06	10	
	C	11	10		1032.69	1039.82	10	
	D	12	10		993.03	1002.48	10	
0.31	A	13	10		1007.88	1016.42	10	
	B	14	10		1023.32	1030.42	10	
	C	15	9		1029.97	1036.39	9	
	D	16	10		1042.42	1049.59	10	
0.63	A	17	9		1019.19	1025.85	9	
	B	18	10		1032.61	1040.35	10	
	C	19	10		1012.10	1019.75	10	
	D	20	10		1025.28	1032.42	10	
1.25	A	21	10		1012.91	1018.98	10	
	B	22	9		1017.08	1022.53	9	
	C	23	8		1002.30	1008.66	8	
	D	24	10	↓	1005.17	1012.23	10	↓

Comments: 10% re-weigh = #6. 1039.57 (mg) #27 = 1021.31 #15 · 1036.32 #32. 1019.49

Reviewed by: [signature]

Date Reviewed: June 23, 2017

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: WDOE

Start Date & Time: May 10/17 1550h

Sample ID: NWTPH-Gx

Termination Date & Time: May 17/17 1630h

Work Order No.: 170513

Sample ID mg/L gasoline	Rep	G Pan No. red	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
2.5	A	25	6	KJ	995.62	998.75	6	NY
	B	26	8		1002.66	1006.90	8	
	C	27	8		1016.83	1021.34	8	
	D	28	8		1017.88	1022.34	8	
5	A	29	0		1004.18	-	-	
	B	30	0		1024.18	-	-	
	C	31	0		1021.69	-	-	
	D	32	2	↓	1018.41	1019.55	2	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Comments:

Reviewed by:

Date Reviewed: June 23, 2017

Client: WDOE

W.O.#: 170513

Hardness and Alkalinity Datasheet

	Alkalinity						Hardness			
Sample ID	Subsample Date	Date Measured	Sample Volume (mL)	(mL) 0.02N HCL/H_2SO_4 used to pH 4.5	(mL) of 0.02N HCL/H_2SO_4 used to pH 4.2	Total Alkalinity ($mg/LCaCO_3$)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness ($mg/L\ CaCO_3$)	Technician
Control MtW	~~5/10~~ May 10/17	May 10/17	50	3.9	4.0	76	50	5.3	106	KJL

Notes:

Reviewed by: [signature] Date Reviewed: June 23, 2017

CETIS Summary Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-0893-5014	7d Survival Rate	0	>0		5.2%		Wilcoxon Rank Sum Two-Sample Test
20-0532-0990	7d Survival Rate	1	2.06	1.435	11.6%		Dunnett Multiple Comparison Test
08-5314-2893	Mean Dry Biomass-mg	<0	0		8.05%		Equal Variance t Two-Sample Test
00-7701-3121	Mean Dry Biomass-mg	0.48	1	0.6928	14.8%		Dunnett Multiple Comparison Test
09-1061-1741	Mean Dry Weight-mg	<0	0		4.5%		Equal Variance t Two-Sample Test
10-0718-1792	Mean Dry Weight-mg	0.08	0.21	0.1296	13.5%		Bonferroni Adj t Test

Point Estimate Summary (1)

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
02-8181-7525	7d Survival Rate	EC50	2.505	2.223	2.822		Trimmed Spearman-Kärber
12-8730-9843	Mean Dry Biomass-mg	IC5	0.06066	0.004546	0.3985		Linear Interpolation (ICPIN)
		IC10	0.1358	0.001466	0.7352		
		IC15	0.4989	N/A	0.8273		
		IC20	0.6916	N/A	1.208		
		IC25	0.909	0.4493	1.313		
		IC40	1.494	1.16	1.888		
		IC50	1.952	1.516	2.333		
19-7710-9662	Mean Dry Weight-mg	IC5	0.04472	0.01018	0.1943		Linear Interpolation (ICPIN)
		IC10	0.1067	0.01083	0.4554		
		IC15	0.5122	N/A	1.377		
		IC20	0.8258	0.3904	1.529		
		IC25	1.164	0.5574	1.707		
		IC40	>4.17	N/A	N/A		
		IC50	>4.17	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-8181-7525	7d Survival Rate	Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria
20-0532-0990	7d Survival Rate	Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria
20-0893-5014	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
	7d Survival Rate	Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria
00-7701-3121	Mean Dry Biomass-mg	Control Resp	0.8533	0.25 - NL	Yes	Passes Acceptability Criteria
08-5314-2893	Mean Dry Biomass-mg	Control Resp	0.7185	0.25 - NL	Yes	Passes Acceptability Criteria
	Mean Dry Biomass-mg	Control Resp	0.8533	0.25 - NL	Yes	Passes Acceptability Criteria
12-8730-9843	Mean Dry Biomass-mg	Control Resp	0.8533	0.25 - NL	Yes	Passes Acceptability Criteria
00-7701-3121	Mean Dry Biomass-mg	PMSD	0.1477	0.12 - 0.3	Yes	Passes Acceptability Criteria
08-5314-2893	Mean Dry Biomass-mg	PMSD	0.08049	0.12 - 0.3	Yes	Below Acceptability Criteria

(1) negative control = lab water

June 30/17

Fathead Minnow 7-d Larval Survival and Growth Test — Nautilus Environmental

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	1	1	1	1	1	0	0	0.0%	0.0%
0	Negative Control	4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
0.08		4	1	1	1	1	1	0	0	0.0%	0.0%
0.21		4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
0.48		4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
1		4	0.925	0.7727	1	0.8	1	0.04787	0.09574	10.35%	7.5%
2.06		4	0.75	0.5909	0.9091	0.6	0.8	0.05	0.1	13.33%	25.0%
4.17		4	0.05	0	0.2091	0	0.2	0.05	0.1	200.0%	95.0%

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0	Negative Control	4	0.8533	0.749	0.9575	0.762	0.918	0.03276	0.06551	7.68%	-18.75%
0.08		4	0.7975	0.6346	0.9604	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7307	0.5894	0.8721	0.642	0.854	0.04443	0.08885	12.16%	-1.71%
0.48		4	0.7298	0.6501	0.8094	0.666	0.774	0.02502	0.05004	6.86%	-1.57%
1		4	0.6235	0.5172	0.7298	0.545	0.706	0.03341	0.06682	10.72%	13.22%
2.06		4	0.4085	0.3055	0.5115	0.313	0.451	0.03237	0.06474	15.85%	43.15%
4.17		4	0.0285	-0.0622	0.1192	0	0.114	0.0285	0.057	200.0%	96.03%

Mean Dry Weight-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0	Negative Control	4	0.8744	0.8258	0.923	0.8467	0.918	0.01527	0.03055	3.49%	-21.7%
0.08		4	0.7975	0.6346	0.9604	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7486	0.6367	0.8605	0.71	0.854	0.03517	0.07033	9.4%	-4.19%
0.48		4	0.7482	0.7053	0.7912	0.714	0.774	0.01349	0.02699	3.61%	-4.14%
1		4	0.6784	0.5338	0.823	0.6056	0.795	0.04542	0.09085	13.39%	5.58%
2.06		4	0.5432	0.5106	0.5759	0.5217	0.5638	0.01027	0.02053	3.78%	24.39%
4.17		1	0.57			0.57	0.57	0	0	0.0%	20.67%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1	1	1	1
0	Negative Control	0.9	1	1	1
0.08		1	1	1	1
0.21		1	1	0.9	1
0.48		0.9	1	1	1
1		1	0.9	0.8	1
2.06		0.6	0.8	0.8	0.8
4.17		0	0	0	0.2

Mean Dry Biomass-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.762	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.642	0.717
0.48		0.666	0.774	0.765	0.714
1		0.607	0.545	0.636	0.706
2.06		0.313	0.424	0.451	0.446
4.17		0	0	0	0.114

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.8467	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.7133	0.717
0.48		0.74	0.774	0.765	0.714
1		0.607	0.6056	0.795	0.706
2.06		0.5217	0.53	0.5638	0.5575
4.17					0.57

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	10/10	10/10	10/10	10/10
0	Negative Control	9/10	10/10	10/10	10/10
0.08		10/10	10/10	10/10	10/10
0.21		10/10	10/10	9/10	10/10
0.48		9/10	10/10	10/10	10/10
1		10/10	9/10	8/10	10/10
2.06		6/10	8/10	8/10	8/10
4.17		0/10	0/10	0/10	2/10

CETIS Summary Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-5056-1722	7d Survival Rate	1	2.06	1.435	10.6%		Dunnett Multiple Comparison Test
20-4029-7436	Mean Dry Biomass-mg	1	2.06	1.435	16.7%		Dunnett Multiple Comparison Test
13-2569-4375	Mean Dry Weight-mg	1	2.06	1.435	16.4%		Bonferroni Adj t Test

Point Estimate Summary (1)

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
21-2155-3157	7d Survival Rate	EC50	2.463	2.17	2.796		Trimmed Spearman-Kärber
12-7302-9017	Mean Dry Biomass-mg	IC5	0.8246	N/A	1.069		Nonlinear Regression
		IC10	1.044	0.6335	1.287		
		IC15	1.208	0.8707	1.454		
		IC20	1.348	1.05	1.593		
		IC25	1.476	1.206	1.718		
		IC40	1.836	1.612	2.07		
		IC50	2.086	1.861	2.339		
16-5075-5031	Mean Dry Weight-mg	IC5	0.6709	N/A	1.406		Linear Interpolation (ICPIN)
		IC10	0.9674	0.335	1.559		
		IC15	1.253	0.4955	1.714		
		IC20	1.572	0.6068	1.96		
		IC25	1.936	1.21	N/A		
		IC40	>4.17	N/A	N/A		
		IC50	>4.17	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
07-5056-1722	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
21-2155-3157	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
12-7302-9017	Mean Dry Biomass-mg	Control Resp	0.7185	0.25 - NL	Yes	Passes Acceptability Criteria
20-4029-7436	Mean Dry Biomass-mg	Control Resp	0.7185	0.25 - NL	Yes	Passes Acceptability Criteria
20-4029-7436	Mean Dry Biomass-mg	PMSD	0.1666	0.12 - 0.3	Yes	Passes Acceptability Criteria

(1) negative control = solvent control (methanol)

emm June 30/17

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	1	1	1	1	1	0	0	0.0%	0.0%
0	Negative Control	4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
0.08		4	1	1	1	1	1	0	0	0.0%	0.0%
0.21		4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
0.48		4	0.975	0.8954	1	0.9	1	0.025	0.05	5.13%	2.5%
1		4	0.925	0.7727	1	0.8	1	0.04787	0.09574	10.35%	7.5%
2.06		4	0.75	0.5909	0.9091	0.6	0.8	0.05	0.1	13.33%	25.0%
4.17		4	0.05	0	0.2091	0	0.2	0.05	0.1	200.0%	95.0%

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0	Negative Control	4	0.8533	0.749	0.9575	0.762	0.918	0.03276	0.06551	7.68%	-18.75%
0.08		4	0.7975	0.6346	0.9604	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7307	0.5894	0.8721	0.642	0.854	0.04443	0.08885	12.16%	-1.71%
0.48		4	0.7298	0.6501	0.8094	0.666	0.774	0.02502	0.05004	6.86%	-1.57%
1		4	0.6235	0.5172	0.7298	0.545	0.706	0.03341	0.06682	10.72%	13.22%
2.06		4	0.4085	0.3055	0.5115	0.313	0.451	0.03237	0.06474	15.85%	43.15%
4.17		4	0.0285	-0.0622	0.1192	0	0.114	0.0285	0.057	200.0%	96.03%

Mean Dry Weight-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0	Negative Control	4	0.8744	0.8258	0.923	0.8467	0.918	0.01527	0.03055	3.49%	-21.7%
0.08		4	0.7975	0.6346	0.9604	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7486	0.6367	0.8605	0.71	0.854	0.03517	0.07033	9.4%	-4.19%
0.48		4	0.7482	0.7053	0.7912	0.714	0.774	0.01349	0.02699	3.61%	-4.14%
1		4	0.6784	0.5338	0.823	0.6056	0.795	0.04542	0.09085	13.39%	5.58%
2.06		4	0.5432	0.5106	0.5759	0.5217	0.5638	0.01027	0.02053	3.78%	24.39%
4.17		1	0.57			0.57	0.57	0	0	0.0%	20.67%

Analyst: EM June 30/17 QA:_____

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1	1	1	1
0	Negative Control	0.9	1	1	1
0.08		1	1	1	1
0.21		1	1	0.9	1
0.48		0.9	1	1	1
1		1	0.9	0.8	1
2.06		0.6	0.8	0.8	0.8
4.17		0	0	0	0.2

Mean Dry Biomass-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.762	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.642	0.717
0.48		0.666	0.774	0.765	0.714
1		0.607	0.545	0.636	0.706
2.06		0.313	0.424	0.451	0.446
4.17		0	0	0	0.114

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.8467	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.7133	0.717
0.48		0.74	0.774	0.765	0.714
1		0.607	0.6056	0.795	0.706
2.06		0.5217	0.53	0.5638	0.5575
4.17					0.57

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	10/10	10/10	10/10	10/10
0	Negative Control	9/10	10/10	10/10	10/10
0.08		10/10	10/10	10/10	10/10
0.21		10/10	10/10	9/10	10/10
0.48		9/10	10/10	10/10	10/10
1		10/10	9/10	8/10	10/10
2.06		6/10	8/10	8/10	8/10
4.17		0/10	0/10	0/10	2/10

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	20-0893-5014	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.2%	Passes 7d survival rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Control	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	20	NA	1	6	1.0000	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003319917	0.003319917	1	1	0.3559	Non-Significant Effect
Error	0.0199195	0.003319917	6			
Total	0.02323942		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	13.75	0.3559	Equal Variances
Variances	Levene Equality of Variance	9	13.75	0.0240	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7065	0.6451	0.0027	Non-normal Distribution

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	1	1	1	1	1	1	0	0.0%	0.0%
0	Negative Control	4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	2.5%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
0	Negative Contr	4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	2.89%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1	1	1	1
0	Negative Control	0.9	1	1	1

Angular (Corrected) Transformed Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1.412	1.412	1.412	1.412
0	Negative Control	1.249	1.412	1.412	1.412

Analyst: KJL June 30/17 QA:

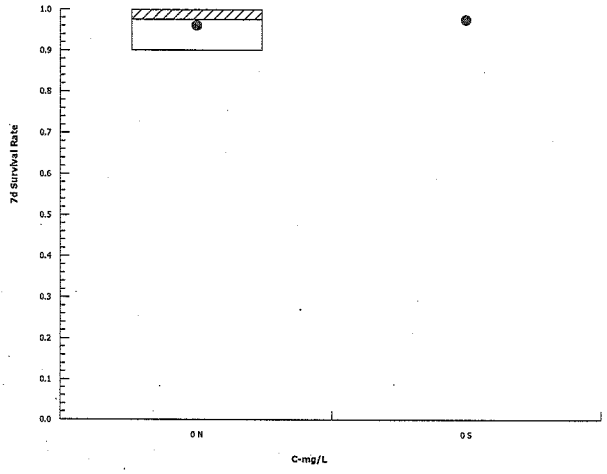
Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

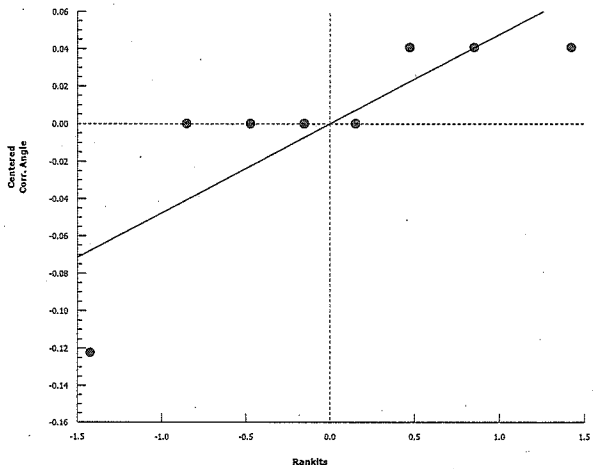
Analysis ID:	20-0893-5014	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	10/10	10/10	10/10	10/10
0	Negative Control	9/10	10/10	10/10	10/10

Graphics





June 30/17

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID:	02-8181-7525	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:34	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.025	5.06%	0.3987	0.02594	2.505	2.223	2.822

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
0.08		4	1	1	1	0	0	0.0%	-2.56%	40	40
0.21		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
0.48		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
1		4	0.925	0.8	1	0.04787	0.09574	10.35%	5.13%	37	40
2.06		4	0.75	0.6	0.8	0.05	0.1	13.33%	23.08%	30	40
4.17		4	0.05	0	0.2	0.05	0.1	200.0%	94.87%	2	40

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9	1	1	1
0.08		1	1	1	1
0.21		1	1	0.9	1
0.48		0.9	1	1	1
1		1	0.9	0.8	1
2.06		0.6	0.8	0.8	0.8
4.17		0	0	0	0.2

7d Survival Rate Binomials

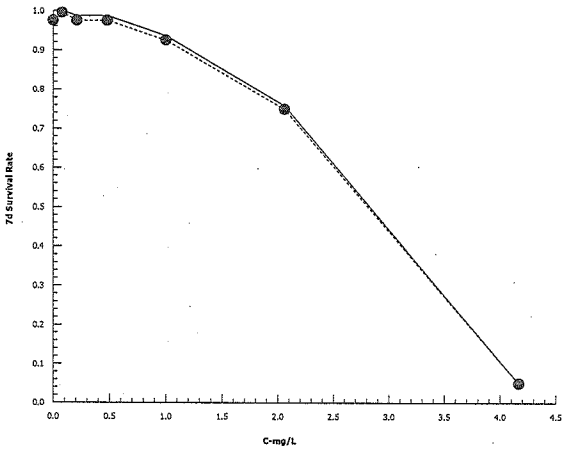
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	10/10	10/10	10/10	10/10
0	Negative Control	9/10	10/10	10/10	10/10
0.08		10/10	10/10	10/10	10/10
0.21		10/10	10/10	9/10	10/10
0.48		9/10	10/10	10/10	10/10
1		10/10	9/10	8/10	10/10
2.06		6/10	8/10	8/10	8/10
4.17		0/10	0/10	0/10	2/10

June 26/17

Fathead Minnow 7-d Larval Survival and Growth Test **Nautilus Environmental**

Analysis ID:	02-8181-7525	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:34	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



Analyst: KJ2 June 26/17 QA:

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	21-2155-3157	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:24	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	5.00%	0.3915	0.02749	2.463	2.17	2.796

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Solvent Blank	4	1	1	1	0	0	0.0%	0.0%	40	40
0.08		4	1	1	1	0	0	0.0%	0.0%	40	40
0.21		4	0.975	0.9	1	0.025	0.05	5.13%	2.5%	39	40
0.48		4	0.975	0.9	1	0.025	0.05	5.13%	2.5%	39	40
1		4	0.925	0.8	1	0.04787	0.09574	10.35%	7.5%	37	40
2.06		4	0.75	0.6	0.8	0.05	0.1	13.33%	25.0%	30	40
4.17		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	2	40

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1	1	1	1
0.08		1	1	1	1
0.21		1	1	0.9	1
0.48		0.9	1	1	1
1		1	0.9	0.8	1
2.06		0.6	0.8	0.8	0.8
4.17		0	0	0	0.2

7d Survival Rate Binomials

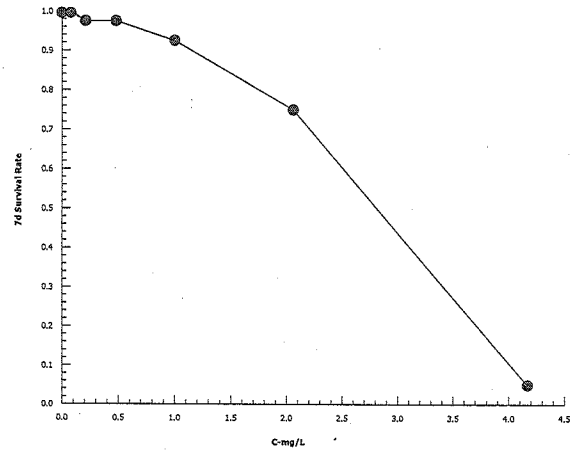
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	10/10	10/10	10/10	10/10
0	Negative Control	9/10	10/10	10/10	10/10
0.08		10/10	10/10	10/10	10/10
0.21		10/10	10/10	9/10	10/10
0.48		9/10	10/10	10/10	10/10
1		10/10	9/10	8/10	10/10
2.06		6/10	8/10	8/10	8/10
4.17		0/10	0/10	0/10	2/10

