

 **ANALYTICAL REPORT****PREPARED FOR**

Attn: Mr. John Davis
Malvern Water Works
506 Overman
Malvern, Arkansas 72104
Generated 12/18/2023 7:19:48 PM

JOB DESCRIPTION

Biomonitoring

JOB NUMBER

192-7200-1

Job Notes

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Authorization



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Authorized for release by
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Re: Chronic 7-Day Renewal *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
- Outfall 001
NPDES Permit No. AR0034126 AFIN 30-00040
Control No. 274759-1

This report is the analytical results and supporting information for the samples submitted to Eurofins Arkansas. The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire document. Each section of the report has been reviewed and approved by the Laboratory Manager or qualified designee.

Testing procedures and Quality Assurance were in accordance with "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013, Fourth Edition, October 2002. The supporting chemistry data included with this report is intended for accessing the basic water quality of the effluent as required by this test method and is not intended to be utilized for discharge monitoring reports. Test results are summarized below:

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The permit requirement is NOEC not less than 12%. The following were concluded from the test:

Survival:	NOEC	LOEC	Growth:	NOEC	LOEC	IC25
	16	>16		16	>16	>16

The sample therefore PASSED the Fathead minnow test.

Method 1002.0 Chronic *Ceriodaphnia dubia* Survival and Reproduction Test: The permit requirement is NOEC not less than 12%. The following were concluded from the test:

Survival:	NOEC	LOEC	Reproduction:	NOEC	LOEC	IC25
	16	>16		16	>16	>16

The sample therefore PASSED the *Ceriodaphnia dubia* test.

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Ceriodaphnia dubia Chemical Parameters Chart

Appendix (Summary)

I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	87.5	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.585	PASS
Control Growth CV < or = 40% *	22.8	PASS
Growth Minimum Significant Difference 12 to 30%	23.4	PASS
Critical Dilution CV < or = 40% *	11.7	PASS

* EPA Region 6 Requirement

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	80.0	PASS
Control Reproduction > or = 15 per Surviving Female	29.4	PASS
Control CV < or = 40% per Surviving Female *	14.9	PASS
Reproduction Minimum Significant Difference 13 to 47%	36.3	PASS
Critical Dilution CV < or = 40% *	17.0	PASS

* EPA Region 6 Requirement

II. Outlined Report

A. Introduction

1. Permit Number: AR0034126 AFIN 30-00040
2. Test Requirements: Test Methods 1000.0 and 1002.0

B. Source of Effluent/Dilution Water:

1. Effluent Samples:

- a. Sampling Point:
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.9	8.4	8.2
pH (standard units)	6.5	6.7	6.8
Alkalinity (mg/l as CaCO ₃)	8.1	7.7	9.0
Hardness (mg/l as CaCO ₃)	24	20	28
Conductivity (umhos/cm)	170	170	160
Residual Chlorine (mg/l)	0.060	<0.05	<0.05
Ammonia as N (mg/l)	0.79	0.86	1.2

2. Dilution Water Samples:

Analysis	192-6872-A-1	192-7160-A-1
Dissolved oxygen (mg/l)	8.2	8.2
pH (standard units)	7.3	7.5
Alkalinity (mg/l as CaCO ₃)	31	32
Hardness (mg/l as CaCO ₃)	41	47
Conductivity (umhos/cm)	170	170
Residual Chlorine (mg/l)	<0.05	<0.05

C. Test Methods

1. Test methods used:

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013; test Methods 1000.0 and 1002.0, Fathead Minnow Survival and Growth and *Ceriodaphnia dubia* Survival and Reproduction.

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: November 28, 2023 at 1504
Date & Time Test Terminated: December 05, 2023 at 1325
Type & Volume of Test Chamber: 500 ml disposable beaker
Volume of Sample: 250 ml
Number of Organisms per replicate: 8
Number of Replicates per dilution: 5

Ceriodaphnia dubia Survival and Reproduction Method 1002.0

Date & Time Test Initiated: November 28, 2023 at 1435
Date & Time Test Terminated: December 04, 2023 at 1623
Type & Volume of Test Chamber: 30 ml disposable beaker
Volume of Sample: 15 ml
Number of Organisms per replicate: 1
Number of Replicates per dilution: 10

4. Source of test organisms: In-house culture

5. Test Temperature: 25 +/- 1 degree Celsius

D. Test Organisms

1. Scientific Name

a. Test 1000.0 *Pimephales promelas*

b. Test 1002.0 *Ceriodaphnia dubia*

III. Data Analysis

The data was analyzed using EPA method criteria and CETIS statistical software.

IV. Standard Reference Toxicants

Sodium chloride in synthetic moderately hard water.

Pimephales promelas (Fathead minnow)

A chronic reference test was performed on October 02, 2023 at 1446 to October 09, 2023 at 1508

The results were as follows: (Control No. 274688-1.)

Survival LC-50: 3132 mg/l

Growth IC-25: 2000 mg/l

Growth PMSD: 0

Ceriodaphnia dubia

A chronic reference test was performed on October 03, 2023 at 1027 to October 09, 2023 at 1210

The results were as follows: (Control No. 274688-2.)

Survival LC-50: 1731 mg/l

Reproduction IC-25: 1146 mg/l

Reproduction PMSD: 13.7

V. Organism History

Pimephales promelas (Fathead minnow)

Date: November 28, 2023

Age: <24 hours

Source: In-house culture

Water: Moderately hard synthetic

Temperature: 25 deg.C

Ceriodaphnia dubia

Date: November 28, 2023

Age: <24 hours

Source: In-house culture

Water: Moderately hard synthetic

Temperature: 25 deg.C

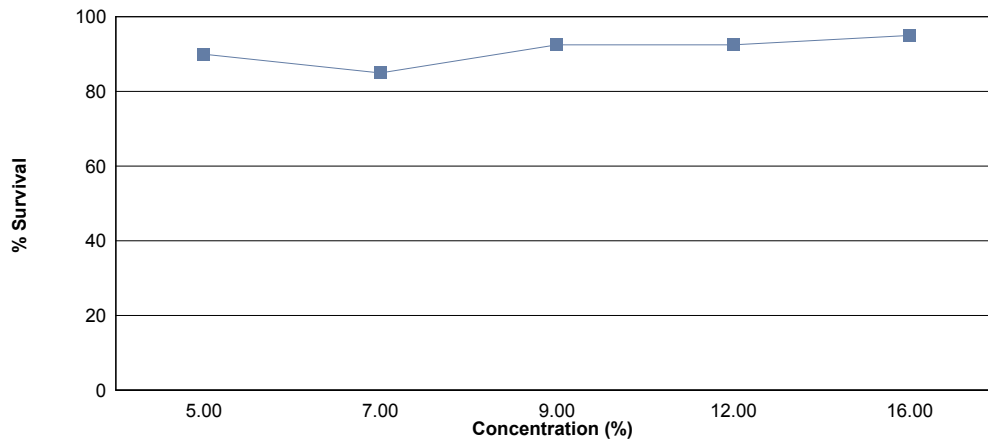
VI. Results Summary *Pimephales promelas*, Fathead minnow Larval Survival and Growth Test -- Method 1000.0

Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (weight) of the larvae.

Effluent concentrations for this test were 5 %, 7 %, 9 %, 12 %, 16 % in accordance with the NPDES permit.