Analyst: KL June 30/17 QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	21-2155-3157	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:24	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



Analyst: KSL June 30/17 QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	06-6247-6961	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	8.05%	Fails mean dry biomass-mg

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	3.812	1.943	0.069	6	0.0044	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.7185	0.25 - NL	Yes	Passes Acceptability Criteria
Control Resp	0.8533	0.25 - NL	Yes	Passes Acceptability Criteria
PMSD	0.08049	0.12 - 0.3	Yes	Below Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03631531	0.03631531	1	14.53	0.0088	Significant Effect
Error	0.01499092	0.002498487	6			
Total	0.05130624		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.087	47.47	0.1722	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8571	0.6451	0.1125	Normal Distribution

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.73	0.679	0.735	0.01328	3.7%	0.0%
0	Negative Control	4	0.8533	0.749	0.9575	0.8665	0.762	0.918	0.03276	7.68%	-18.75%

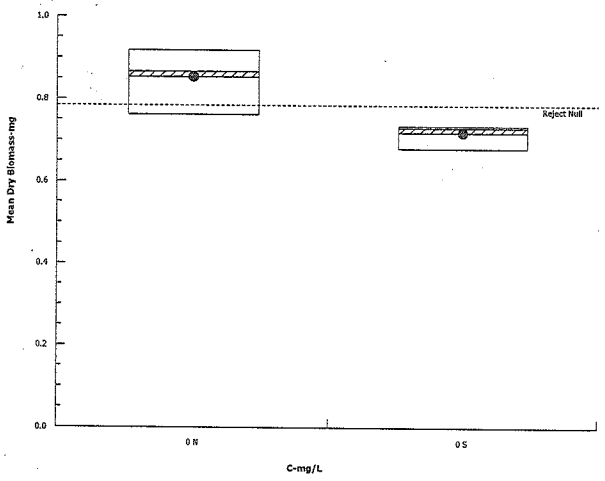
Mean Dry Biomass-mg Detail

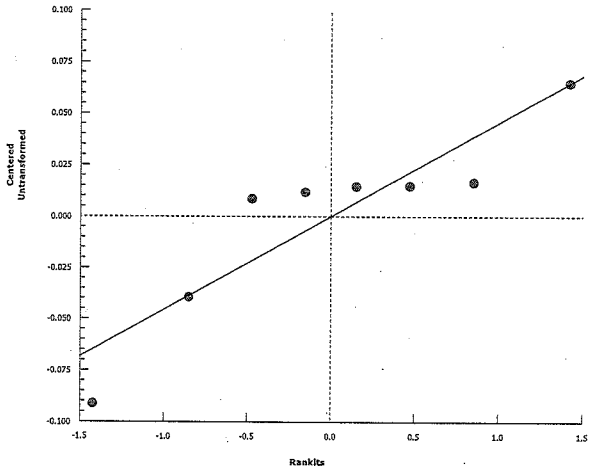
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.762	0.918	0.868	0.865

June 30/17

Analysis ID: 06-6247-6961 **Endpoint:** Mean Dry Biomass-mg **CETIS Version:** CETISv1.8.7
Analyzed: 22 Jun-17 16:35 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Graphics





Analyst: bL June 30/17 QA:

CETIS Analytical Report

Test Code: 170513 | 15-2511-1598

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	12-8730-9843	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1805120	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.8533	0.25 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.06066	0.004546	0.3985
IC10	0.1358	0.001466	0.7352
IC15	0.4989	N/A	0.8273
IC20	0.6916	N/A	1.208
IC25	0.909	0.4493	1.313
IC40	1.494	1.16	1.888
IC50	1.952	1.516	2.333

Mean Dry Biomass-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.8533	0.762	0.918	0.03276	0.06551	7.68%	0.0%
0.08		4	0.7975	0.713	0.945	0.0512	0.1024	12.84%	6.53%
0.21		4	0.7307	0.642	0.854	0.04443	0.08885	12.16%	14.36%
0.48		4	0.7298	0.666	0.774	0.02502	0.05004	6.86%	14.47%
1		4	0.6235	0.545	0.706	0.03341	0.06682	10.72%	26.93%
2.06		4	0.4085	0.313	0.451	0.03237	0.06474	15.85%	52.12%
4.17		4	0.0285	0	0.114	0.0285	0.057	200.0%	96.66%

Mean Dry Biomass-mg Detail

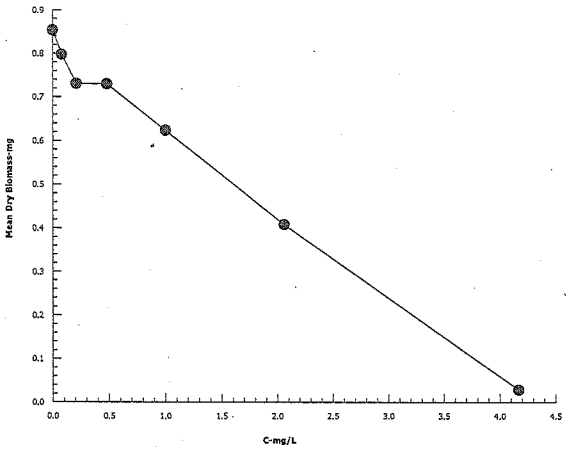
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.762	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.642	0.717
0.48		0.666	0.774	0.765	0.714
1		0.607	0.545	0.636	0.706
2.06		0.313	0.424	0.451	0.446
4.17		0	0	0	0.114

Analyst: KL June 30/17 QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	12-8730-9843	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: KSL June 30/17 QA:

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	12-7302-9017	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:24	**Analysis:**	Nonlinear Regression	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
14	60.34	-113.7	-110.7	0.9209	Yes	1.981	2.84	0.1345	Non-Significant Lack of Fit

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.8246	N/A	1.069
IC10	1.044	0.6335	1.287
IC15	1.208	0.8707	1.454
IC20	1.348	1.05	1.593
IC25	1.476	1.206	1.718
IC40	1.836	1.612	2.07
IC50	2.086	1.861	2.339

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.7185	0.25 - NL	Yes	Passes Acceptability Criteria

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.7378	0.01882	0.7009	0.7747	39.21	<0.0001	Significant Parameter
C	3.172	0.6174	1.962	4.382	5.138	<0.0001	Significant Parameter
D	2.086	0.1286	1.834	2.338	16.23	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	1.750167	1.750167	1	316.1	<0.0001	Significant
Lack of Fit	0.0379091	0.0094773	4	1.981	0.1345	Non-Significant
Pure Error	0.1004888	0.0047852	21			
Residual	0.1383979	0.0055359	25			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	4.967	12.59	0.5480	Equal Variances
	Mod Levene Equality of Variance	0.4141	2.573	0.8613	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9474	0.9264	0.1700	Normal Distribution
	Anderson-Darling A2 Normality	0.4712	2.492	0.2495	Normal Distribution

Analyst: KS QA: June 30/17

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID: 12-7302-9017 **Endpoint:** Mean Dry Biomass-mg **CETIS Version:** CETISv1.8.7
Analyzed: 30 Jun-17 16:24 **Analysis:** Nonlinear Regression **Official Results:** Yes

Mean Dry Biomass-mg Summary

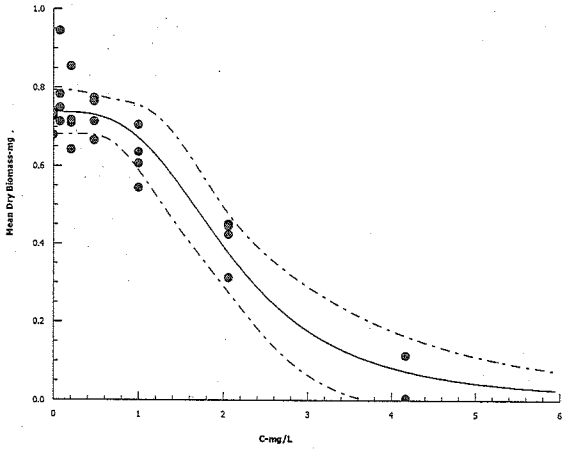
			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0.08		4	0.7975	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7307	0.642	0.854	0.04443	0.08885	12.16%	-1.71%
0.48		4	0.7298	0.666	0.774	0.02502	0.05004	6.86%	-1.57%
1		4	0.6235	0.545	0.706	0.03341	0.06682	10.72%	13.22%
2.06		4	0.4085	0.313	0.451	0.03237	0.06474	15.85%	43.15%
4.17		4	0.0285	0	0.114	0.0285	0.057	200.0%	96.03%

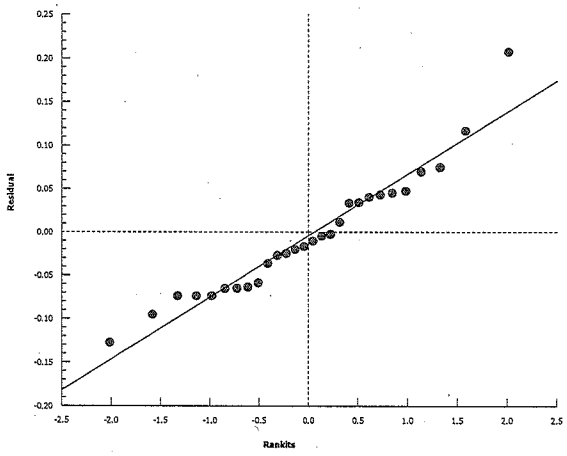
Mean Dry Biomass-mg Detail

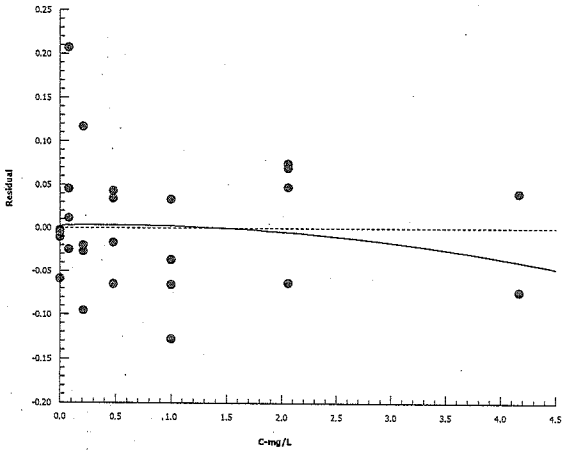
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.642	0.717
0.48		0.666	0.774	0.765	0.714
1		0.607	0.545	0.636	0.706
2.06		0.313	0.424	0.451	0.446
4.17		0	0	0	0.114

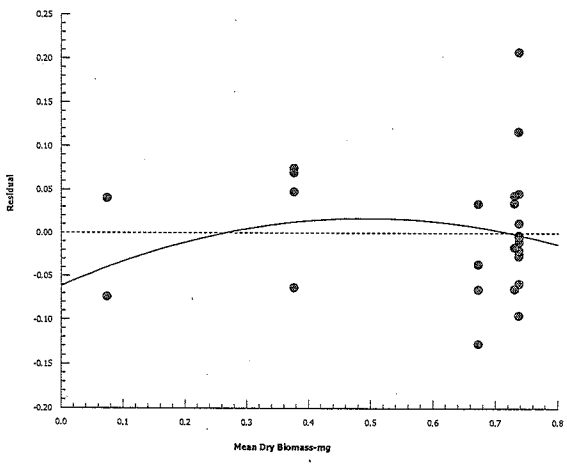
Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]









June 30/17

CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	00-8422-8509	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	4.5%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	7.704	1.943	0.039	6	0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04862022	0.04862022	1	59.35	0.0003	Significant Effect
Error	0.00491523	0.0008192049	6			
Total	0.05353545		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.324	47.47	0.8233	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9771	0.6451	0.9474	Normal Distribution

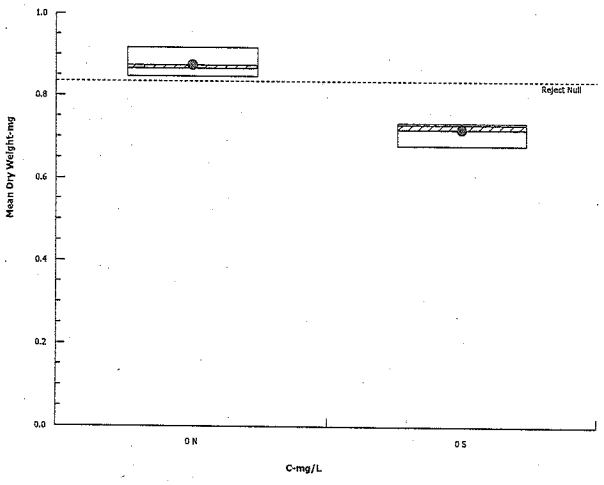
Mean Dry Weight-mg Summary

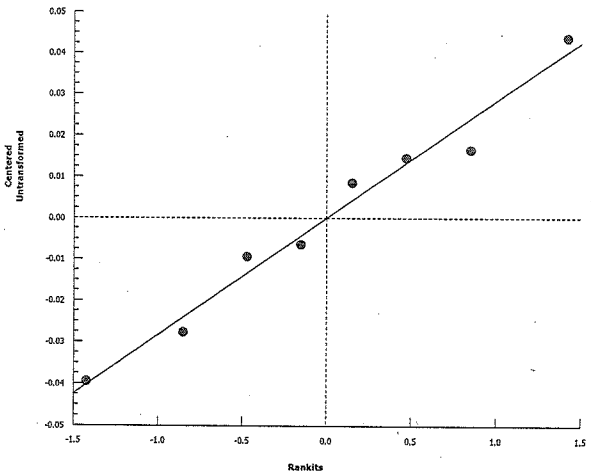
C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.7185	0.6762	0.7608	0.73	0.679	0.735	0.01328	3.7%	0.0%
0	Negative Control	4	0.8744	0.8258	0.923	0.8665	0.8467	0.918	0.01528	3.49%	-21.7%

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0	Negative Control	0.8467	0.918	0.868	0.865

Graphics





CETIS Analytical Report

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	19-7710-9662	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	549304	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.04472	0.01018	0.1943
IC10	0.1067	0.01083	0.4554
IC15	0.5122	N/A	1.377
IC20	0.8258	0.3904	1.529
IC25	1.164	0.5574	1.707
IC40	>4.17	N/A	N/A
IC50	>4.17	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.8744	0.8467	0.918	0.01528	0.03055	3.49%	0.0%
0.08		4	0.7975	0.713	0.945	0.0512	0.1024	12.84%	8.8%
0.21		4	0.7486	0.71	0.854	0.03517	0.07033	9.4%	14.39%
0.48		4	0.7482	0.714	0.774	0.01349	0.02699	3.61%	14.43%
1		4	0.6784	0.6056	0.795	0.04542	0.09085	13.39%	22.42%
2.06		4	0.5432	0.5217	0.5638	0.01027	0.02053	3.78%	37.88%
4.17		1	0.57	0.57	0.57	0	0	0.0%	34.81%

Mean Dry Weight-mg Detail

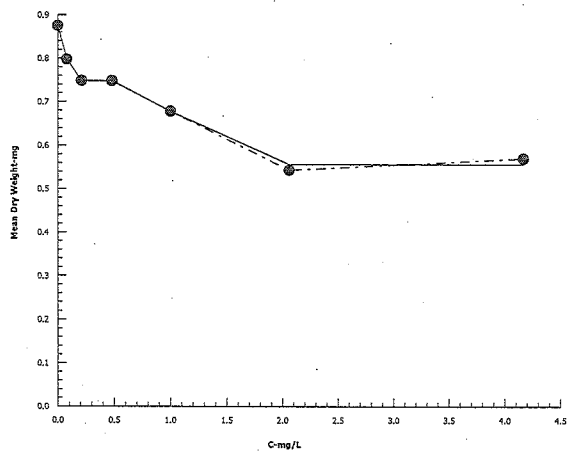
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.8467	0.918	0.868	0.865
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.7133	0.717
0.48		0.74	0.774	0.765	0.714
1		0.607	0.6056	0.795	0.706
2.06		0.5217	0.53	0.5638	0.5575
4.17		0.57			

June 30/17

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	19-7710-9662	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:21	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



June 30/17

Analyst: KJ2 QA:

Fathead Minnow 7-d Larval Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	16-5075-5031	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	04-3104-2454	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 15:50	**Protocol:**	EPA/821/R-02-013 (2002)	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	17 May-17 16:30	**Species:**	Pimephales promelas	**Brine:**	
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	610236	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.6709	N/A	1.406
IC10	0.9674	0.335	1.559
IC15	1.253	0.4955	1.714
IC20	1.572	0.6068	1.96
IC25	1.936	1.21	N/A
IC40	>4.17	N/A	N/A
IC50	>4.17	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.7185	0.679	0.735	0.01328	0.02655	3.7%	0.0%
0.08		4	0.7975	0.713	0.945	0.0512	0.1024	12.84%	-10.99%
0.21		4	0.7486	0.71	0.854	0.03517	0.07033	9.4%	-4.19%
0.48		4	0.7482	0.714	0.774	0.01349	0.02699	3.61%	-4.14%
1		4	0.6784	0.6056	0.795	0.04542	0.09085	13.39%	5.58%
2.06		4	0.5432	0.5217	0.5638	0.01027	0.02053	3.78%	24.39%
4.17		1	0.57	0.57	0.57	0	0	0.0%	20.67%

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.735	0.727	0.733	0.679
0.08		0.783	0.749	0.713	0.945
0.21		0.854	0.71	0.7133	0.717
0.48		0.74	0.774	0.765	0.714
1		0.607	0.6056	0.795	0.706
2.06		0.5217	0.53	0.5638	0.5575
4.17		0.57			

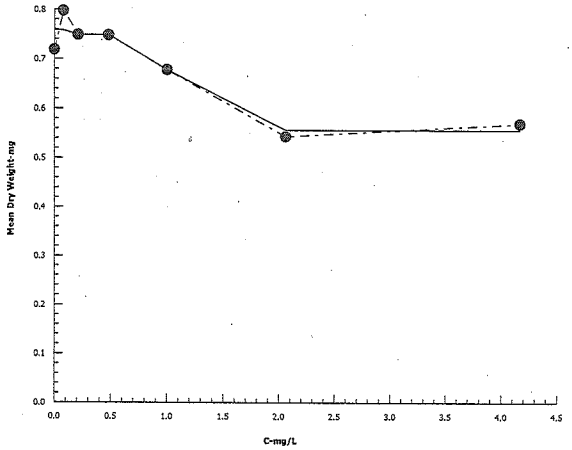
Analyst: KSL June 30/17 QA:

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID:	16-5075-5031	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



June 30/17

Analyst: PJL QA:

APPENDIX B - Topsmelt Toxicity Test Data

Topsmelt Test Summary Sheet

Client: WDOE

Start Date & Time: May 10, 2017 @ 1430h

Work Order No.: 170515

Test Species: *Atherinops affinis*

Sample Information:

Sample ID: NWTPH-Gx (Gasoline)
Sample Date: 5-Apr-17
Date Received: 5-Apr-17
Sample Volume: 50x 5mL

Dilution Water:

Type: Natural Seawater
Source: Vancouver Aquarium, Vancouver, BC

Test Organism Information:

Batch No.: 051017
Source: Aquatic Biosystems, CO
Age: 9-days

Copper Reference Toxicant Results:

Reference Toxicant ID: AAC27
Stock Solution ID: 17Cu01
Date Initiated: 10-May-17
7-d EC50 (95% CL): 118.5 (104.7 - 134.1)
7-d IC50 (95% CL): 105.0 (88.6 - 113.3)

EC50 Reference Toxicant Mean (Acceptable Range) : 101.8 (64.4 - 160.9) CV (%): 26
IC50 Reference Toxicant Mean (Acceptable Range) : 96.2 (59.8 - 155.1) CV (%): 27