The test was initiated on November 28, 2023 at 1504 and continued through December 05, 2023 at 1325. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 16 % effluent
- b.) NOEC growth = 16 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	87.5	0.512
5 %	90.0	0.546
7 %	85.0	0.561
9 %	92.5	0.606
12 %	92.5	0.591
16 %	95.0	0.628

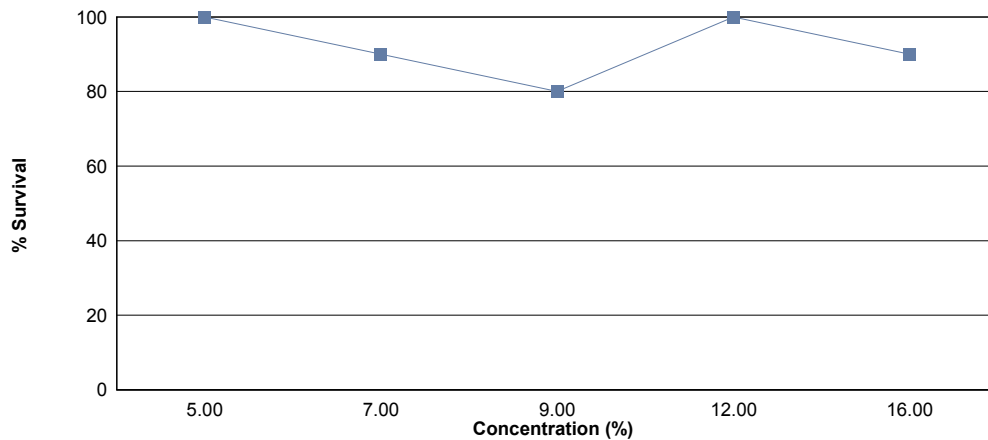
VI. Results Summary *Ceriodaphnia dubia*, Cladoceran Survival and Reproduction Test -- Method 1002.0

Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring or a maximum of eight test days.

Effluent concentrations for this test were 5 %, 7 %, 9 %, 12 %, 16 % in accordance with the NPDES permit.

The test was initiated on November 28, 2023 at 1435 and continued through December 04, 2023 at 1623. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 16 % effluent
- b.) NOEC reproduction = 16 % effluent



Summary of the 6-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	80.0	25.2
5 %	100	30.2
7 %	90.0	26.5
9 %	80.0	26.3
12 %	100	29.0
16 %	90.0	26.6

Appendix (Data): Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: November 28, 2023 at 1504

Date and Time Test Terminated: December 05, 2023 at 1325

Concentration Replicate		Number of Survivors						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	A	8	8	8	8	8	8	7
	B	8	8	8	8	8	8	8
	C	8	7	6	6	6	6	6
	D	8	8	7	7	7	7	7
	E	8	7	7	7	7	7	7
5 %	A	8	8	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	7	7
	D	8	8	8	7	7	7	7
	E	8	7	7	7	7	7	7
7 %	A	8	7	7	7	7	7	7
	B	8	6	6	6	6	6	6
	C	8	7	7	7	7	7	7
	D	7	7	7	7	7	7	7
	E	8	8	8	8	8	8	7
9 %	A	8	8	8	8	8	7	7
	B	8	7	7	7	7	7	7
	C	8	8	7	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
12 %	A	8	8	8	8	8	8	8
	B	8	7	7	7	7	7	7
	C	8	8	8	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	7	7	7	7	7	7
16 %	A	7	7	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	7	7	7	7	7	7

Appendix (Data): Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: November 28, 2023 at 1504
 Test Terminated: December 05, 2023 at 1325

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.77055	.77489	0.00434	8	0.542
	B	.75069	.75517	0.00448	8	0.560
	C	.75496	.75740	0.00244	8	0.305
	D	.76500	.76974	0.00474	8	0.592
	E	.76536	.76983	0.00447	8	0.559
5 %	A	.76047	.76443	0.00396	8	0.495
	B	.76834	.77314	0.00480	8	0.600
	C	.76396	.76796	0.00400	8	0.500
	D	.77077	.77525	0.00448	8	0.560
	E	.76014	.76474	0.00460	8	0.575
7 %	A	.76236	.76629	0.00393	8	0.491
	B	.76941	.77287	0.00346	8	0.432
	C	.76069	.76622	0.00553	8	0.691
	D	.76418	.76944	0.00526	8	0.658
	E	.76924	.77349	0.00425	8	0.531
9 %	A	.77331	.77802	0.00471	8	0.589
	B	.76940	.77379	0.00439	8	0.549
	C	.76528	.77084	0.00556	8	0.695
	D	.76041	.76487	0.00446	8	0.558
	E	.77539	.78052	0.00513	8	0.641
12 %	A	.76469	.76948	0.00479	8	0.599
	B	.75724	.76261	0.00537	8	0.671
	C	.76072	.76570	0.00498	8	0.622
	D	.75513	.75900	0.00387	8	0.484
	E	.75412	.75874	0.00462	8	0.578
16 %	A	.77140	.77646	0.00506	8	0.632
	B	.77544	.78050	0.00506	8	0.632
	C	.77341	.77794	0.00453	8	0.566
	D	.76359	.76854	0.00495	8	0.619
	E	.76596	.77149	0.00553	8	0.691

Appendix (Data): Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 28, 2023 at 1435
 Date and Time Test Terminated: December 04, 2023 at 1623

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	3	0	2	5	3	6	5	4	4	32	10	3.20
4	5	0	4	0	0	0	0	0	0	0	9	10	0.900
5	13	5	9	10	10	9	11	12	1X	11	91	9	10.1
6	15	13	13	16	15	0X	14	18	X	16	120	8	15.0
7													
8													
TOTAL	33	21	26	28	30	12	31	35	5	31	252	10	25.2

Concentration: 5 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	3	5	5	4	7	6	6	36	10	3.60
4	4	6	1	0	0	0	0	0	0	0	11	10	1.10
5	12	12	10	11	10	10	13	15	8	10	111	10	11.1
6	14	0	15	16	15	13	15	19	18	19	144	10	14.4
7													
8													
TOTAL	30	18	26	30	30	28	32	41	32	35	302	10	30.2

Concentration: 7 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	5	0	3	6	3	6	3	5	4	35	10	3.50
4	3	0	0	0	0	0	0	0	0	0	3	10	0.300
5	7	8	0X	12	13	11	10	13	9	9	92	9	10.2
6	12	16	X	14	15	14	17	16	14	17	135	9	15.0
7													
8													
TOTAL	22	29	0	29	34	28	33	32	28	30	265	10	26.5

Appendix (Data): Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 28, 2023 at 1435
 Date and Time Test Terminated: December 04, 2023 at 1623