Test Results: (1)

	Survival	Dry Biomass	Dry Weight
NOEC	1.72	1.72	1.72
LOEC	~~3.42~~ >1.72	~~3.42~~ >1.72	>1.72
EC25 (mg/L) (95% CL)	n/a		
EC50 (mg/L) (95% CL)	1.7 ~~(1.4 - 2.0)~~ (1.5 - 2.1)		
IC25 (mg/L) (95% CL)	1.7 (0.4 - 2.2) ~~1.5 (0.1 - 2.3)~~		>1.72
IC50 (mg/L) (95% CL)	2.2 (1.1 - 2.6) ~~2.1 (1.0 - 2.6)~~		>1.72

(1) endpoints calculated using solvent as negative control

Reviewed by: [signature]

Date reviewed: June 29, 2017

Chronic Marine Toxicity Test
Initial and Final Water Quality Measurements

Client: WDOE blue
Sample ID: NWTPH-Gx (gasoline)
Work Order #: ~~170STA~~ 170515 KL

Start Date & Time: May 10/17 1430h
Stop Date & Time: May 17/17 1400h
Test Species: *Atherinops affinis*

mg/L gasoline Concentration Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.6	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	7.2	7.2	6.6	7.6	6.9	7.7	6.4	7.9	6.5	7.7	6.7	7.7	7.0
pH	7.7	7.4	7.4	7.6	7.8	7.84	7.7	7.5	7.7	7.5	7.8	7.7	7.6	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration Methanol Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	7.0	7.2	7.0	7.7	7.0	7.9	6.5	7.9	7.2	7.7	6.8	7.7	6.9
pH	7.8	7.4	7.6	7.2	7.7	7.4	7.7	7.5	7.7	7.6	7.8	7.6	7.8	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 0.16	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	6.5	7.7	6.3	7.7	6.9	7.7	6.6	7.7	6.9	7.7	7.1	7.7	7.0
pH	7.8	7.4	7.2	7.5	7.8	7.4	7.7	7.6	7.7	7.5	7.8	7.6	7.8	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 0.31	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	6.7	7.7	6.6	7.7	6.9	7.7	6.6	7.7	7.1	7.7	7.2	7.7	7.1
pH	7.8	7.4	7.7	7.4	7.8	7.4	7.7	7.5	7.7	7.7	7.8	7.7	7.9	7.6
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Analysts: KJL, AWD
Reviewed by: [signature]
Date reviewed: June 23, 2017

Sample Description: Test treatments prepared from NWTPH-Gx (standard)

Comments: Project Manager notified of low DO. Aeration initiated ~1600h on Day 2 KJL

Chronic Marine Toxicity Test
Initial and Final Water Quality Measurements

Client: WDOE
Sample ID: ~~170515A~~ 170515
Work Order #: NWTPH-Gx (gasoline)

Start Date & Time: May 10/17 1430h
Stop Date & Time: May 17/17 1400h
Test Species: *Atherinops affinis*

mg/L gasoline

Concentration 0.63

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	6.3	7.7	4.8	7.7	6.8	7.7	6.5	7.7	7.2	7.7	7.3	7.7	7.0
pH	7.8	7.7	7.7	7.4	7.8	7.4	7.7	7.5	7.7	7.7	7.8	7.8	7.9	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 1.25

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	5.9	7.7	4.4	7.7	6.9	7.7	6.5	7.7	7.2	7.7	7.2	7.7	6.5
pH	7.8	7.8	7.7	7.1	7.8	7.4	7.7	7.5	7.7	7.7	7.8	7.7	7.8	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 2.5

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0	19.5	19.0	19.5	19.0	19.0	19.0	19.0	19.0
DO (mg/L)	7.7	4.8	7.7	4.5	7.7	6.9	7.7	6.6	7.7	7.1	7.7	6.8	7.7	6.6
pH	7.7	6.9	7.7	6.9	7.8	7.4	7.7	7.5	7.7	7.6	7.8	7.6	7.8	7.5
Salinity (ppt)	29	29		29		29		29		29		29		29
Initials	KJL	KJL		KJL		A		A		KJL		KJL		KJL

Concentration 5

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	19.0	20.0	19.5	19.5	19.0	19.0								
DO (mg/L)	7.7	4.2	7.7	4.7	7.7	6.8								
pH	7.7	7.0	7.6	7.0	7.7	7.4								
Salinity (ppt)	29	29		29										
Initials	KJL	KJL		KJL		A								

Analysts: KJL, AWD

Reviewed by: [signature]

Date reviewed: June 23, 2017

Sample Description:

Comments:

7-d Topsmelt Toxicity Test
Daily Survival

Client: WDOE
Sample ID: NWTPH-Gx (gasoline)
Work Order #: 170515

Start Date & Time: May 10/17 1430h
Stop Date & Time: May 17/17 1400h
Test Species: *Atherinops affinis*

Concentration mg/L gasoline	Rep	Day of Test - No. of Survivors 1	2	3	4	5	6	7	Comments
Control	A	5	5	5	5	5	5	5	
	B							5	
	C							5	
	D							5	
	E							5	
Methanol Control	A							5	
	B							5	
	C							5	
	D							4	
	E							5	
0.16	A							4①	1 organism lost during wa
	B							5	
	C							5	
	D						5	5	
	E						4	4	
0.31	A						5	5	
	B							5	
	C							5	
	D							5	
	E							5	
0.63	A						5	5	
	B							4	
	C							5	
	D							4	
	E	0	0	1	1	1	1	5	
1.25	A	2	2	2	2	2	2	2	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5			5	
	D	5	5	5	5			5	
	E	5	5	5	5	5		4	
2.5	A	5	0					0	
	B	5	5	5	4	4	4	4	
	C	5	5	5	5	5	5	5	
	D	4	4	4	4	4	4	4	
	E	5	5	5	5	5	4	4	
5	A	3	2	0					
	B	2	0						
	C	0	0						
	D	2	0						
	E	3	0						
Tech Initials		KJL	KJL			KJL	KJL	KJL	

Comments: Remaining fish appear normal.

Reviewed by: [signature]

Date reviewed: June 26, 2017

Topsmelt Toxicity Test Data Sheet

Dry Weight Data

Client: WDOE

Start Date & Time: May 10/17 1430h

Work Order #: ~~17015LA~~ 17055

Termination Date & Time: May 17/17 1400h

Sample ID: NWTPH-Gx (Gasoline)

mg/L gasoline	Rep	TS Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	5	KJL	1019.66	1026.06	5	KJL
	B	2	5		1021.32	1030.97	5	
	C	3	5		1019.29	1025.67	5	
	D	4	5		1014.28	1021.95	5	
	E	5	5		1012.65	1019.33	5	
Methanol Control	A	6	5		1008.90	1014.890 KJL	5	
	B	7	5		1028.53	1034.95	5	
	C	8	5		1024.51	1030.67	5	
	D	9	4		1015.77	1020.58	4	
	E	10	5		1035.95	1042.45	5	
0.16	A	11	4		1031.33	1037.94	4	
	B	12	5		1022.89	1029.30	5	
	C	13	5		1029.05	1036.88	5	
	D	14	5		1015.06	1021.085 KJL	5	
	E	15	4		1020.88	1026.46	4	
0.31	A	16	5		1025.22	1033.85	5	
	B	17	5		1026.24	1033.11	5	
	C	18	5		1028.16	1034.01	5	
	D	19	5		1021.53	1030.35	5	
	E	20	5		1022.75	1030.23	5	
0.63	A	21	5		1015.01	1022.24	5	
	B	22	4		1015.21	1020.26	4	
	C	23	5		1033.20	1043.28	5	
	D	24	4		1021.46	1027.61	4	
	E	25	5		1032.40	1038.92	5	
1.25	A	26	2		1028.48	1032.08	2	
	B	27	5		1021.87	1030.53	5	
	C	28	5		1011.56	1018.08	5	
	D	29	5		1001.26	1009.75	5	
	E	30	4	↓	1025.49	1031.52	4	↓

Comments: 10% pan reweigh - 7 - 1035.00
15 - 1026.42
27 - 1030.43
34 - 1009.60

Reviewed by: [signature]

Date Reviewed: June 23, 2017

Topsmelt Toxicity Test Data Sheet

Dry Weight Data

Client: UDOG

Work Order #: ~~170151A~~ 170515

Sample ID: NWTPH-Gx (gasoline)

Start Date & Time: May 10/17 1430h

Termination Date & Time: May 17/17 1400h

mg/L gasoline	Rep	TS Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
2.5	A	31	0	KJL	1000.47	—	0	KJL
	B	32	4		1023.11	1029.06	4	
	C	33	5		992.84	1001.96	5	
	D	34	4		1005.10	1009.71	4	
	E	35	4		999.46	1005.87	4	
5	A	36	0		1010.91			
	B	37	0		985.43			
	C	38	0		1011.14			
	D	39	0		1025.06			
	E	40	0		1029.96 NM			
	A							
	B							
	C							
	D							
	E							
	A							
	B							
	C							
	D							
	E							
	A							
	B							
	C							
	D							
	E							
	A							
	B							
	C							
	D							
	E							

Comments: _____

Reviewed by: _____

Date Reviewed: June 23, 2017

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-1031-4044	7d Survival Rate	1.72	3.42	2.425	28.1%		Steel Many-One Rank Sum Test
05-8800-3042	7d Survival Rate	0	>0		9.54%		Wilcoxon Rank Sum Two-Sample Test
01-2744-8584	Mean Dry Biomass-mg	<0	0		17.5%		Equal Variance t Two-Sample Test
07-0688-7561	Mean Dry Biomass-mg	1.72	3.42	2.425	40.5%		Dunnett Multiple Comparison Test
00-9262-9924	Mean Dry Weight-mg	0	>0		18.2%		Unequal Variance t Two-Sample Test
04-9762-5113	Mean Dry Weight-mg	1.72	>1.72	NA	28.7%		Bonferroni Adj t Test

Point Estimate Summary (1)

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
07-9902-7928	7d Survival Rate	EC50	1.698	1.413	2.04		Trimmed Spearman-Kärber
00-7846-7010	Mean Dry Biomass-mg	IC5	0.4695	N/A	1.851		Linear Interpolation (ICPIN)
		IC10	0.8992	N/A	2.233		
		IC15	1.087	N/A	2.248		
		IC20	1.293	N/A	2.256		
		IC25	1.519	0.1372	2.257		
		IC40	1.931	0.7325	2.411		
		IC50	2.139	1.036	2.563		
08-8248-7537	Mean Dry Weight-mg	IC5	>1.72	N/A	N/A		Linear Interpolation (ICPIN)
		IC10	>1.72	N/A	N/A		
		IC15	>1.72	N/A	N/A		
		IC20	>1.72	N/A	N/A		
		IC25	>1.72	N/A	N/A		
		IC40	>1.72	N/A	N/A		
		IC50	>1.72	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-8800-3042	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria
	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
07-9902-7928	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
14-1031-4044	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
00-7846-7010	Mean Dry Biomass-mg	Control Resp	1.471	0.85 - NL	Yes	Passes Acceptability Criteria
01-2744-8584	Mean Dry Biomass-mg	Control Resp	1.196	0.85 - NL	Yes	Passes Acceptability Criteria
	Mean Dry Biomass-mg	Control Resp	1.471	0.85 - NL	Yes	Passes Acceptability Criteria
07-0688-7561	Mean Dry Biomass-mg	Control Resp	1.471	0.85 - NL	Yes	Passes Acceptability Criteria
05-8800-3042	7d Survival Rate	PMSD	0.09544	NL - 0.25	No	Passes Acceptability Criteria
14-1031-4044	7d Survival Rate	PMSD	0.281	NL - 0.25	No	Above Acceptability Criteria
01-2744-8584	Mean Dry Biomass-mg	PMSD	0.1747	NL - 0.5	No	Passes Acceptability Criteria
07-0688-7561	Mean Dry Biomass-mg	PMSD	0.4051	NL - 0.5	No	Passes Acceptability Criteria

(1) negative control = lab water

June 26/17

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental**

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	0.0%
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	-4.17%
0.14		5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	0.0%
0.24		5	1	1	1	1	1	0	0	0.0%	-4.17%
0.45		5	0.92	0.784	1	0.8	1	0.04899	0.1095	11.91%	4.17%
0.88		5	0.84	0.5162	1	0.4	1	0.1166	0.2608	31.04%	12.5%
1.72		5	0.68	0.1959	1	0	1	0.1744	0.3899	57.33%	29.17%
3.42		5	0	0	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.196	1.026	1.365	0.962	1.3	0.06108	0.1366	11.42%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.276	1.93	0.124	0.2772	18.84%	-23.05%
0.14		5	1.363	1.072	1.654	1.116	1.652	0.1048	0.2344	17.2%	-13.99%
0.24		5	1.506	1.198	1.814	1.17	1.764	0.1108	0.2477	16.45%	-25.96%
0.45		5	1.401	0.9317	1.871	1.01	2.016	0.1691	0.3781	26.98%	-17.2%
0.88		5	1.332	0.8181	1.846	0.72	1.732	0.1851	0.4139	31.07%	-11.41%
1.72		5	1.044	0.2127	1.874	0	1.824	0.2993	0.6692	64.12%	12.71%
3.42		5	0	0	0	0	0	0	0		100.0%

Mean Dry Weight-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.244	1.186	1.301	1.2	1.3	0.02066	0.0462	3.71%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.276	1.93	0.124	0.2772	18.84%	-18.29%
0.14		5	1.419	1.183	1.655	1.198	1.652	0.08494	0.1899	13.39%	-14.07%
0.24		5	1.506	1.198	1.814	1.17	1.764	0.1108	0.2477	16.45%	-21.09%
0.45		5	1.513	1.138	1.888	1.262	2.016	0.135	0.3019	19.95%	-21.67%
0.88		5	1.608	1.358	1.859	1.304	1.8	0.09024	0.2018	12.55%	-29.32%
1.72		4	1.517	1.071	1.962	1.153	1.824	0.14	0.28	18.47%	-21.95%

Solvent blank = methanol control

June 26/17

Pacific Topsmelt 7-d Survival and Growth Test — Nautilus Environmental

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1	1	1	0.8	1
0	Negative Control	1	1	1	1	1
0.14		1	1	1	1	0.8
0.24		1	1	1	1	1
0.45		1	0.8	1	0.8	1
0.88		0.4	1	1	1	0.8
1.72		0	0.8	1	0.8	0.8
3.42		0	0	0	0	0

Mean Dry Biomass-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	0.962	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.116
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.01	2.016	1.23	1.304
0.88		0.72	1.732	1.304	1.698	1.206
1.72		0	1.19	1.824	0.922	1.282
3.42		0	0	0	0	0

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	1.202	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.395
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.262	2.016	1.537	1.304
0.88		1.8	1.732	1.304	1.698	1.508
1.72			1.488	1.824	1.153	1.602
3.42						

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	4/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.14		4/4	5/5	5/5	5/5	4/5
0.24		5/5	5/5	5/5	5/5	5/5
0.45		5/5	4/5	5/5	4/5	5/5
0.88		2/5	5/5	5/5	5/5	4/5
1.72		0/5	4/5	5/5	4/5	4/5
3.42		0/5	0/5	0/5	0/5	0/5

Solvent blank = methanol control

June 26/17

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
08-9590-1906	7d Survival Rate	1.72	>1.72	NA	30.3%		Steel Many-One Rank Sum Test
01-7518-5057	Mean Dry Biomass-mg	1.72	>1.72	NA	48.3%		Dunnett Multiple Comparison Test
20-5794-2757	Mean Dry Weight-mg	1.72	>1.72	NA	30.3%		Bonferroni Adj t Test

Point Estimate Summary (1)

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
05-8647-9778	7d Survival Rate	EC50	1.742	1.476	2.056		Spearman-Kärber
06-7753-6516	Mean Dry Biomass-mg	IC5	0.9634	0.01206	2.199		Linear Interpolation (ICPIN)
		IC10	1.143	0.08337	2.211		
		IC15	1.339	0.2848	2.219		
		IC20	1.553	0.3291	2.22		
		IC25	1.744	0.3649	2.235		
		IC40	2.018	0.9845	2.445		
		IC50	2.217	1.114	2.593		
14-7253-3664	Mean Dry Weight-mg	IC5	>1.72	N/A	N/A		Linear Interpolation (ICPIN)
		IC10	>1.72	N/A	N/A		
		IC15	>1.72	N/A	N/A		
		IC20	>1.72	N/A	N/A		
		IC25	>1.72	N/A	N/A		
		IC40	>1.72	N/A	N/A		
		IC50	>1.72	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-8647-9778	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria
08-9590-1906	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria
01-7518-5057	Mean Dry Biomass-mg	Control Resp	1.196	0.85 - NL	Yes	Passes Acceptability Criteria
06-7753-6516	Mean Dry Biomass-mg	Control Resp	1.196	0.85 - NL	Yes	Passes Acceptability Criteria
08-9590-1906	7d Survival Rate	PMSD	0.3027	NL - 0.25	No	Above Acceptability Criteria
01-7518-5057	Mean Dry Biomass-mg	PMSD	0.4831	NL - 0.5	No	Passes Acceptability Criteria

(1) solvent control
=
negative ctrl

Analyst: EMM June 30/17 QA:

Pacific Topsmelt 7-d Survival and Growth Test — Nautilus Environmental

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	0.0%
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	-4.17%
0.14		5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	0.0%
0.24		5	1	1	1	1	1	0	0	0.0%	-4.17%
0.45		5	0.92	0.784	1	0.8	1	0.04899	0.1095	11.91%	4.17%
0.88		5	0.84	0.5162	1	0.4	1	0.1166	0.2608	31.04%	12.5%
1.72		5	0.68	0.1959	1	0	1	0.1744	0.3899	57.33%	29.17%
3.42		5	0	0	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.196	1.026	1.365	0.962	1.3	0.06108	0.1366	11.42%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.276	1.93	0.124	0.2772	18.84%	-23.05%
0.14		5	1.363	1.072	1.654	1.116	1.652	0.1048	0.2344	17.2%	-13.99%
0.24		5	1.506	1.198	1.814	1.17	1.764	0.1108	0.2477	16.45%	-25.96%
0.45		5	1.401	0.9317	1.871	1.01	2.016	0.1691	0.3781	26.98%	-17.2%
0.88		5	1.332	0.8181	1.846	0.72	1.732	0.1851	0.4139	31.07%	-11.41%
1.72		5	1.044	0.2127	1.874	0	1.824	0.2993	0.6692	64.12%	12.71%
3.42		5	0	0	0	0	0	0	0		100.0%

Mean Dry Weight-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.244	1.186	1.301	1.2	1.3	0.02066	0.0462	3.71%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.276	1.93	0.124	0.2772	18.84%	-18.29%
0.14		5	1.419	1.183	1.655	1.198	1.652	0.08494	0.1899	13.39%	-14.07%
0.24		5	1.506	1.198	1.814	1.17	1.764	0.1108	0.2477	16.45%	-21.09%
0.45		5	1.513	1.138	1.888	1.262	2.016	0.135	0.3019	19.95%	-21.67%
0.88		5	1.608	1.358	1.859	1.304	1.8	0.09024	0.2018	12.55%	-29.32%
1.72		4	1.517	1.071	1.962	1.153	1.824	0.14	0.28	18.47%	-21.95%

Analyst: em June 30/17 QA:

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1	1	1	0.8	1
0	Negative Control	1	1	1	1	1
0.14		1	1	1	1	0.8
0.24		1	1	1	1	1
0.45		1	0.8	1	0.8	1
0.88		0.4	1	1	1	0.8
1.72		0	0.8	1	0.8	0.8
3.42		0	0	0	0	0

Mean Dry Biomass-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	0.962	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.116
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.01	2.016	1.23	1.304
0.88		0.72	1.732	1.304	1.698	1.206
1.72		0	1.19	1.824	0.922	1.282
3.42		0	0	0	0	0

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	1.202	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.395
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.262	2.016	1.537	1.304
0.88		1.8	1.732	1.304	1.698	1.508
1.72			1.488	1.824	1.153	1.602
3.42						

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	4/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.14		4/4	5/5	5/5	5/5	4/5
0.24		5/5	5/5	5/5	5/5	5/5
0.45		5/5	4/5	5/5	4/5	5/5
0.88		2/5	5/5	5/5	5/5	4/5
1.72		0/5	4/5	5/5	4/5	4/5
3.42		0/5	0/5	0/5	0/5	0/5

Analyst: emm June 30/17 QA:

CETIS Analytical Report

Test Code: 170515 | 08-4712-9143

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	05-8800-3042	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:09	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.54%	Passes 7d survival rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Control	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	25	NA	1	8	0.5000	Exact	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
PMSD	0.09544	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00567079	0.00567079	1	1	0.3466	Non-Significant Effect
Error	0.04536632	0.00567079	8			
Total	0.05103711		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	13.75	0.3559	Equal Variances
Variances	Levene Equality of Variance	7.111	11.26	0.0285	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.6247	0.7411	0.0001	Non-normal Distribution

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	-4.17%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
0	Negative Contr	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-3.67%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1	1	1	0.8	1
0	Negative Control	1	1	1	1	1

Angular (Corrected) Transformed Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.345	1.345	1.345	1.107	1.345
0	Negative Control	1.345	1.345	1.345	1.345	1.345

June 30/17

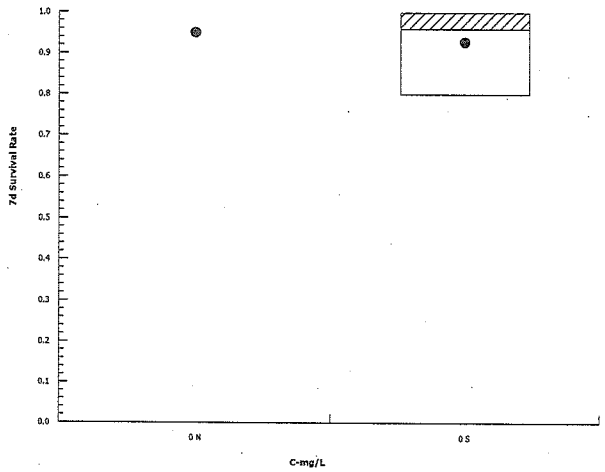
Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

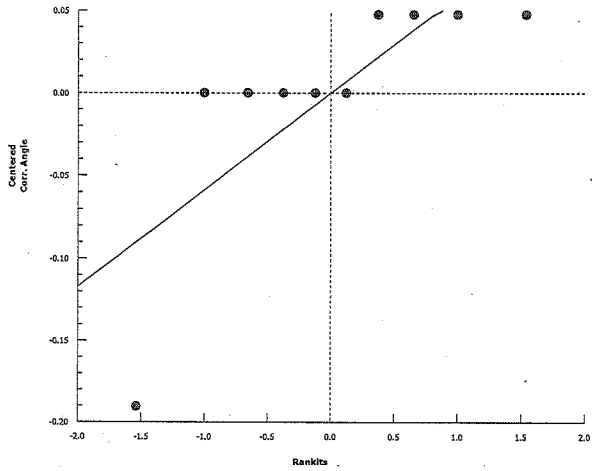
Analysis ID:	05-8800-3042	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:09	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	4/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5

Graphics





Analyst: KSL June 30/17 QA:

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	07-9902-7928	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:07	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	2.08%	0.2299	0.03988	1.698	1.413	2.04

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	25	25
0.14		5	0.96	0.8	1	0.04	0.08944	9.32%	4.0%	23	24
0.24		5	1	1	1	0	0	0.0%	0.0%	25	25
0.45		5	0.92	0.8	1	0.04899	0.1095	11.91%	8.0%	23	25
0.88		5	0.84	0.4	1	0.1166	0.2608	31.04%	16.0%	21	25
1.72		5	0.68	0	1	0.1744	0.3899	57.33%	32.0%	17	25
3.42		5	0	0	0	0	0		100.0%	0	25

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.14		1	1	1	1	0.8
0.24		1	1	1	1	1
0.45		1	0.8	1	0.8	1
0.88		0.4	1	1	1	0.8
1.72		0	0.8	1	0.8	0.8
3.42		0	0	0	0	0

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	4/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.14		4/4	5/5	5/5	5/5	4/5
0.24		5/5	5/5	5/5	5/5	5/5
0.45		5/5	4/5	5/5	4/5	5/5
0.88		2/5	5/5	5/5	5/5	4/5
1.72		0/5	4/5	5/5	4/5	4/5
3.42		0/5	0/5	0/5	0/5	0/5

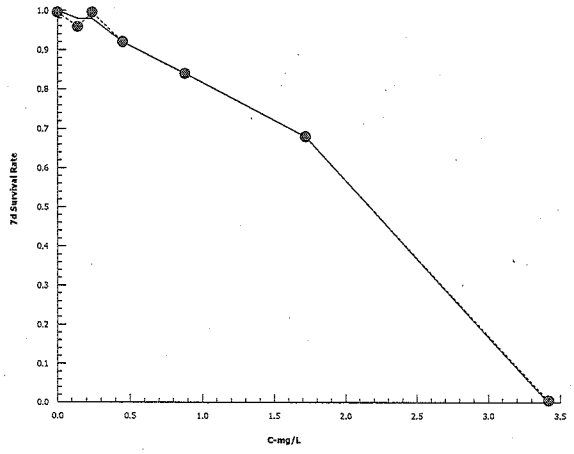
Solvent blank = methanol control

June 26/17

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	07-9902-7928	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:07	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



June 26/17

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	05-8647-9778	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.04	0.00%	0.241	0.03598	1.742	1.476	2.056

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Solvent Blank	5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
0.14		5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	23	24
0.24		5	1	1	1	0	0	0.0%	-4.17%	25	25
0.45		5	0.92	0.8	1	0.04899	0.1095	11.91%	4.17%	23	25
0.88		5	0.84	0.4	1	0.1166	0.2608	31.04%	12.5%	21	25
1.72		5	0.68	0	1	0.1744	0.3899	57.33%	29.17%	17	25
3.42		5	0	0	0	0	0		100.0%	0	25

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1	1	1	0.8	1
0.14		1	1	1	1	0.8
0.24		1	1	1	1	1
0.45		1	0.8	1	0.8	1
0.88		0.4	1	1	1	0.8
1.72		0	0.8	1	0.8	0.8
3.42		0	0	0	0	0

7d Survival Rate Binomials

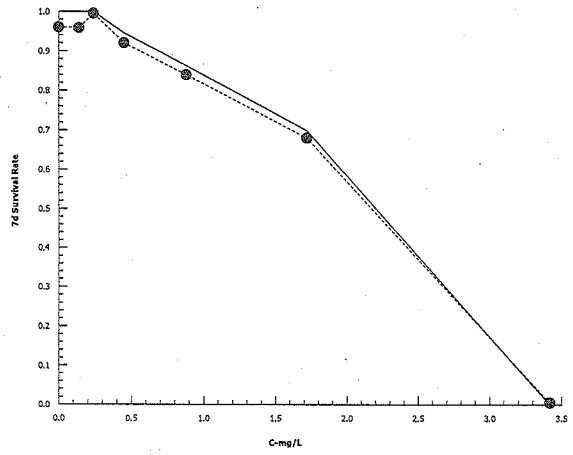
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	4/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.14		4/4	5/5	5/5	5/5	4/5
0.24		5/5	5/5	5/5	5/5	5/5
0.45		5/5	4/5	5/5	4/5	5/5
0.88		2/5	5/5	5/5	5/5	4/5
1.72		0/5	4/5	5/5	4/5	4/5
3.42		0/5	0/5	0/5	0/5	0/5

June 30/17

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	05-8647-9778	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



Analyst: emm June 30/17 QA:_____

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-5276-7581	2d Survival Rate	1.72	3.42	2.425	29.4%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
04-3902-7291	2d Survival Rate	EC50	2.086	1.767	2.463		Trimmed Spearman-Kärber

2d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1	1	1	1	1	0	0	0.0%	0.0%
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0.14		5	1	1	1	1	1	0	0	0.0%	0.0%
0.24		5	1	1	1	1	1	0	0	0.0%	0.0%
0.45		5	1	1	1	1	1	0	0	0.0%	0.0%
0.88		5	0.88	0.5468	1	0.4	1	0.12	0.2683	30.49%	12.0%
1.72		5	0.76	0.2216	1	0	1	0.1939	0.4336	57.05%	24.0%
3.42		5	0.08	0	0.3021	0	0.4	0.08	0.1789	223.6%	92.0%

2d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1	1	1	1	1
0	Negative Control	1	1	1	1	1
0.14		1	1	1	1	1
0.24		1	1	1	1	1
0.45		1	1	1	1	1
0.88		0.4	1	1	1	1
1.72		0	1	1	0.8	1
3.42		0.4	0	0	0	0

2d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	5/5	5/5	5/5	5/5	5/5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.14		5/5	5/5	5/5	5/5	5/5
0.24		5/5	5/5	5/5	5/5	5/5
0.45		5/5	5/5	5/5	5/5	5/5
0.88		2/5	5/5	5/5	5/5	5/5
1.72		0/5	5/5	5/5	4/5	5/5
3.42		2/5	0/5	0/5	0/5	0/5

Survival on Day 2 of test
Solvent blank = methanol control

Analyst: KL QA: June 29/17

CETIS Analytical Report

Test Code: 170515 | 08-4712-9143

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	01-2744-8584	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:11	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.5%	Fails mean dry biomass-mg

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	1.994	1.86	0.257	8	0.0406	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1.196	0.85 - NL	Yes	Passes Acceptability Criteria
Control Resp	1.471	0.85 - NL	Yes	Passes Acceptability Criteria
PMSD	0.1747	NL - 0.5	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1898959	0.1898959	1	3.977	0.0812	Non-Significant Effect
Error	0.3819875	0.04774844	8			
Total	0.5718834		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.119	23.15	0.1992	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8846	0.7411	0.1475	Normal Distribution

Mean Dry Biomass-mg Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	5	1.196	1.026	1.365	1.232	0.962	1.3	0.06108	11.42%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.336	1.276	1.93	0.124	18.84%	-23.05%

Mean Dry Biomass-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	0.962	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336

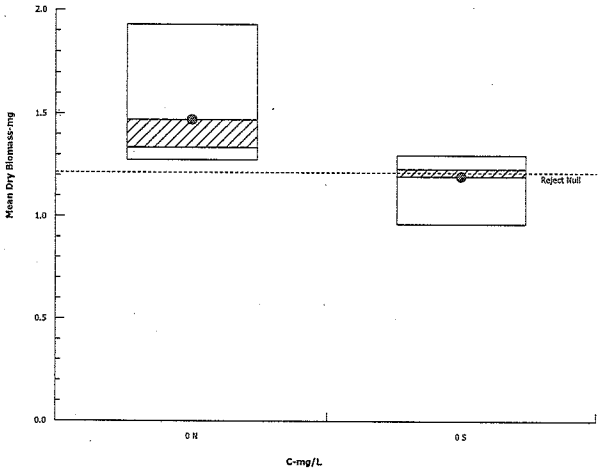
June 30/17

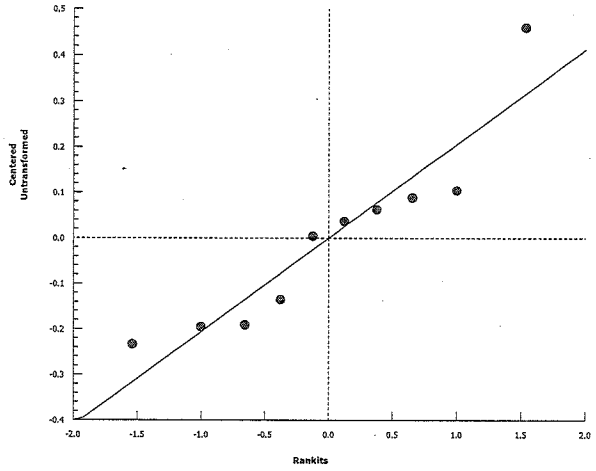
Pacific Topsmelt 7-d Survival and Growth Test

Nautilus Environmental

Analysis ID:	01-2744-8584	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:11	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Analyst: KJL June 30/17 QA:

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	00-7846-7010	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:43	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1914144	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1.471	0.85 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.4695	N/A	1.851
IC10	0.8992	N/A	2.233
IC15	1.087	N/A	2.248
IC20	1.293	N/A	2.256
IC25	1.519	0.1372	2.257
IC40	1.931	0.7325	2.411
IC50	2.139	1.036	2.563

Mean Dry Biomass-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.471	1.276	1.93	0.124	0.2772	18.84%	0.0%
0.14		5	1.363	1.116	1.652	0.1048	0.2344	17.2%	7.36%
0.24		5	1.506	1.17	1.764	0.1108	0.2477	16.45%	-2.37%
0.45		5	1.401	1.01	2.016	0.1691	0.3781	26.98%	4.76%
0.88		5	1.332	0.72	1.732	0.1851	0.4139	31.07%	9.46%
1.72		5	1.044	0	1.824	0.2993	0.6692	64.12%	29.06%
3.42		5	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Detail

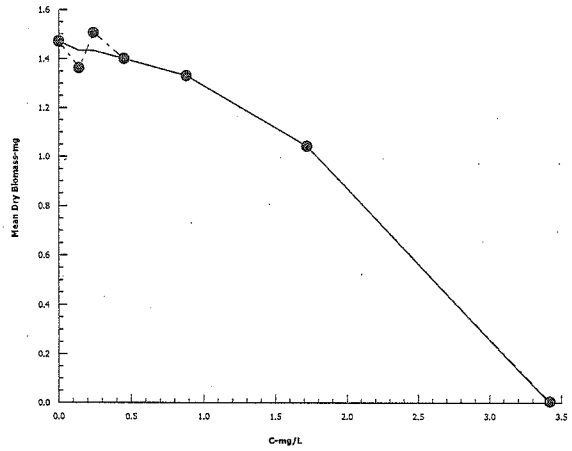
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.116
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.01	2.016	1.23	1.304
0.88		0.72	1.732	1.304	1.698	1.206
1.72		0	1.19	1.824	0.922	1.282
3.42		0	0	0	0	0

June 26/17

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	00-7846-7010	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:43	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: IC,SC QA: June 26/17

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	06-7753-6516	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	433337	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1.196	0.85 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.9634	0.01206	2.199
IC10	1.143	0.08337	2.211
IC15	1.339	0.2848	2.219
IC20	1.553	0.3291	2.22
IC25	1.744	0.3649	2.235
IC40	2.018	0.9845	2.445
IC50	2.217	1.114	2.593

Mean Dry Biomass-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.196	0.962	1.3	0.06108	0.1366	11.42%	0.0%
0.14		5	1.363	1.116	1.652	0.1048	0.2344	17.2%	-13.99%
0.24		5	1.506	1.17	1.764	0.1108	0.2477	16.45%	-25.96%
0.45		5	1.401	1.01	2.016	0.1691	0.3781	26.98%	-17.2%
0.88		5	1.332	0.72	1.732	0.1851	0.4139	31.07%	-11.41%
1.72		5	1.044	0	1.824	0.2993	0.6692	64.12%	12.71%
3.42		5	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Detail

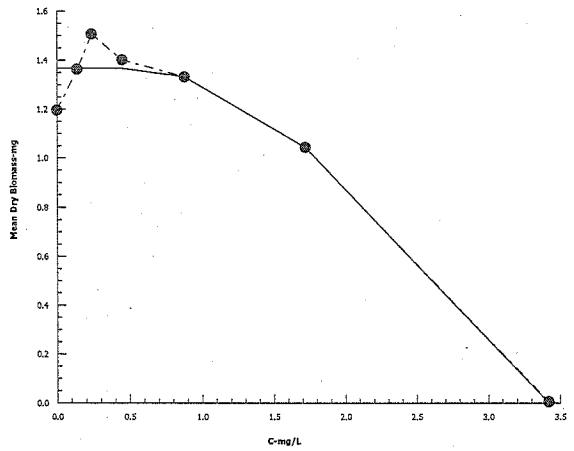
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	0.962	1.3
0.14		1.652	1.282	1.566	1.198	1.116
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.01	2.016	1.23	1.304
0.88		0.72	1.732	1.304	1.698	1.206
1.72		0	1.19	1.824	0.922	1.282
3.42		0	0	0	0	0

June 30/17

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	06-7753-6516	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: EWM QA: June 30/17

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	00-9262-9924	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:09	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.2%	Passes mean dry weight-mg

Unequal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	1.81	2.132	0.268	4	0.0723	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1293969	0.1293969	1	3.277	0.1079	Non-Significant Effect
Error	0.3158988	0.03948735	8			
Total	0.4452957		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	36.01	23.15	0.0043	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8275	0.7411	0.0313	Normal Distribution

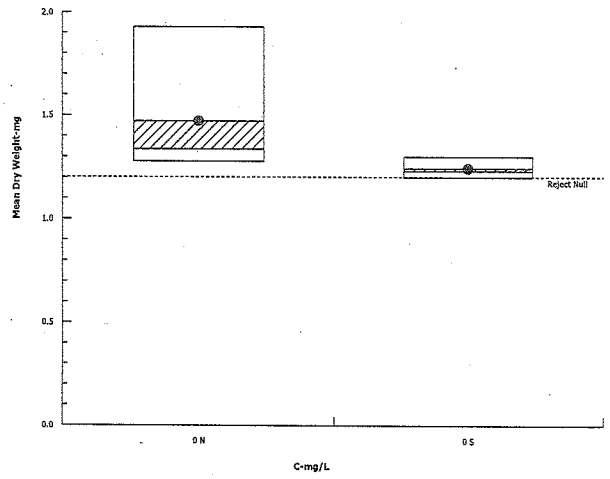
Mean Dry Weight-mg Summary

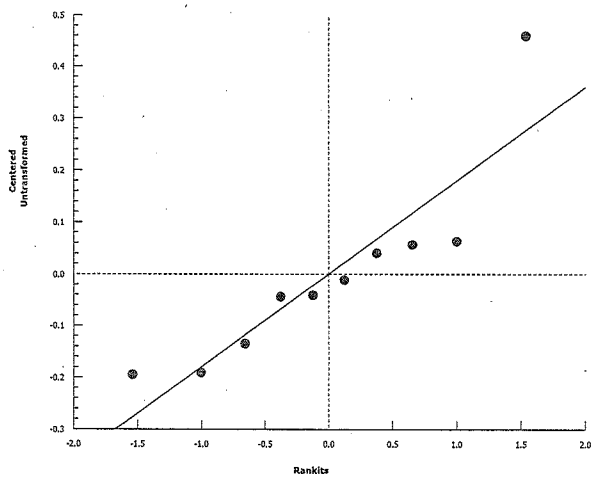
C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	5	1.244	1.186	1.301	1.232	1.2	1.3	0.02066	3.71%	0.0%
0	Negative Control	5	1.471	1.127	1.815	1.336	1.276	1.93	0.124	18.84%	-18.29%

Mean Dry Weight-mg Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	1.202	1.3
0	Negative Control	1.28	1.93	1.276	1.534	1.336

Graphics





Analyst: KSL QA: June 30/17

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	08-8248-7537	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:08	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	176471	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	>1.72	N/A	N/A
IC10	>1.72	N/A	N/A
IC15	>1.72	N/A	N/A
IC20	>1.72	N/A	N/A
IC25	>1.72	N/A	N/A
IC40	>1.72	N/A	N/A
IC50	>1.72	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.471	1.276	1.93	0.124	0.2772	18.84%	0.0%
0.14		5	1.419	1.198	1.652	0.08494	0.1899	13.39%	3.57%
0.24		5	1.506	1.17	1.764	0.1108	0.2477	16.45%	-2.37%
0.45		5	1.513	1.262	2.016	0.135	0.3019	19.95%	-2.86%
0.88		5	1.608	1.304	1.8	0.09024	0.2018	12.55%	-9.32%
1.72		4	1.517	1.153	1.824	0.14	0.28	18.47%	-3.09%