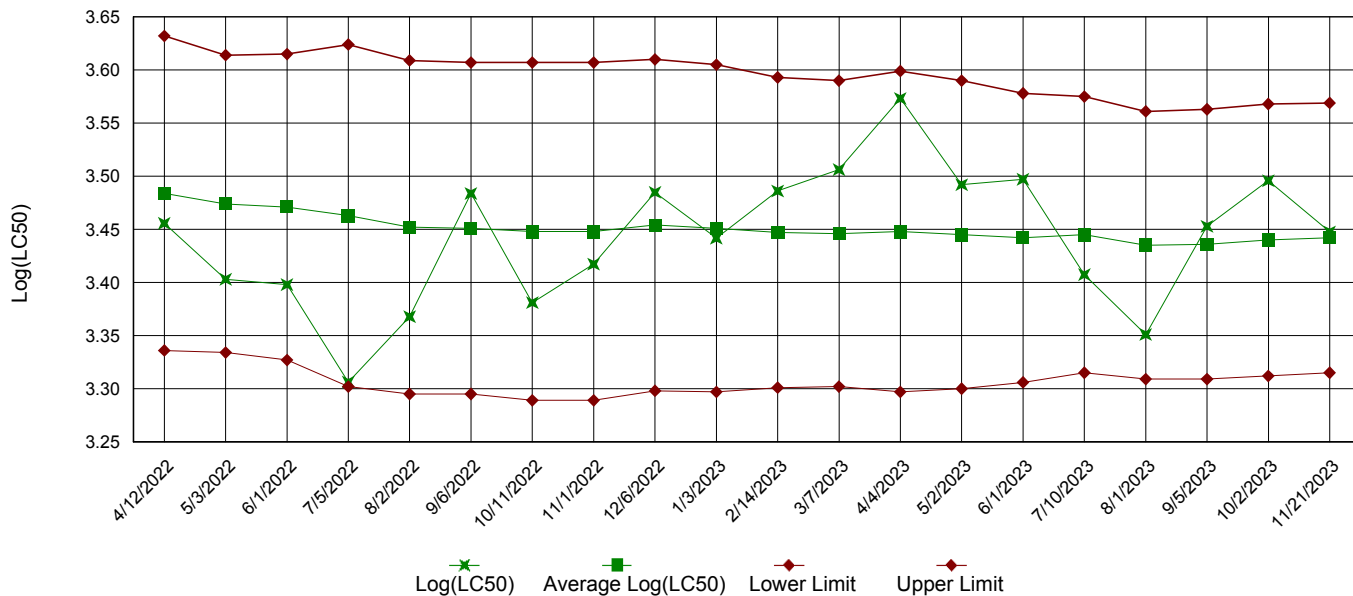
Concentration: 9 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	2	4	3	3	5	6	6	6	5	4	44	10	4.40	
4	2X	0	0	0	0	0	0	0	0	0	2	9	0.222	
5	X	4	10	10	10	12	14	14	8X	11	93	8	11.6	
6	X	13	14	15	15	17	16	15	X	19	124	8	15.5	
7														
8														
TOTAL	4	21	27	28	30	35	36	35	13	34	263	10	26.3	

Concentration: 12 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	3	0	3	4	3	6	4	3	4	30	10	3.00
4	6	0	6	0	0	0	0	0	0	0	12	10	1.20
5	13	8	0	10	9	11	9	14	11	11	96	10	9.60