Mean Dry Weight-mg Detail

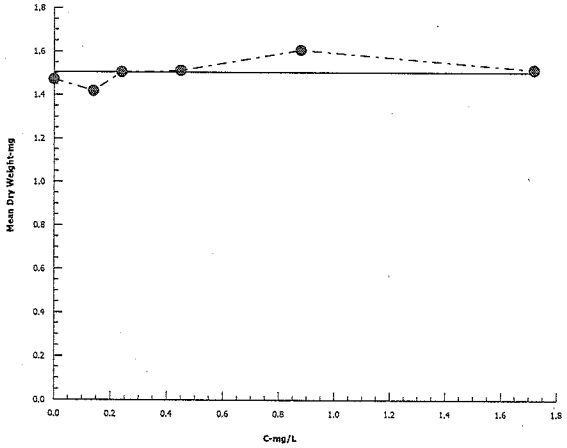
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.28	1.93	1.276	1.534	1.336
0.14		1.652	1.282	1.566	1.198	1.395
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.262	2.016	1.537	1.304
0.88		1.8	1.732	1.304	1.698	1.508
1.72		1.488	1.824	1.153	1.602	

Analyst: KSL June 26/17 QA:

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	08-8248-7537	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 16:08	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: [illegible] QA: June 26/17

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	14-7253-3664	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	11-8436-6492	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Karen Lee
Start Date:	10 May-17 14:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	17 May-17 14:00	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	9-d
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	35d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1348875	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	>1.72	N/A	N/A
IC10	>1.72	N/A	N/A
IC15	>1.72	N/A	N/A
IC20	>1.72	N/A	N/A
IC25	>1.72	N/A	N/A
IC40	>1.72	N/A	N/A
IC50	>1.72	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	5	1.244	1.2	1.3	0.02066	0.0462	3.71%	0.0%
0.14		5	1.419	1.198	1.652	0.08494	0.1899	13.39%	-14.07%
0.24		5	1.506	1.17	1.764	0.1108	0.2477	16.45%	-21.09%
0.45		5	1.513	1.262	2.016	0.135	0.3019	19.95%	-21.67%
0.88		5	1.608	1.304	1.8	0.09024	0.2018	12.55%	-29.32%
1.72		4	1.517	1.153	1.824	0.14	0.28	18.47%	-21.95%

Mean Dry Weight-mg Detail

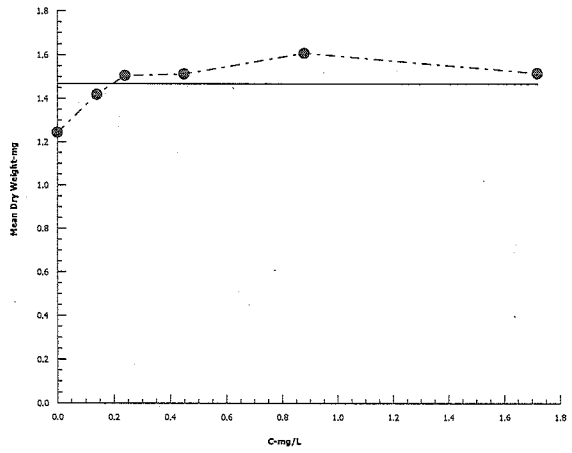
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Solvent Blank	1.2	1.284	1.232	1.202	1.3
0.14		1.652	1.282	1.566	1.198	1.395
0.24		1.726	1.374	1.17	1.764	1.496
0.45		1.446	1.262	2.016	1.537	1.304
0.88		1.8	1.732	1.304	1.698	1.508
1.72		1.488	1.824	1.153	1.602	

emm June 30/17

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental**

Analysis ID:	14-7253-3664	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



June 30/17

APPENDIX C – *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: WDOE
Work Order No.: 170516

Start Date/Time: May 11/17 @1500
Set up by: JS

Sample Information:

Sample ID: NWTPH-GX
Sample Date: Apr 15/17
Date Received: Apr 15/17
Sample Volume: USEPA Standards
50 x 5mL

Test Validity Criteria:

1) Mean survival of first generation controls is ≥80 %
2) At least 60% of controls have produced three broods within 8 days
3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 050417B
Age of young (Day 0): <24-h (within 12-h)
Avg No. young in first 3 broods of previous 7 d: 19
Mortality (%) in previous 7 d: 5
Individual female # used ≥8 young on test day: 22, 28, 30, 32, 34, 40

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd160
Stock Solution ID: 17Na07
Date Initiated: May 25/17

7-d LC50 (95% CL): 2.0 (1.9 - 2.3) g/L NaCL
7-d IC50 (95% CL): 1.1 (0.9 - 1.2) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8 - 2.2) g/L NaCL CV (%): 5
7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.1 - 2.1) g/L NaCL CV (%): 17

Test Results: (1)

Onepoint calculated using negative control as solvent control

(mg/L Baseline)	Survival	Reproduction
LC50 % ~~(v/v) (95% CL)~~ em	>2.3	
IC25 % ~~(v/v) (95% CL)~~ em		~~1.5 (0.5 - 1.8)~~ 1.7 (1.3-1.9)
IC50 % (v/v) ~~(95% CL)~~ em		>2.3
NOEC	2.3	1.1
LOEC	>2.3	2.3

Reviewed by: [signature]

Date reviewed: June 26, 2017

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: WDOE
Sample ID: ~~WDOE~~ NWTPH-Gx
Work Order #: 17C516

Start Date & Time: May 11/17 @1500h
Stop Date & Time: May 18/17 @1115h
Test Species: *Ceriodaphnia dubia*

Concentration: Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.6	8.0	7.4	8.2	7.7	8.1	7.6	8.0	7.4	8.2	7.5	8.0	7.3
pH	8.0	7.5	7.9	7.7	7.7	7.8	8.0	7.7	*7.8	7.5	7.9	7.4	8.0	7.3
Cond. (µS/cm)	213	216		215		219		217		213		213		224
Initials	JS	JS		A		MLT		JS		JS		JS		JS

Methanol Concentration: Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.6	8.0	3.7	8.1	3.0	8.3	5.4	8.3	3.9	7.7	2.7	8.2	4.2
pH	7.9	7.5	7.8	6.9	7.1	7.8	7.7	7.0	7.7	7.0	8.2	7.0	7.7	6.9
Cond. (µS/cm)	218	215		224		211		221		210 JS		211		213
Initials	JS	JS		A		MLT		JS		JS		JS		JS

(mg/L) Concentration: 0.16	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.6	8.0	7.2	8.1	7.1	8.3	7.0	8.3	6.0	8.2	6.6	8.2	5.2
pH	7.9	7.7	7.8	7.8		7.7	7.7	7.2	7.7	7.0	7.7	7.3	7.7	7.0
Cond. (µS/cm)	217	246		225		212		217		213		213		216
Initials	JS	JS		A		MLT		JS		JS		JS		JS

(mg/L) Concentration: 0.31	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.5	8.0	7.3	8.1	7.1	8.3	7.0	8.2	6.0	8.2	6.7	8.2	5.2
pH	8.0	7.7	7.8	7.7	7.8	7.8	7.7	7.2	7.7	7.0	7.7	7.3	7.7	7.1
Cond. (µS/cm)	231	228		222		213		226		214		213		217
Initials	JS	JS		A		MLT		JS		JS		JS		JS

Thermometer: 4 DO meter: 2/1 pH meter: 4 Conductivity meter: 2/1

	Control	100% (v/v)		
Hardness*	100			
Alkalinity*	98			

* mg/L as CaCO3

Analysts: AWD/MLT/JS
Reviewed by:
Date reviewed: June 22, 2017

Sample Description: Gasoline standard

Comments: Broodboard Used: 050417B (22-28, 30, 32, 34, 40)

Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements

Client: EVS
Sample ID: WOOE NWTPH-GX
Work Order #: 17076

Start Date & Time: May 11/17 @ 1500h
Stop Date & Time: May 18/17 @ 1115h
Test Species: *Ceriodaphnia dubia*

Concentration (mg/L): 0.63

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.5	8.0	7.4	8.1	7.2	8.3	7.0	8.2	6.6	8.2	6.5	8.2	5.2
pH	8.0	7.7	7.8	7.7	7.8	7.8	7.7	7.3	7.7	7.0	7.7	7.4	7.7	7.1
Cond. (µS/cm)	228	351	229	225		213		224		215		215		217
Initials	JS	JS				MLT		JS		JS		JS		JS

Concentration (mg/L): 1.25

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.5	8.0	7.3	8.1	7.1	8.3	7.0	8.2	6.6	8.2	6.5	8.2	5.2
pH	8.0	7.7	7.9	7.7	7.8	7.8	7.8	7.3	7.7	7.0	7.7	7.3	7.7	7.2
Cond. (µS/cm)	330	478		226		215		220		214		215		217
Initials	JS	JS				MLT		JS		JS		JS		JS

(1) 6.6

Concentration (mg/L): 2.5

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.5	8.0	7.4	8.1	7.2	8.3	6.9	8.2	6.5	8.2	5.5	8.2	5.2
pH	8.0	7.7	7.9	7.7	7.9	7.8	7.9	7.3	7.8	7.1	7.6	7.2	7.6	7.1
Cond. (µS/cm)	468	731		227		217		220		216		216		219
Initials	JS	JS				MLT		JS		JS		JS		JS

Concentration (mg/L): 5.0

	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.5	8.0	7.3	8.1	7.1	8.3	6.9	8.2	6.8	8.2	5.6	8.2	5.3
pH	8.0	7.6	7.9	7.7	7.9	7.7	7.9	7.3	7.8	7.1	7.6	7.0	7.6	7.0
Cond. (µS/cm)	213	229		225		221		218		218		220		220
Initials	JS	JS				MLT		JS		JS		JS		JS

Thermometer: 4 DO meter: 2/1 pH meter: 4 Conductivity meter: 2/1

	Control	100% IWW		
Hardness*	100			
Alkalinity*	98			

* mg/L as CaCO3

Analysts: AWD/MLT/JS

Reviewed by:

Date reviewed: June 22, 2017

Sample Description: Baseline standard

Comments: Broodboard Used: 050417B (22-28, 30, 32, 34, 40)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: WDOE
Sample ID: ~~WDOE~~ NWTPH-Gx
Work Order: 170516

Start Date & Time: May 11/17 @ 1500h
Stop Date & Time: May 18/17 @ 1115h
Set up by: JS

(mg/L)

Days	Concentration: control										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	2	3	✓	✓	2	4/JS	3	3	2	3	JS
5	X	✓	5	4	7	4	4	6	6	5	JS
6	|	5	✓	6	✓	✓	✓	✓	✓	✓	JS
7	|	9	8	10	8	8	11	10	10	10	JS
8									18cm		
Total	2X	17	13	20	17	16	18	19	19	18	JS

Days	Concentration: Methanol control										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	MH
4	2	2	2	✓	✓	3	2	✓	3	|	JS
5	5	4	✓	5	4	4	3	3	5	|	JS
6	✓	✓	5	6	5	✓	✓	✓	✓	|	JS
7	6	6	6	8	7	8	9	6	8	|	JS
8											
Total	13	12	13	19	16	15	14	9	16	0X	JS

Days	Concentration: 0.16										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	2	3	2	3	3	✓	4	2	3	3	JS
5	6	4	6	8	5	4	✓	✓	✓	5	JS
6	✓	8	8	✓	✓	3	10	✓	7	✓	JS
7	7	✓	✓JS	10	9	5	10	11	6	10	JS
8											
Total	15	15	14	21	17	12	24	13	16	18	JS

Days	Concentration: 0.31										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	2	2	3	✓	2	✓	2	2X	2	2	JS
5	7	✓	6	2	8	3	✓	|	6	7	JS
6	✓	7	✓	5	✓	✓	6	|	✓	✓	JS
7	9	8	8	9	8	9	8	|	6	9	JS
8											
Total	18	17	17	16	18	12	16	2X	14	18	JS

Days	Concentration: 0.63										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	3	✓	2	3	✓	✓	4	2	2	✓	JS
5	5	4	✓	✓	4	4	✓	6	4	2	JS
6	✓	✓	8	10	10	✓	9	✓	✓	11	JS
7	8	8	9	11	8	10	9	8	11	11	JS
8											
Total	16	12	19	24	22	14	22	16	17	24	JS

Days	Concentration: 1.25										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	2	2	2	3	✓	4	✓	✓	✓	2	JS
5	✓	5	5	5	4	5	✓	6	✓	3	JS
6	4	✓	✓	✓	✓	✓	8	✓	✓	✓	JS
7	10	9	9	9	10	11	6	9	2	7	JS
8									2 JS 8		
Total	16	16	16	17	14	20	14	15		12	JS

Days	Concentration: 2.5										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	2	2	2	3	3	2	3	✓	3	2	JS
5	3	6	5	6	✓	3	✓	2	6	6	JS
6	✓	✓	✓	✓	7	✓	8	5	✓	✓	JS
7	5	6	8	8	3	9	9	8	7	8	JS
8											
Total	10	14	15	17	13	14	20	15	16	16	JS

Days	Concentration: 5.0										
	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JS
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MH
4	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	JS
5	✓	2	✓	✓	✓	✓	✓	2	3	✓	JS
6	3	✓	3	3	3	✓	6	✓	✓	2	JS
7	6	6	7	8	7	7	5	5	7	4	JS
8											
Total	9	8	10	11	10	9	11	7	10	6	JS

Days	Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init
1											
2											
3											
4											
5											
6											
7											
8											
Total											

Notes: X = mortality.

Sample Description: See WQ sheet

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: [signature]

Date reviewed: June 22, 2017

Client: WDOE

W.O.#: 170516

Hardness and Alkalinity Datasheet

	Alkalinity						Hardness			
Sample ID	Subsample Date	Date Measured	Sample Volume (mL)	(mL) 0.02N HCL/H_2SO_4 used to pH 4.5	(mL) of 0.02N HCL/H_2SO_4 used to pH 4.2	Total Alkalinity ($mg/LCaCO_3$)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness ($mg/L\ CaCO_3$)	Technician
20L Reuse	May 11/17	May 11/17	50	5.0	5.1	98	50	5.0	100	EMM

Notes:

Reviewed by: [signature] Date Reviewed: June 22, 2017

CETIS Summary Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-6255-9440	7d Survival Rate	0	>0		NA		Fisher Exact Test
03-3075-2840	7d Survival Rate	2.27	>2.27	NA	NA		Fisher Exact/Bonferroni-Holm Test
15-1951-7293	Reproduction	1.13	2.27	1.602	26.9%		Steel Many-One Rank Sum Test
17-4820-3536	Reproduction	1.13	2.27	1.602	33.5%		Steel Many-One Rank Sum Test
18-5765-6473	Reproduction	<0	0		25.5%		Wilcoxon Rank Sum Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
21-3374-7830	7d Survival Rate	EC5	>2.27	N/A	N/A		Linear Interpolation (ICPIN)
		EC10	>2.27	N/A	N/A		
		EC15	>2.27	N/A	N/A		
		EC20	>2.27	N/A	N/A		
		EC25	>2.27	N/A	N/A		
		EC40	>2.27	N/A	N/A		
		EC50	>2.27	N/A	N/A		
15-0759-3871	Reproduction	IC5	0.4833	0.3271	1.254		Linear Interpolation (ICPIN)
①		IC10	1.217	0.4221	1.394		
		IC15	1.357	0.5095	1.539		
		IC20	1.505	1.168	1.708		
		IC25	1.662	1.334	1.891		
		IC40	2.197	1.893	N/A		
		IC50	>2.27	N/A	N/A		
21-0423-8468	Reproduction	IC5	0.3992	0.0272	1.238		Linear Interpolation (ICPIN)
		IC10	0.5294	0.05514	1.353		
		IC15	1.239	0.3404	1.479		
②		IC20	1.387	0.4811	1.63		
		IC25	1.544	0.5462	1.793		
		IC40	2.083	1.737	N/A		
		IC50	>2.27	N/A	N/A		

① solvent control as negative control

② 20% perrier lab water as negative control

June 30/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

7d Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	10	0.9	0.6738	1	0	1	0.1	0.3162	35.14%	0.0%
0	Negative Control	10	0.9	0.6738	1	0	1	0.1	0.3162	35.14%	0.0%
0.06		10	1	1	1	1	1	0	0	0.0%	-11.11%
0.13		10	0.9	0.6738	1	0	1	0.1	0.3162	35.14%	0.0%
0.28		10	1	1	1	1	1	0	0	0.0%	-11.11%
0.56		10	1	1	1	1	1	0	0	0.0%	-11.11%
1.13		10	1	1	1	1	1	0	0	0.0%	-11.11%
2.27		10	1	1	1	1	1	0	0	0.0%	-11.11%

Reproduction Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	10	12.7	8.974	16.43	0	19	1.647	5.208	41.01%	0.0%
0	Negative Control	10	15.8	12.08	19.52	2	20	1.645	5.203	32.93%	-24.41%
0.06		10	16.5	13.86	19.14	12	24	1.167	3.689	22.36%	-29.92%
0.13		10	14.8	11.3	18.3	2	18	1.548	4.894	33.07%	-16.54%
0.28		10	18.6	15.56	21.64	12	24	1.343	4.248	22.84%	-46.46%
0.56		10	14.2	10.78	17.62	2	20	1.511	4.78	33.66%	-11.81%
1.13		10	15	13.12	16.88	10	20	0.83	2.625	17.5%	-18.11%
2.27		10	9.1	7.91	10.29	6	11	0.526	1.663	18.28%	28.35%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1	1	1	1	1	1	1	1	1	0
0	Negative Control	0	1	1	1	1	1	1	1	1	1
0.06		1	1	1	1	1	1	1	1	1	1
0.13		1	1	1	1	1	1	1	0	1	1
0.28		1	1	1	1	1	1	1	1	1	1
0.56		1	1	1	1	1	1	1	1	1	1
1.13		1	1	1	1	1	1	1	1	1	1
2.27		1	1	1	1	1	1	1	1	1	1

Reproduction Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	13	12	13	19	16	15	14	9	16	0
0	Negative Control	2	17	13	20	17	16	18	19	18	18
0.06		15	15	14	21	17	12	24	13	16	18
0.13		18	17	17	16	18	12	16	2	14	18
0.28		16	12	19	24	22	14	22	16	17	24
0.56		16	16	16	17	14	20	14	15	2	12
1.13		10	14	15	17	13	14	20	15	16	16
2.27		9	8	10	11	10	9	11	7	10	6

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.06		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
0.28		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2.27		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: emm QA: June 30/17

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	07-6255-9440	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 15:28	**Analysis:**	Single 2x2 Contingency Table	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	Passes 7d survival rate

Fisher Exact Test

Control	vs	Control	Test Stat	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	0.7632	0.7632	Exact	Non-Significant Effect

Data Summary

C-mg/L	Control Type	NR	R	NR + R	Prop NR	Prop R	%Effect
0	Solvent Blank	9	1	10	0.9	0.1	0.0%
0	Negative Contr	9	1	10	0.9	0.1	0.0%

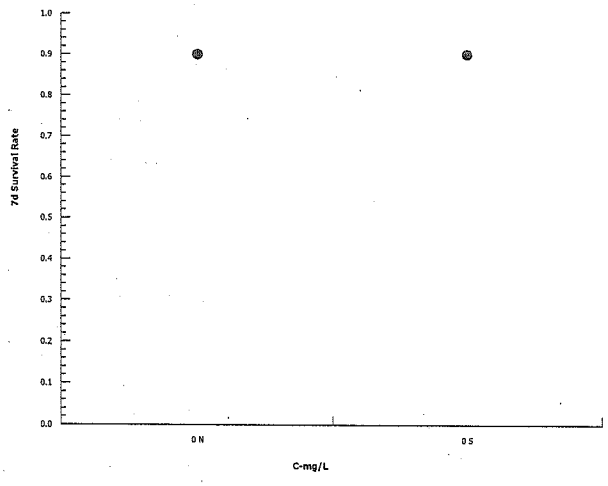
7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1	1	1	1	1	1	1	1	1	0
0	Negative Control	0	1	1	1	1	1	1	1	1	1

7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



Analyst: emm June 22/17 QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	21-3374-7830	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 15:27	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2008678	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
EC5	>2.27	N/A	N/A
EC10	>2.27	N/A	N/A
EC15	>2.27	N/A	N/A
EC20	>2.27	N/A	N/A
EC25	>2.27	N/A	N/A
EC40	>2.27	N/A	N/A
EC50	>2.27	N/A	N/A