6	15	15	13	14	17	13	15	19	14	17	152	10	15.2
7													
8													
TOTAL	34	26	19	27	30	27	30	37	28	32	290	10	29.0

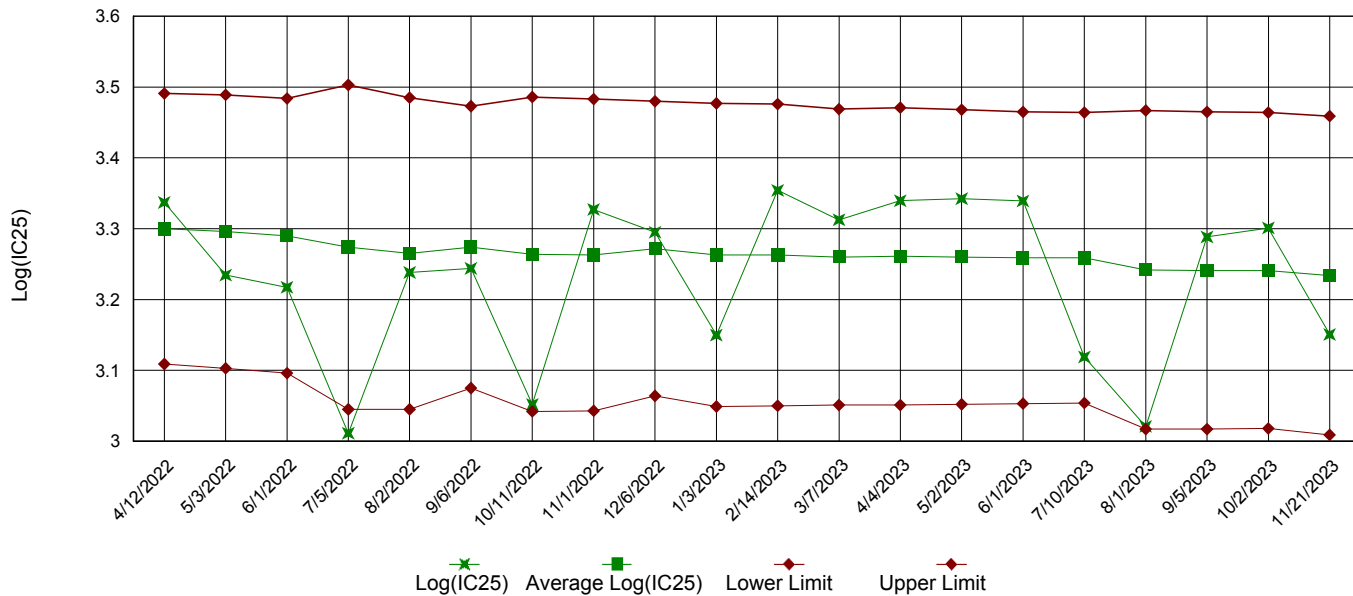
Concentration: 16 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0X	0	0	0	0	0	0	0	9	0.00
3	0	0	4	X	5	5	5	4	4	5	32	9	3.56
4	4	6	0	X	0	0	0	0	0	0	10	9	1.11
5	12	0	13	X	11	11	7	13	10	8	85	9	9.44
6	16	11	15	X	16	19	16	14	18	14	139	9	15.4
7													
8													
TOTAL	32	17	32	0	32	35	28	31	32	27	266	10	26.6