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
0.06		10	1	1	1	0	0	0.0%	-11.11%	10	10
0.13		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
0.28		10	1	1	1	0	0	0.0%	-11.11%	10	10
0.56		10	1	1	1	0	0	0.0%	-11.11%	10	10
1.13		10	1	1	1	0	0	0.0%	-11.11%	10	10
2.27		10	1	1	1	0	0	0.0%	-11.11%	10	10

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0	1	1	1	1	1	1	1	1	1
0.06		1	1	1	1	1	1	1	1	1	1
0.13		1	1	1	1	1	1	1	0	1	1
0.28		1	1	1	1	1	1	1	1	1	1
0.56		1	1	1	1	1	1	1	1	1	1
1.13		1	1	1	1	1	1	1	1	1	1
2.27		1	1	1	1	1	1	1	1	1	1

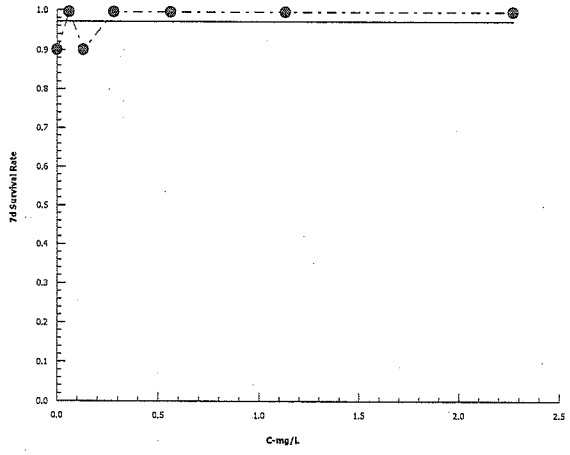
7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.06		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
0.28		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2.27		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 — **Nautilus Environmental**

Analysis ID:	21-3374-7830	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 15:27	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: emm June 22/17 QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	03-3075-2840	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 15:30	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed		C > T	NA	NA	2.27	>2.27	NA	

Fisher Exact/Bonferroni-Holm Test

Control	vs	C-mg/L	Test Stat	P-Value	P-Type	Decision(α:5%)
Negative Control		0.06	1	1.0000	Exact	Non-Significant Effect
		0.13	0.7632	1.0000	Exact	Non-Significant Effect
		0.28	1	1.0000	Exact	Non-Significant Effect
		0.56	1	1.0000	Exact	Non-Significant Effect
		1.13	1	1.0000	Exact	Non-Significant Effect
		2.27	1	1.0000	Exact	Non-Significant Effect

Data Summary

C-mg/L	Control Type	NR	R	NR + R	Prop NR	Prop R	%Effect
0	Negative Contr	9	1	10	0.9	0.1	0.0%
0.06		10	0	10	1	0	-11.11%
0.13		9	1	10	0.9	0.1	0.0%
0.28		10	0	10	1	0	-11.11%
0.56		10	0	10	1	0	-11.11%
1.13		10	0	10	1	0	-11.11%
2.27		10	0	10	1	0	-11.11%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	0	1	1	1	1	1	1	1	1	1
0.06		1	1	1	1	1	1	1	1	1	1
0.13		1	1	1	1	1	1	1	0	1	1
0.28		1	1	1	1	1	1	1	1	1	1
0.56		1	1	1	1	1	1	1	1	1	1
1.13		1	1	1	1	1	1	1	1	1	1
2.27		1	1	1	1	1	1	1	1	1	1

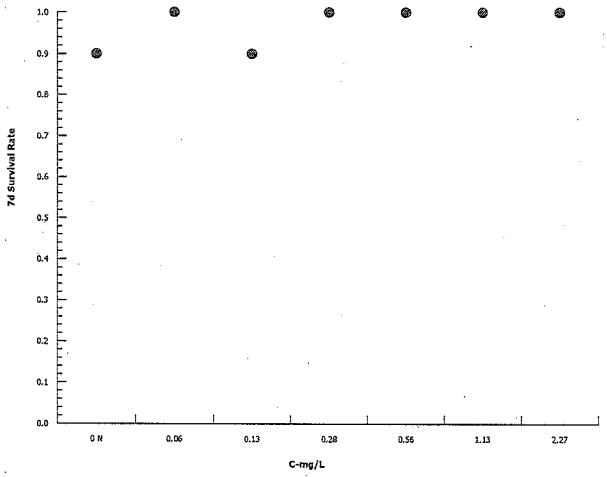
7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.06		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
0.28		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2.27		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 — **Nautilus Environmental**

Analysis ID:	03-3075-2840	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	22 Jun-17 15:30	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes

Graphics



Analyst: emm QA: June 22/17

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	07-5386-8197	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:42	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1104539	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
EC5	>2.27	N/A	N/A
EC10	>2.27	N/A	N/A
EC15	>2.27	N/A	N/A
EC20	>2.27	N/A	N/A
EC25	>2.27	N/A	N/A
EC40	>2.27	N/A	N/A
EC50	>2.27	N/A	N/A

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Solvent Blank	10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
0.06		10	1	1	1	0	0	0.0%	-11.11%	10	10
0.13		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
0.28		10	1	1	1	0	0	0.0%	-11.11%	10	10
0.56		10	1	1	1	0	0	0.0%	-11.11%	10	10
1.13		10	1	1	1	0	0	0.0%	-11.11%	10	10
2.27		10	1	1	1	0	0	0.0%	-11.11%	10	10

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1	1	1	1	1	1	1	1	1	0
0.06		1	1	1	1	1	1	1	1	1	1
0.13		1	1	1	1	1	1	1	0	1	1
0.28		1	1	1	1	1	1	1	1	1	1
0.56		1	1	1	1	1	1	1	1	1	1
1.13		1	1	1	1	1	1	1	1	1	1
2.27		1	1	1	1	1	1	1	1	1	1

7d Survival Rate Binomials

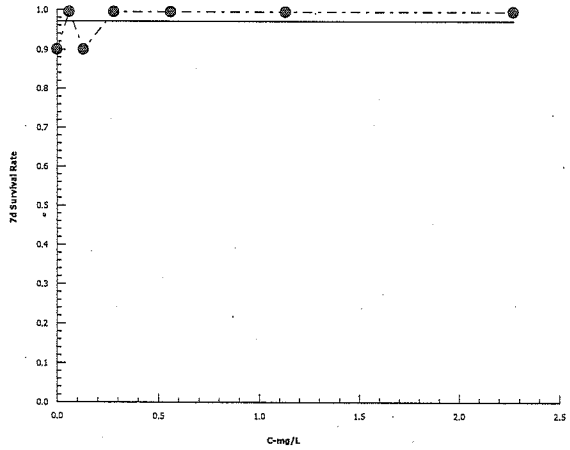
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.06		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
0.28		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2.27		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: emm QA: July 5/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	07-5386-8197	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:42	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst:_____ QA: July 5/17

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	09-3336-5559	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:44	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed		C > T	NA	NA	2.27	>2.27	NA	

Fisher Exact/Bonferroni-Holm Test

Control	vs	C-mg/L	Test Stat	P-Value	P-Type	Decision(α:5%)
Solvent Blank		0.06	1	1.0000	Exact	Non-Significant Effect
		0.13	0.7632	1.0000	Exact	Non-Significant Effect
		0.28	1	1.0000	Exact	Non-Significant Effect
		0.56	1	1.0000	Exact	Non-Significant Effect
		1.13	1	1.0000	Exact	Non-Significant Effect
		2.27	1	1.0000	Exact	Non-Significant Effect

Data Summary

C-mg/L	Control Type	NR	R	NR + R	Prop NR	Prop R	%Effect
0	Solvent Blank	9	1	10	0.9	0.1	0.0%
0.06		10	0	10	1	0	-11.11%
0.13		9	1	10	0.9	0.1	0.0%
0.28		10	0	10	1	0	-11.11%
0.56		10	0	10	1	0	-11.11%
1.13		10	0	10	1	0	-11.11%
2.27		10	0	10	1	0	-11.11%

7d Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1	1	1	1	1	1	1	1	1	0
0.06		1	1	1	1	1	1	1	1	1	1
0.13		1	1	1	1	1	1	1	0	1	1
0.28		1	1	1	1	1	1	1	1	1	1
0.56		1	1	1	1	1	1	1	1	1	1
1.13		1	1	1	1	1	1	1	1	1	1
2.27		1	1	1	1	1	1	1	1	1	1

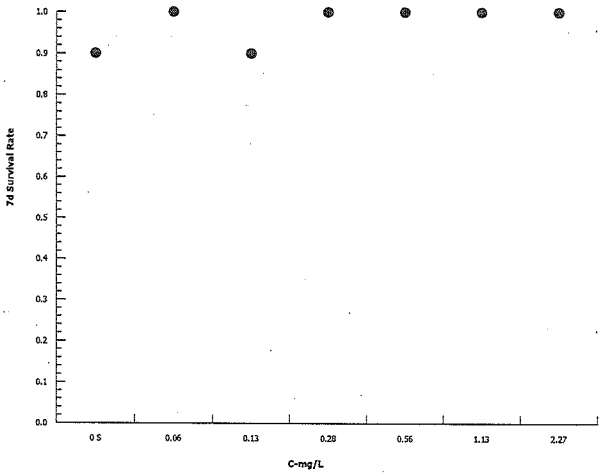
7d Survival Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
0	Negative Control	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.06		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
0.28		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
0.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.13		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2.27		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Analyst: emm July 5/17 QA:

Analysis ID:	09-3336-5559	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:44	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes

Graphics



Analyst: ehm 7/5/17 QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	18-5765-6473	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:48	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	25.5%	Fails reproduction

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Control	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	77.5	NA	3	18	0.0175	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	48.05	48.05	1	1.773	0.1996	Non-Significant Effect
Error	487.7	27.09444	18			
Total	535.75		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.002	6.541	0.9976	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7656	0.866	0.0003	Non-normal Distribution

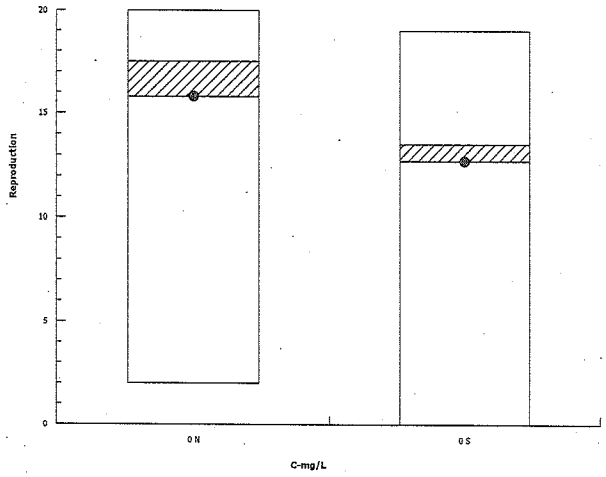
Reproduction Summary

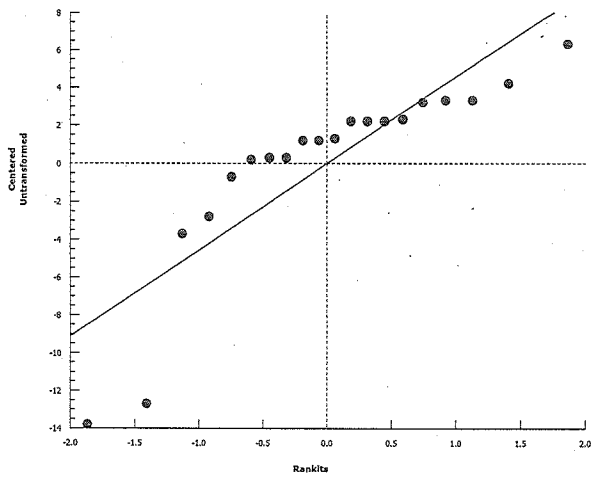
C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	10	12.7	8.974	16.43	13.5	0	19	1.647	41.01%	0.0%
0	Negative Control	10	15.8	12.08	19.52	17.5	2	20	1.645	32.93%	-24.41%

Reproduction Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	13	12	13	19	16	15	14	9	16	0
0	Negative Control	2	17	13	20	17	16	18	19	18	18

Graphics





Analyst: emm QA: June 22/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	21-0423-8468	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1523409	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.3992	0.0272	1.238
IC10	0.5294	0.05514	1.353
IC15	1.239	0.3404	1.479
IC20	1.387	0.4811	1.63
IC25	1.544	0.5462	1.793
IC40	2.083	1.737	N/A
IC50	>2.27	N/A	N/A

Reproduction Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	15.8	2	20	1.645	5.203	32.93%	0.0%
0.06		10	16.5	12	24	1.167	3.689	22.36%	-4.43%
0.13		10	14.8	2	18	1.548	4.894	33.07%	6.33%
0.28		10	18.6	12	24	1.343	4.248	22.84%	-17.72%
0.56		10	14.2	2	20	1.511	4.78	33.66%	10.13%
1.13		10	15	10	20	0.83	2.625	17.5%	5.06%
2.27		10	9.1	6	11	0.526	1.663	18.28%	42.41%

Reproduction Detail

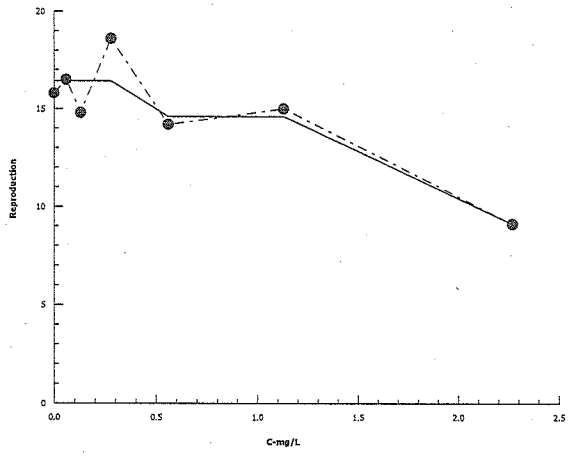
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	2	17	13	20	17	16	18	19	18	18
0.06		15	15	14	21	17	12	24	13	16	18
0.13		18	17	17	16	18	12	16	2	14	18
0.28		16	12	19	24	22	14	22	16	17	24
0.56		16	16	16	17	14	20	14	15	2	12
1.13		10	14	15	17	13	14	20	15	16	16
2.27		9	8	10	11	10	9	11	7	10	6

Analyst: emm June 22/17 QA:

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	21-0423-8468	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:39	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: EWM

QA: June 22/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	15-1951-7293	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	26.9%	1.13	2.27	1.602	

Steel Many-One Rank Sum Test

Control	vs	C-mg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.06	96.5	74	4	18	0.6156	Asymp	Non-Significant Effect
		0.13	91	74	4	18	0.4201	Asymp	Non-Significant Effect
		0.28	115.5	74	3	18	0.9790	Asymp	Non-Significant Effect
		0.56	83.5	74	4	18	0.1921	Asymp	Non-Significant Effect
		1.13	84	74	4	18	0.2044	Asymp	Non-Significant Effect
		2.27*	65	74	0	18	0.0066	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	511.9714	85.32858	6	5.186	0.0002	Significant Effect
Error	1036.6	16.45397	63			
Total	1548.571		69			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	13.38	16.81	0.0374	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8871	0.9526	<0.0001	Non-normal Distribution

Reproduction Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	15.8	12.08	19.52	17.5	2	20	1.645	32.93%	0.0%
0.06		10	16.5	13.86	19.14	15.5	12	24	1.167	22.36%	-4.43%
0.13		10	14.8	11.3	18.3	16.5	2	18	1.548	33.07%	6.33%
0.28		10	18.6	15.56	21.64	18	12	24	1.343	22.84%	-17.72%
0.56		10	14.2	10.78	17.62	15.5	2	20	1.511	33.66%	10.13%
1.13		10	15	13.12	16.88	15	10	20	0.83	17.5%	5.06%
2.27		10	9.1	7.91	10.29	9.5	6	11	0.526	18.28%	42.41%

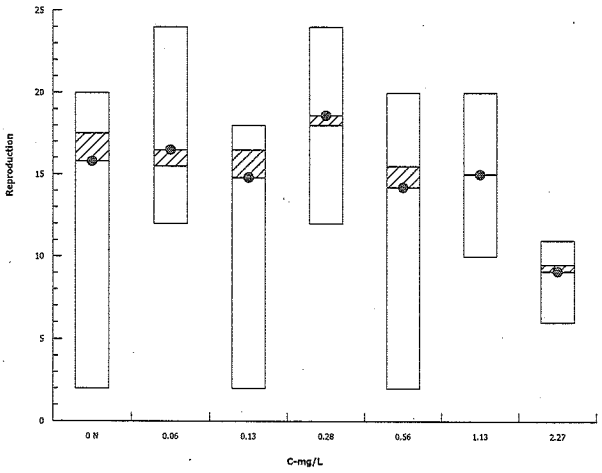
Reproduction Detail

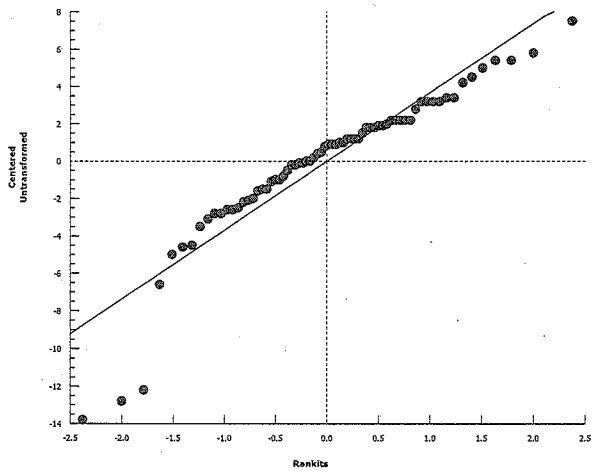
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	2	17	13	20	17	16	18	19	18	18
0.06		15	15	14	21	17	12	24	13	16	18
0.13		18	17	17	16	18	12	16	2	14	18
0.28		16	12	19	24	22	14	22	16	17	24
0.56		16	16	16	17	14	20	14	15	2	12
1.13		10	14	15	17	13	14	20	15	16	16
2.27		9	8	10	11	10	9	11	7	10	6

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	15-1951-7293	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 9:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: EMM June 22/17 QA:

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	15-0759-3871	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	870533	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	0.4833	0.3271	1.254
IC10	1.217	0.4221	1.394
IC15	1.357	0.5095	1.539
IC20	1.505	1.168	1.708
IC25	1.662	1.334	1.891
IC40	2.197	1.893	N/A
IC50	>2.27	N/A	N/A

Reproduction Summary

			Calculated Variate						
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	10	12.7	0	19	1.647	5.208	41.01%	0.0%
0.06		10	16.5	12	24	1.167	3.689	22.36%	-29.92%
0.13		10	14.8	2	18	1.548	4.894	33.07%	-16.54%
0.28		10	18.6	12	24	1.343	4.248	22.84%	-46.46%
0.56		10	14.2	2	20	1.511	4.78	33.66%	-11.81%
1.13		10	15	10	20	0.83	2.625	17.5%	-18.11%
2.27		10	9.1	6	11	0.526	1.663	18.28%	28.35%

Reproduction Detail

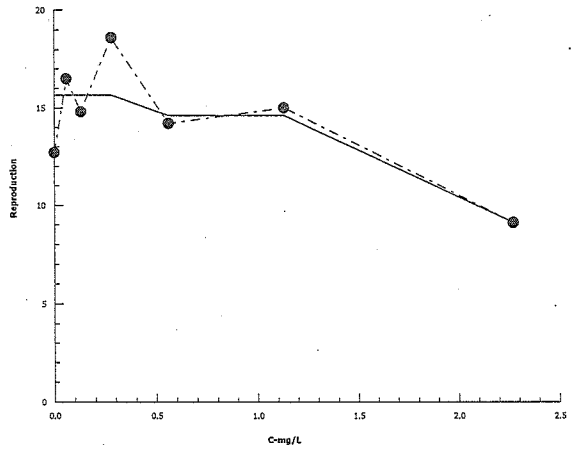
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	13	12	13	19	16	15	14	9	16	0
0.06		15	15	14	21	17	12	24	13	16	18
0.13		18	17	17	16	18	12	16	2	14	18
0.28		16	12	19	24	22	14	22	16	17	24
0.56		16	16	16	17	14	20	14	15	2	12
1.13		10	14	15	17	13	14	20	15	16	16
2.27		9	8	10	11	10	9	11	7	10	6

Analyst: _____ QA: _____ July 5/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	15-0759-3871	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Analyst: eMM QA: July 5/17

CETIS Analytical Report

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	17-4820-3536	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	05-1016-8409	**Test Type:**	Reproduction-Survival (7d)	**Analyst:**	Emma Marus
Start Date:	11 May-17 15:00	**Protocol:**	EC/EPS 1/RM/21	**Diluent:**	20% Perrier Water
Ending Date:	18 May-17 11:15	**Species:**	Ceriodaphnia dubia	**Brine:**	
Duration:	6d 20h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	36d 4h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	33.5%	1.13	2.27	1.602	

Steel Many-One Rank Sum Test

Control	vs	C-mg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Solvent Blank		0.06	126	74	5	18	0.9987	Asymp	Non-Significant Effect
		0.13	125	74	3	18	0.9982	Asymp	Non-Significant Effect
		0.28	137.5	74	4	18	1.0000	Asymp	Non-Significant Effect
		0.56	119	74	4	18	0.9908	Asymp	Non-Significant Effect
		1.13	120	74	4	18	0.9929	Asymp	Non-Significant Effect
		2.27*	71	74	1	18	0.0248	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	535.8857	89.31429	6	5.426	0.0001	Significant Effect
Error	1037.1	16.4619	63			
Total	1572.986		69			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	13.39	16.81	0.0372	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9045	0.9526	<0.0001	Non-normal Distribution

Reproduction Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	10	12.7	8.974	16.43	13.5	0	19	1.647	41.01%	0.0%
0.06		10	16.5	13.86	19.14	15.5	12	24	1.167	22.36%	-29.92%
0.13		10	14.8	11.3	18.3	16.5	2	18	1.548	33.07%	-16.54%
0.28		10	18.6	15.56	21.64	18	12	24	1.343	22.84%	-46.46%
0.56		10	14.2	10.78	17.62	15.5	2	20	1.511	33.66%	-11.81%
1.13		10	15	13.12	16.88	15	10	20	0.83	17.5%	-18.11%
2.27		10	9.1	7.91	10.29	9.5	6	11	0.526	18.28%	28.35%

Reproduction Detail

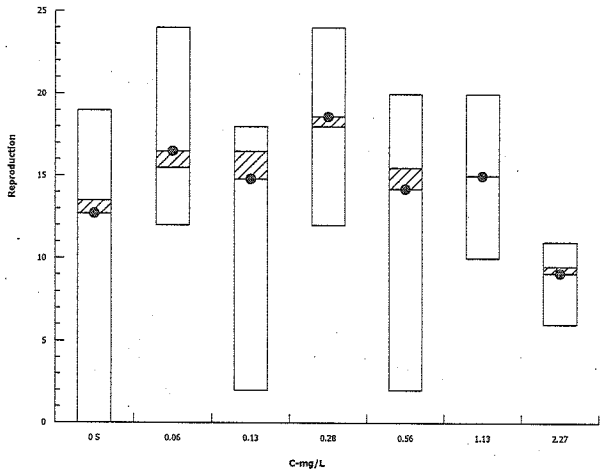
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Solvent Blank	13	12	13	19	16	15	14	9	16	0
0.06		15	15	14	21	17	12	24	13	16	18
0.13		18	17	17	16	18	12	16	2	14	18
0.28		16	12	19	24	22	14	22	16	17	24
0.56		16	16	16	17	14	20	14	15	2	12
1.13		10	14	15	17	13	14	20	15	16	16
2.27		9	8	10	11	10	9	11	7	10	6

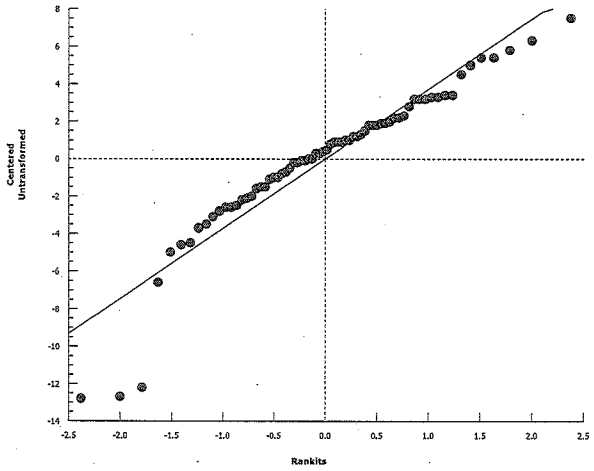
emm June 30/17

Ceriodaphnia 7-d Survival and Reproduction Test — **Nautilus Environmental**

Analysis ID:	17-4820-3536	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.8.7
Analyzed:	30 Jun-17 16:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: emm June 30/17 QA:

APPENDIX D – Echinoderm Toxicity Test Data

Echinoderm Fertilization Test Summary Sheet

Client: WDOE

Start Date/Time: May 18, 2017 @ 1425h

Work Order No.: 170514

Test Species: *S. purpuratus*

Sample Information:

Sample ID: NWTPH - Gx
Sample Date: 5-Apr-17
Date Received: 5-Apr-17
Sample Volume: 50 x 5mL

Dilution Water:

Type: Natural Seawater
Source: Vancouver Aquarium

Test Organism Information:

Batch No.: 18-May-17
Source: Nautilus Environmental San Diego
Sperm:Egg Ratio: 2000:1
Exposure Period: 20 min : 20 min

Reference Toxicant Results:

Reference Toxicant ID: SpUS04
Stock Solution ID: 17Cu01
Date Initiated: 18-May-17
IC50 (95% CL): 28.8 (27.2 - 30.8) ug/L Cu

Reference Toxicant Mean ± 2 SD: 16.4 (7.1 - 38.1) ug/L Cu
Reference Toxicant CV (%): 52

Test Results:

(1)

mg/L	Fertilization Rate
NOEC	2.5
LOEC	5
IC25 (95% CL)	JW ~~3.2 (2.9 - 3.4)~~
IC50 (95% CL)	JW ~~3.6 (3.4 - 3.8)~~

2nd ~~3.0 (2.9 - 3.0)~~ 3.0 (2.9 - 3.0)
2nd ~~3.6 (3.5 - 3.6)~~ 3.6 (3.5 - 3.6)

(1) endpoint calculated using solvent control as negative control

Reviewed by: [signature]

Date reviewed: June 26, 2017

Echinoderm Egg Fertilization Toxicity Test Worksheet

Client: WDOE
Test Date: May 18/17
WO No.: 170514
Test Species: S. purpuratus
Date Collected: May 18/17

Injection Time: 1140

Egg Density Calculation and Adjustment

Eggs Checked: 1 ✓ 2 ✓ 3 ✓ 4 ✓ 5 ✓ 6 X 7 ✓ 8 ✓
9 X 10 ✓ 11 ___ 12 ___ 13 ___ 14 ___ 15 ___ 16 ___

Eggs Pooled: 1-5, 7.8, 10
Time Pooled: 1210

Eggs Counted: 41, 41, 46
Mean: 42.67 X 100 = 4267 eggs/ml

Egg Density Adjust

$$v1 = \frac{2000 \text{ eggs/ml} \times 300 \text{ ml}}{4267 \text{ eggs/ml}} = 78.74$$ (JW: 1120)

Sperm Density Calculation and Adjustment

Time sperm activated: 1210

Time Counted: 1230
Sperm Counted (y): 1 745 2 685

Sperm Stock = 715 x 10^6

$$v1 = \frac{2 \times 10^6 \text{ sperm/ml} \times 60 \text{ ml}}{715 \times 10^6 \text{ sperm/ml}} = 0.094 \text{ mL.}$$ (JW: 1.12)

Sperm to Egg Ratio

Rangefinder Test:	100:1	200:1	400:1	800:1	1200:1	2000:1
Sperm Conc Req'd	1.12 2 x 10^6	JW 4 x 10^6	JW 8 x 10^6	JW 18 x 10^6	JW 24 x 10^6	JW 40 x 10^6
Final volume (mL) 60	JW ~~25~~	2.24 ~~25~~	4.48 ~~25~~	8.96 ~~25~~	13.4 ~~25~~	22.4 ~~25~~ JW
Volume of Stock (mL)	0.094	0.188	0.376	0.752	1.128	1.88

	Time
Sperm Added:	1310
Eggs Added:	1330
Test Ended:	1350

Rangefinder Ratio:	Fert.	Unfert.	Percent Fert.
100:1	29	71	29
200:1	50	50	50
400:1	71	29	71
800:1	85	15	85
1200:1	90	10	90
2000:1	94	6	94

Definitive Test

Sperm:Egg Ratio Used: 2000 : 1

	Time
Sperm Added:	1425
Eggs Added:	1445
Test Ended:	1505

Comments:

Reviewed by: [signature]
Date Reviewed: June 26, 2017

Echinoderm Fertilization WQ Data Sheet

Client : WDOE **Analysts:** JW

Sample ID: NWTPH - Gx **Test Date & Time:** 18-May- 17 @ 1425

WO No: 170514 **Test Species:** *S. purpuratus*

Initial Water Quality JW

	100% sample
Temp (°C)	
DO (mg/L)	
pH	
Salinity	

Brine/Salt Adjusted Water Quality JW

	% sample
Temp (°C)	
DO (mg/L)	
pH	
Salinity	

	Water Quality			
Concentration % (v/v)	Temp. (°C)	DO (mg/L)	pH	Salinity (ppt)
Seawater ctrl	13.0	8.8	7.8	28
Methanol CtrL	13.0	8.6	7.9	28
JW 0.13 16	13.0	8.7	7.8	28
JW 0.26 32	13.0	8.8	7.8	28
0.62	13.0	8.7	7.8	28
1.25	13.0	8.7	7.8	28
2.5	13.0	8.6	7.7	28
5	13.0	8.4	7.6	28
Analyst Initials	JW	JW	JW	JW

Thermometer: CER # 2 **DO meter:** 1 **pH meter:** 1 **Salinity:** 1.

Sample Description: Gasoline Standard.

Echinoderm Source: Nautilus San Diego **Date Received:** 18-May-17

Seawater Source: Vancouver Aquarium **Date Collected:** 16 - May 17

Comments:

Reviewed: **Date Reviewed:** June 26, 2017

Echinoderm Fertilization Toxicity Test Data Sheet
Fertilized Egg Counts

Client: WDOE

Work Order #: 170514

Sample ID: JW ~~gasoline~~ NWTPH - Gx

Start Date/Time: May 17/18 JW @ 1425

Test species: ~~JW~~ JW S. purpuratus

Test set up by: JW

Test Duration: 20 min = 20 min

	Rep	No. Fertilized Eggs	No. Unfertilized Eggs	Comments	Initials
Control Seawater	A	95	5		JW
	B	94	6		
	C	96	4		
	D	90	10		
Control Methanol	A	96	4		
	B	95	5		
	C	96	4		
	D	96	4		
0.16	A	JW ~~95~~ 93	JW ~~5~~ 7		
	B	96	4		
	C	91	9		
	D	89	11		
0.32	A	95	5		
	B	92	8		
	C	94	6		
	D	96	4		
0.63	A	93	7		
	B	97	3		
	C	92	8		
	D	95	5		
1.25	A	97	3		
	B	95	5		
	C	98	2		
	D	93	7		
2.5	A	96	4		
	B	94	6		
	C	91	9		
	D	89	11		
5	A	2	~~98~~		
	B	2	98		
	C	2	98		
	D	4	96		

Comments: Egg control counts : # fertilized / # unfertilized

A 0 / 100

B 0 / 100

C 0 / 100

D 0 / 100

Reviewed by: [signature]

Date Reviewed: June 26, 2017

CETIS Summary Report

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-4752-3994	Fertilization Rate	0	>0		3.39%		Paired Sample t Test
02-1516-0092	Fertilization Rate	2.5	5	3.536	6.01%		Dunnett T3 Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
15-4684-8782	Fertilization Rate	IC5	2.567	2.46	2.618		Linear Interpolation (ICPIN)
		IC10	2.669	2.565	2.719		
		IC15	2.773	2.672	2.824		
		IC20	2.881	2.783	2.931		
		IC25	2.992	2.898	3.041		
		IC40	3.344	3.262	3.391		
		IC50	3.596	3.524	3.64		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-1516-0092	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
06-4752-3994	Fertilization Rate	Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
15-4684-8782	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
02-1516-0092	Fertilization Rate	PMSD	0.06011	NL - 0.25	No	Passes Acceptability Criteria
06-4752-3994	Fertilization Rate	PMSD	0.03392	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0 ①	Solvent Blank	4	0.9575	0.9495	0.9655	0.95	0.96	0.002501	0.005002	0.52%	0.0%
0	Negative Control	4	0.9375	0.8957	0.9793	0.9	0.96	0.01315	0.0263	2.81%	2.09%
0.16		4	0.9225	0.875	0.97	0.89	0.96	0.01493	0.02986	3.24%	3.66%
0.31		4	0.9425	0.9153	0.9697	0.92	0.96	0.008539	0.01708	1.81%	1.57%
0.62		4	0.9425	0.9072	0.9778	0.92	0.97	0.01109	0.02217	2.35%	1.57%
1.25		4	0.9575	0.9222	0.9928	0.93	0.98	0.01109	0.02217	2.32%	0.0%
2.5		4	0.925	0.8755	0.9745	0.89	0.96	0.01555	0.03109	3.36%	3.39%
5		4	0.025	0.009088	0.04091	0.02	0.04	0.005	0.01	40.0%	97.39%

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.96	0.95	0.96	0.96
0	Negative Control	0.95	0.94	0.96	0.9
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

① Solvent Blank = Methanol control

June 26/17

Echinoid Sperm Cell Fertilization Test **Nautilus Environmental**

Fertilization Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	96/100	95/100	96/100	96/100
0	Negative Control	95/100	94/100	96/100	90/100
0.16		93/100	96/100	91/100	89/100
0.31		95/100	92/100	94/100	96/100
0.62		93/100	97/100	92/100	95/100
1.25		97/100	95/100	98/100	93/100
2.5		96/100	94/100	91/100	89/100
5		2/100	2/100	2/100	4/100

CETIS Analytical Report

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	06-4752-3994	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 12:09	**Analysis:**	Parametric-Paired Sample	**Official Results:**	Yes
Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	3.39%	Passes fertilization rate

Paired Sample t Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Solvent Blank	-1.552	2.353	0.063	3	0.8908	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.03392	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003465353	0.003465353	1	2.431	0.1700	Non-Significant Effect
Error	0.008553993	0.001425665	6			
Total	0.01201935		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	18.55	47.47	0.0387	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8807	0.6451	0.1913	Normal Distribution

Fertilization Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.9575	0.9495	0.9655	0.96	0.95	0.96	0.002501	0.52%	0.0%
0	Negative Control	4	0.9375	0.8957	0.9793	0.945	0.9	0.96	0.01315	2.81%	2.09%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0 ①	Solvent Blank	4	1.363	1.344	1.383	1.369	1.345	1.369	0.006039	0.89%	0.0%
0	Negative Contr	4	1.322	1.239	1.405	1.334	1.249	1.369	0.02601	3.94%	3.05%

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0 ①	Solvent Blank	0.96	0.95	0.96	0.96
0	Negative Control	0.95	0.94	0.96	0.9

Angular (Corrected) Transformed Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0 ①	Solvent Blank	1.369	1.345	1.369	1.369
0	Negative Control	1.345	1.323	1.369	1.249

① solvent blank = Methanol control

June 26/17

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

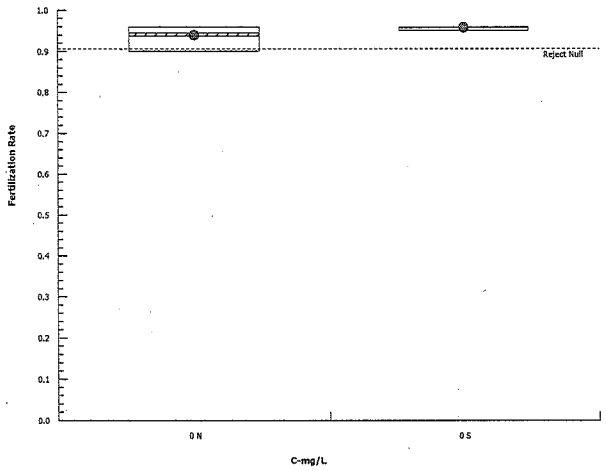
Analysis ID:	06-4752-3994	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 12:09	**Analysis:**	Parametric-Paired Sample	**Official Results:**	Yes

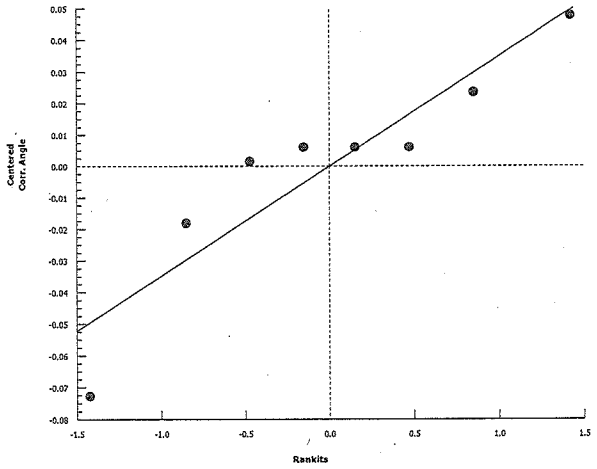
Fertilization Rate Binomials

C-mg/L		Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	①	Solvent Blank	96/100	95/100	96/100	96/100
0		Negative Control	95/100	94/100	96/100	90/100

① Solvent Blank = Methanol Control

Graphics





June 26/17

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	15-4684-8782	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 14:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1355482	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	2.567	2.46	2.618
IC10	2.669	2.565	2.719
IC15	2.773	2.672	2.824
IC20	2.881	2.783	2.931
IC25	2.992	2.898	3.041
IC40	3.344	3.262	3.391
IC50	3.596	3.524	3.64

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0 (1)	Negative Control	4	0.9375	0.9	0.96	0.01315	0.0263	2.81%	0.0%	375	400
0.16		4	0.9225	0.89	0.96	0.01493	0.02986	3.24%	1.6%	369	400
0.31		4	0.9425	0.92	0.96	0.008539	0.01708	1.81%	-0.53%	377	400
0.62		4	0.9425	0.92	0.97	0.01109	0.02217	2.35%	-0.53%	377	400
1.25		4	0.9575	0.93	0.98	0.01109	0.02217	2.32%	-2.13%	383	400
2.5		4	0.925	0.89	0.96	0.01555	0.03109	3.36%	1.33%	370	400
5		4	0.025	0.02	0.04	0.005	0.01	40.0%	97.33%	10	400

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.95	0.94	0.96	0.9
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

(1) negative control = lab water

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

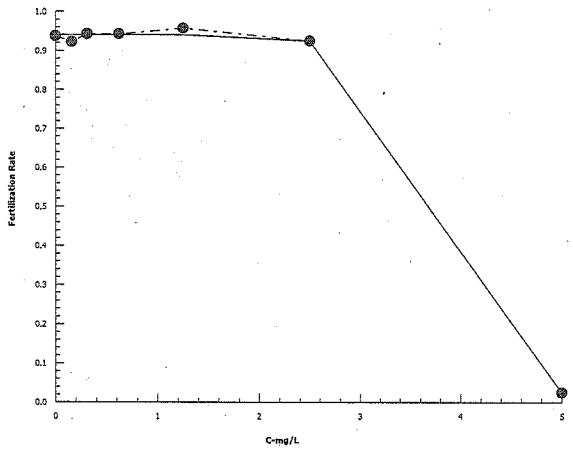
Analysis ID: 15-4684-8782 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 26 Jun-17 14:24 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Fertilization Rate Binomials

C-mg/L		Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	①	Solvent Blank	96/100	95/100	96/100	96/100
0		Negative Control	95/100	94/100	96/100	90/100
0.16			93/100	96/100	91/100	89/100
0.31			95/100	92/100	94/100	96/100
0.62			93/100	97/100	92/100	95/100
1.25			97/100	95/100	98/100	93/100
2.5			96/100	94/100	91/100	89/100
5			2/100	2/100	2/100	4/100

① Solvent Blank = Methanol control

Graphics



Analyst: JN QA: June 26/17

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	02-1516-0092	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	26 Jun-17 14:28	**Analysis:**	Parametric-Multiple Comparison	**Official Results:**	Yes
Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.01%	2.5	5	3.536	

Dunnett T3 Multiple Comparison Test

Control	vs	C-mg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.16	0.7389	3.189	0.125	6	0.7936	CDF	Non-Significant Effect
		0.31	-0.276	3.293	0.104	5	0.9958	CDF	Non-Significant Effect
		0.62	-0.2908	3.176	0.115	6	0.9961	CDF	Non-Significant Effect
		1.25	-1.227	3.179	0.121	6	0.9999	CDF	Non-Significant Effect
		2.5	0.5978	3.197	0.128	6	0.8550	CDF	Non-Significant Effect
		5*	38.89	3.437	0.103	5	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.06011	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.685924	0.7809873	6	310.6	<0.0001	Significant Effect
Error	0.05280655	0.002514597	21			
Total	4.73873		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.942	16.81	0.9249	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9637	0.8975	0.4243	Normal Distribution

Fertilization Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.9375	0.8957	0.9793	0.945	0.9	0.96	0.01315	2.81%	0.0%
0.16		4	0.9225	0.875	0.97	0.92	0.89	0.96	0.01493	3.24%	1.6%
0.31		4	0.9425	0.9153	0.9697	0.945	0.92	0.96	0.008539	1.81%	-0.53%
0.62		4	0.9425	0.9072	0.9778	0.94	0.92	0.97	0.01109	2.35%	-0.53%
1.25		4	0.9575	0.9222	0.9928	0.96	0.93	0.98	0.01109	2.32%	-2.13%
2.5		4	0.925	0.8755	0.9745	0.925	0.89	0.96	0.01555	3.36%	1.33%
5		4	0.025	0.009088	0.04091	0.02	0.02	0.04	0.005	40.0%	97.33%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.322	1.239	1.405	1.334	1.249	1.369	0.02601	3.94%	0.0%
0.16		4	1.293	1.2	1.386	1.285	1.233	1.369	0.0293	4.53%	2.19%
0.31		4	1.331	1.273	1.388	1.334	1.284	1.369	0.01813	2.73%	-0.66%
0.62		4	1.332	1.253	1.412	1.324	1.284	1.397	0.02501	3.75%	-0.79%
1.25		4	1.368	1.28	1.457	1.371	1.303	1.429	0.02779	4.06%	-3.53%
2.5		4	1.298	1.201	1.394	1.295	1.233	1.369	0.03031	4.67%	1.81%
5		4	0.1568	0.1095	0.2041	0.1419	0.1419	0.2014	0.01487	18.97%	88.14%

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID: 02-1516-0092 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 26 Jun-17 14:28 **Analysis:** Parametric-Multiple Comparison **Official Results:** Yes

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.95	0.94	0.96	0.9
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

Angular (Corrected) Transformed Detail

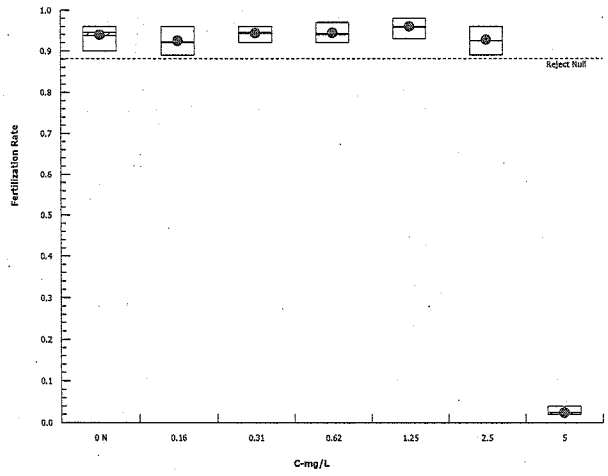
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.345	1.323	1.369	1.249
0.16		1.303	1.369	1.266	1.233
0.31		1.345	1.284	1.323	1.369
0.62		1.303	1.397	1.284	1.345
1.25		1.397	1.345	1.429	1.303
2.5		1.369	1.323	1.266	1.233
5		0.1419	0.1419	0.1419	0.2014

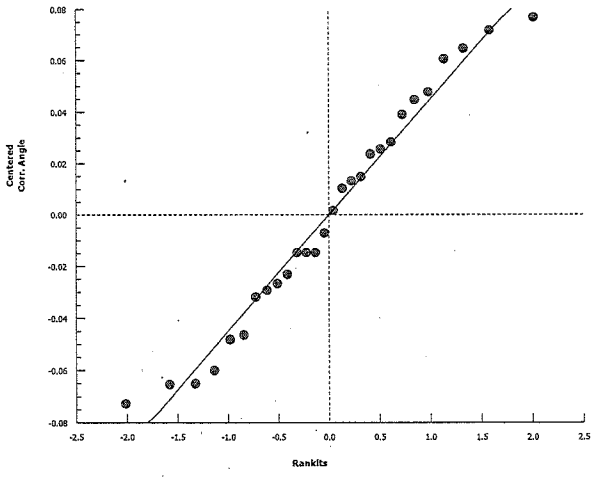
Fertilization Rate Binomials

C-mg/L		Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	ⓘ	Solvent Blank	96/100	95/100	96/100	96/100
0		Negative Control	95/100	94/100	96/100	90/100
0.16			93/100	96/100	91/100	89/100
0.31			95/100	92/100	94/100	96/100
0.62			93/100	97/100	92/100	95/100
1.25			97/100	95/100	98/100	93/100
2.5			96/100	94/100	91/100	89/100
5			2/100	2/100	2/100	4/100

ⓘ Solvent Blank = Methanol control

Graphics





June 26/17

CETIS Summary Report

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-4752-3994	Fertilization Rate	0	>0		3.39%		Paired Sample t Test
02-1516-0092	Fertilization Rate	2.5	5	3.536	6.01%		Dunnett T3 Multiple Comparison Test
08-9145-0043	Fertilization Rate	2.5	5	3.536	3.97%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
15-1251-9870	Fertilization Rate	IC5	2.532	2.03	2.597		Linear Interpolation (ICPIN)
		IC10	2.635	2.561	2.697		
(2)		IC15	2.741	2.667	2.8		
		IC20	2.85	2.778	2.906		
		IC25	2.962	2.891	3.015		
		IC40	3.317	3.258	3.367		
		IC50	3.572	3.517	3.621		
15-4684-8782	Fertilization Rate	IC5	2.567	2.46	2.618		Linear Interpolation (ICPIN)
		IC10	2.669	2.565	2.719		
(1)		IC15	2.773	2.672	2.824		
		IC20	2.881	2.783	2.931		
		IC25	2.992	2.898	3.041		
		IC40	3.344	3.262	3.391		
		IC50	3.596	3.524	3.64		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-1516-0092	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
06-4752-3994	Fertilization Rate	Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
08-9145-0043	Fertilization Rate	Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
15-1251-9870	Fertilization Rate	Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
15-4684-8782	Fertilization Rate	Control Resp	0.9375	0.7 - NL	Yes	Passes Acceptability Criteria
02-1516-0092	Fertilization Rate	PMSD	0.06011	NL - 0.25	No	Passes Acceptability Criteria
06-4752-3994	Fertilization Rate	PMSD	0.03392	NL - 0.25	No	Passes Acceptability Criteria
08-9145-0043	Fertilization Rate	PMSD	0.03966	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Solvent Blank	4	0.9575	0.9495	0.9655	0.95	0.96	0.002501	0.005002	0.52%	0.0%
0	Negative Control	4	0.9375	0.8957	0.9793	0.9	0.96	0.01315	0.0263	2.81%	2.09%
0.16		4	0.9225	0.875	0.97	0.89	0.96	0.01493	0.02986	3.24%	3.66%
0.31		4	0.9425	0.9153	0.9697	0.92	0.96	0.008539	0.01708	1.81%	1.57%
0.62		4	0.9425	0.9072	0.9778	0.92	0.97	0.01109	0.02217	2.35%	1.57%
1.25		4	0.9575	0.9222	0.9928	0.93	0.98	0.01109	0.02217	2.32%	0.0%
2.5		4	0.925	0.8755	0.9745	0.89	0.96	0.01555	0.03109	3.36%	3.39%
5		4	0.025	0.009088	0.04091	0.02	0.04	0.005	0.01	40.0%	97.39%

(1) negative control = lab water
(2) solvent control = negative control

July 5/17

Echinoid Sperm Cell Fertilization Test — Nautilus Environmental

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.96	0.95	0.96	0.96
0	Negative Control	0.95	0.94	0.96	0.9
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

Fertilization Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	96/100	95/100	96/100	96/100
0	Negative Control	95/100	94/100	96/100	90/100
0.16		93/100	96/100	91/100	89/100
0.31		95/100	92/100	94/100	96/100
0.62		93/100	97/100	92/100	95/100
1.25		97/100	95/100	98/100	93/100
2.5		96/100	94/100	91/100	89/100
5		2/100	2/100	2/100	4/100

CETIS Analytical Report

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	15-1251-9870	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:47	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1151248	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	mg/L	95% LCL	95% UCL
IC5	2.532	2.03	2.597
IC10	2.635	2.561	2.697
IC15	2.741	2.667	2.8
IC20	2.85	2.778	2.906
IC25	2.962	2.891	3.015
IC40	3.317	3.258	3.367
IC50	3.572	3.517	3.621

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Solvent Blank	4	0.9575	0.95	0.96	0.002501	0.005002	0.52%	0.0%	383	400
0.16		4	0.9225	0.89	0.96	0.01493	0.02986	3.24%	3.66%	369	400
0.31		4	0.9425	0.92	0.96	0.008539	0.01708	1.81%	1.57%	377	400
0.62		4	0.9425	0.92	0.97	0.01109	0.02217	2.35%	1.57%	377	400
1.25		4	0.9575	0.93	0.98	0.01109	0.02217	2.32%	0.0%	383	400
2.5		4	0.925	0.89	0.96	0.01555	0.03109	3.36%	3.39%	370	400
5		4	0.025	0.02	0.04	0.005	0.01	40.0%	97.39%	10	400

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.96	0.95	0.96	0.96
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

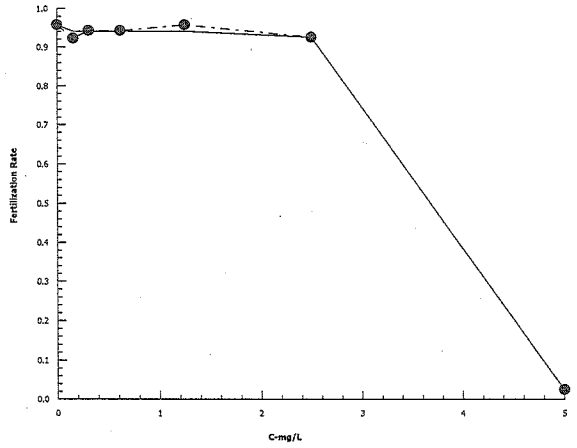
Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID: 15-1251-9870 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 04 Jul-17 14:47 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Fertilization Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	96/100	95/100	96/100	96/100
0	Negative Control	95/100	94/100	96/100	90/100
0.16		93/100	96/100	91/100	89/100
0.31		95/100	92/100	94/100	96/100
0.62		93/100	97/100	92/100	95/100
1.25		97/100	95/100	98/100	93/100
2.5		96/100	94/100	91/100	89/100
5		2/100	2/100	2/100	4/100

Graphics



Analyst: emm QA: July 5/17

CETIS Analytical Report

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	08-9145-0043	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:47	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	00-0967-1059	**Test Type:**	Fertilization	**Analyst:**	Jeslin Wijaya
Start Date:	18 May-17 14:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Natural seawater
Ending Date:	18 May-17 15:05	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	40m	**Source:**	San Diego Lab	**Age:**	
Sample ID:	08-0588-3388	**Code:**	3008CDFC	**Client:**	WDOE
Sample Date:	05 Apr-17 11:26	**Material:**	Gasoline	**Project:**	
Receive Date:	05 Apr-17 11:26	**Source:**	WDOE		
Sample Age:	43d 3h	**Station:**	NWTPH-Gx		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.97%	2.5	5	3.536	

Dunnett Multiple Comparison Test

Control	vs	C-mg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Solvent Blank		0.16	2.153	2.448	0.080	6	0.0872	CDF	Non-Significant Effect
		0.31	1.003	2.448	0.080	6	0.4525	CDF	Non-Significant Effect
		0.62	0.9498	2.448	0.080	6	0.4769	CDF	Non-Significant Effect
		1.25	-0.1551	2.448	0.080	6	0.8949	CDF	Non-Significant Effect
		2.5	1.998	2.448	0.080	6	0.1145	CDF	Non-Significant Effect
		5*	36.81	2.448	0.080	6	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9575	0.7 - NL	Yes	Passes Acceptability Criteria
PMSD	0.03966	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.746662	0.7911103	6	368.1	<0.0001	Significant Effect
Error	0.04512778	0.002148942	21			
Total	4.79179		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.788	16.81	0.3409	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.965	0.8975	0.4543	Normal Distribution

Fertilization Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.9575	0.9495	0.9655	0.96	0.95	0.96	0.002501	0.52%	0.0%
0.16		4	0.9225	0.875	0.97	0.92	0.89	0.96	0.01493	3.24%	3.66%
0.31		4	0.9425	0.9153	0.9697	0.945	0.92	0.96	0.008539	1.81%	1.57%
0.62		4	0.9425	0.9072	0.9778	0.94	0.92	0.97	0.01109	2.35%	1.57%
1.25		4	0.9575	0.9222	0.9928	0.96	0.93	0.98	0.01109	2.32%	0.0%
2.5		4	0.925	0.8755	0.9745	0.925	0.89	0.96	0.01555	3.36%	3.39%
5		4	0.025	0.009088	0.04091	0.02	0.02	0.04	0.005	40.0%	97.39%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	1.363	1.344	1.383	1.369	1.345	1.369	0.006039	0.89%	0.0%
0.16		4	1.293	1.2	1.386	1.285	1.233	1.369	0.0293	4.53%	5.18%
0.31		4	1.331	1.273	1.388	1.334	1.284	1.369	0.01813	2.73%	2.41%
0.62		4	1.332	1.253	1.412	1.324	1.284	1.397	0.02501	3.75%	2.28%
1.25		4	1.368	1.28	1.457	1.371	1.303	1.429	0.02779	4.06%	-0.37%
2.5		4	1.298	1.201	1.394	1.295	1.233	1.369	0.03031	4.67%	4.8%
5		4	0.1568	0.1095	0.2041	0.1419	0.1419	0.2014	0.01487	18.97%	88.5%

Echinoid Sperm Cell Fertilization Test — **Nautilus Environmental**

Analysis ID:	08-9145-0043	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	04 Jul-17 14:47	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Fertilization Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.96	0.95	0.96	0.96
0.16		0.93	0.96	0.91	0.89
0.31		0.95	0.92	0.94	0.96
0.62		0.93	0.97	0.92	0.95
1.25		0.97	0.95	0.98	0.93
2.5		0.96	0.94	0.91	0.89
5		0.02	0.02	0.02	0.04

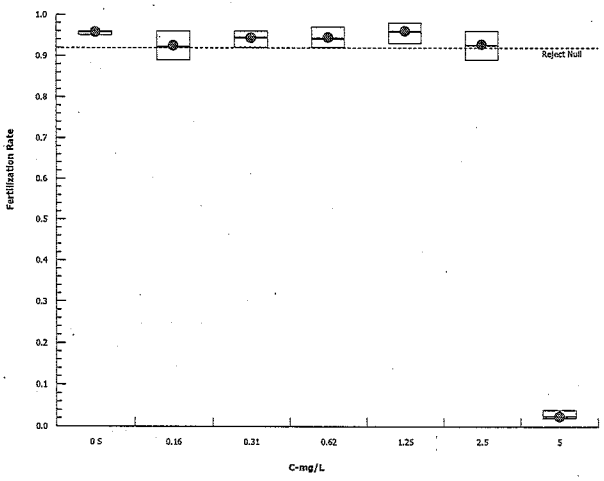
Angular (Corrected) Transformed Detail

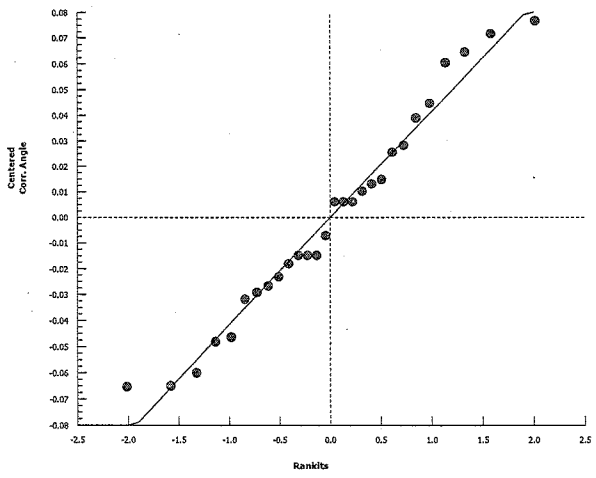
C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	1.369	1.345	1.369	1.369
0.16		1.303	1.369	1.266	1.233
0.31		1.345	1.284	1.323	1.369
0.62		1.303	1.397	1.284	1.345
1.25		1.397	1.345	1.429	1.303
2.5		1.369	1.323	1.266	1.233
5		0.1419	0.1419	0.1419	0.2014

Fertilization Rate Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	96/100	95/100	96/100	96/100
0	Negative Control	95/100	94/100	96/100	90/100
0.16		93/100	96/100	91/100	89/100
0.31		95/100	92/100	94/100	96/100
0.62		93/100	97/100	92/100	95/100
1.25		97/100	95/100	98/100	93/100
2.5		96/100	94/100	91/100	89/100
5		2/100	2/100	2/100	4/100

Graphics





APPENDIX E – Chain-of-Custody Form

Nautilus Environmental

Chain of Custody (electronic)

[X] British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

WO# 170513 170514 170515 170516

Date May 18/17 Page 1 of 1

Sample Collection By:		
	Report to:	**Invoice to:**
Company	Washing Department of Ecology	WDOE - Accounts Payable
Address	PO BOX 47600	PO BOX 47612
City/Prov/Postal Code	Olympia, WA	Olympia, WA 98504-7612
Contact	William Hobbs	Dianne Schieck
Phone	360-407-7512	360-407-7020
Email	whob461@ecy.wa.gov	disc461@ecy.wa.gov

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	ANALYSES REQUIRED: 7-d Fathead Minnow	Echinoderm Fertilization	7-d Topsmelt	Ceriodaphnia survival and reproduction								Receipt Temperature (°C)
1	NWTPH-Gx	5-Apr-17	11:26	Methanol	50mL DW	50	Gasoline Standards	x	x	x	x								X DW
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PROJECT INFORMATION	SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)	RELIQUINSHED BY (COURIER)
Client: WDOE	**Total # Containers:**	2	**Signature:**	**Signature:**
P.O. No.: 17-31239	**Good Condition?**	Y	**Print:**	**Print:**
Shipped Via: FedEx	**Matches Schedule?**	n/a	**Company:**	**Company:**
			Time/Date:	**Time/Date:**
SPECIAL INSTRUCTIONS/COMMENTS: All testing procedures are based on US EPA protocols. Standards were ordered by John Weakland.			**RECEIVED BY (COURIER)**	**RECEIVED BY (LABORATORY)**
			Signature:	**Signature:** NY
			Print:	**Print:** Nan Yamamoto
			Company:	**Company:** Nautilus Environmental Company Inc.
			Time/Date:	**Time/Date:** April 5, 2017 @ 1126h

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

END OF REPORT