Appendix (Reference Toxicant): Test 1000.0
Chronic Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data

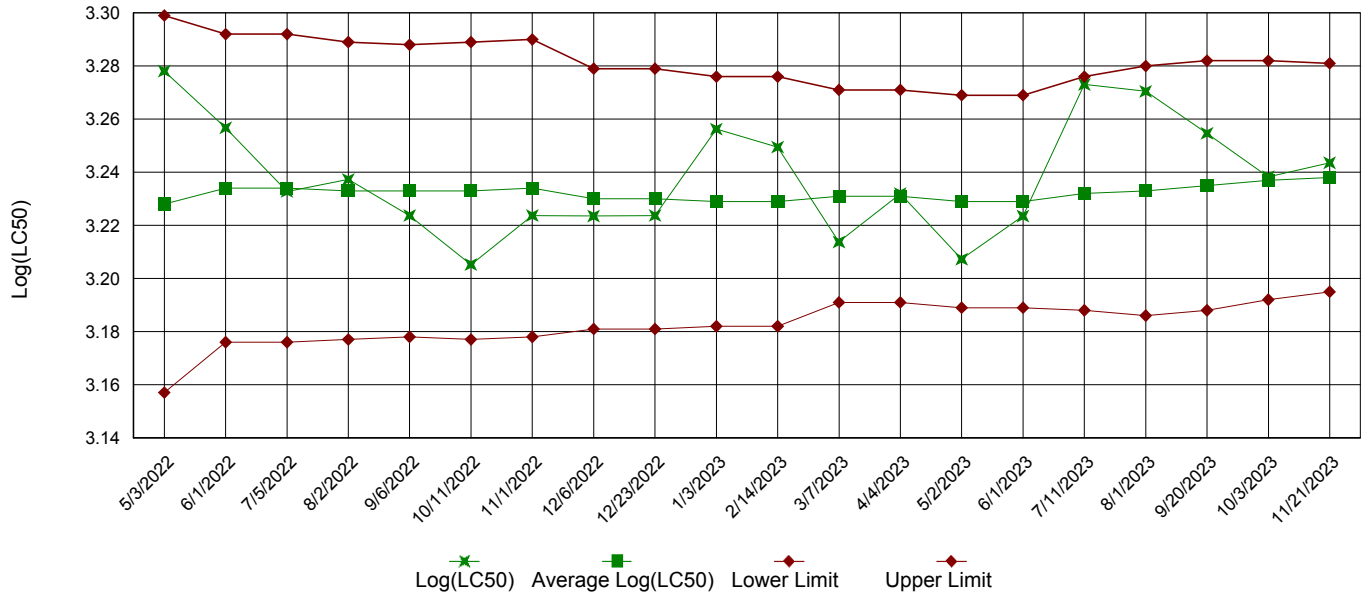


IC25 Growth Data

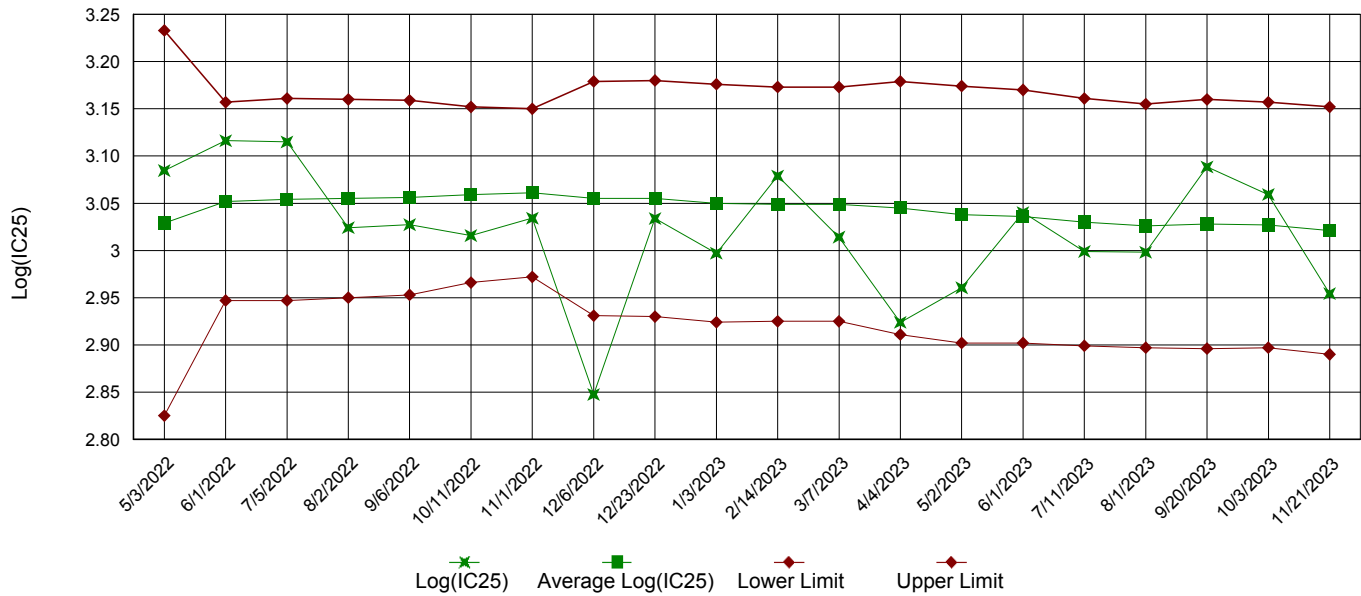


Appendix (Reference Toxicant): Test 1002.0
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix (Summary): Test 1000.0
 SUMMARY REPORTING FORMS
 CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
 SURVIVAL AND GROWTH

Permittee: Malvern Water Works

NPDES No.: AR0034126 AFIN 30-00040

Date and Time Test Initiated: November 28, 2023 at 1504

Date and Time Test Terminated: December 05, 2023 at 1325

Dilution water used:

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	87.5	100	75.0	87.5	87.5	100	95.0	87.5	10.1
5 %	87.5	100	87.5	87.5	87.5	100	97.5	90.0	6.21
7 %	87.5	75.0	87.5	87.5	87.5	97.5	87.5	85.0	6.58
9 %	87.5	87.5	87.5	100	100	100	97.5	92.5	7.40
12 %	100	87.5	87.5	100	87.5	100	95.0	92.5	7.40
16 %	87.5	100	100	100	87.5	97.5	95.0	95.0	7.21

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.542	0.560	0.305	0.592	0.559	0.512	22.8
5 %	0.495	0.600	0.500	0.560	0.575	0.546	8.53
7 %	0.491	0.432	0.691	0.658	0.531	0.561	19.7
9 %	0.589	0.549	0.695	0.558	0.641	0.606	10.1
12 %	0.599	0.671	0.622	0.484	0.578	0.591	11.7
16 %	0.632	0.632	0.566	0.619	0.691	0.628	7.09

CV = Coefficient of variation = standard deviation * 100 / mean

Appendix (Summary): Test 1000.0
 SUMMARY REPORTING FORMS
 CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
 SURVIVAL AND GROWTH

1. Dunnett's Test:

Is the mean survival significantly different ($p=0.05$) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	_____ YES	_____ X NO
b.) 1/2 LOW FLOW DILUTION	_____ YES	_____ NO

2. Dunnett's Test:

Is the mean dry weight (growth) significantly different ($p=0.05$) than the control's dry weight (growth) for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	_____ YES	_____ X NO
b.) 1/2 LOW FLOW DILUTION	_____ YES	_____ NO

- 3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP6C)
- 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP6C)
- 5. NOEC Pimephales Lethality: 16 % (TOP6C)
- 6. LOEC Pimephales Lethality: 16 % (TXP6C)
- 7. NOEC Pimephales Sublethality: 16 % (TPP6C)
- 8. LOEC Pimephales Sublethality: 16 % (TYP6C)
- 9. Coefficient of variation for Pimephales growth: 22.8 (TQP6C)
- 10. Sublethality for this test: 16 % (51714 or 51714S)

Appendix (Summary): Test 1000.0
CHRONIC TOXICITY SUMMARY FORM
Pimephales promelas (Fathead minnow)
CHEMICAL PARAMETERS CHART

PERMITTEE: Malvern Water Works
 NPDES NO.: AR0034126 AFIN 30-00040
 CONTACT: Mr. John Davis
 ANALYST: GCX6, V6YL, B6YF, QGL9, WK7B

Test Initiated: DATE: November 28, 2023 TIME: 1504
 Test Terminated: DATE: December 05, 2023 TIME: 1325

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.1	8.2	8.3	8.1	8.2	8.2
Final	6.4	5.2	5.7	6.2	6.6	5.6	6.1
pH Initial	7.3	7.5	7.5	7.6	7.7	7.7	7.7
Final	7.3	7.1	7.2	7.3	7.5	7.1	7.0

DILUTION 5 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.3	8.0	8.2	8.0	7.8	7.9
Final	6.0	5.5	5.5	5.5	6.7	5.7	6.3
pH Initial	7.4	7.5	7.5	7.6	7.6	7.6	7.6
Final	7.2	7.1	7.2	7.1	7.4	7.1	7.0

DILUTION 7 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.5	8.1	8.2	8.0	7.9	8.0
Final	6.0	5.5	5.6	5.8	6.6	5.8	6.3
pH Initial	7.4	7.5	7.5	7.6	7.6	7.6	7.6
Final	7.2	7.0	7.2	7.2	7.4	7.1	7.0

DILUTION 9 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	8.0	8.2	7.8	7.9	8.3
Final	5.9	5.3	5.9	6.0	6.4	5.7	6.0
pH Initial	7.5	7.5	7.4	7.5	7.6	7.6	7.6
Final	7.2	7.1	7.2	7.2	7.3	7.1	7.0

DILUTION 12 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	8.1	8.6	8.1	7.9	8.1	8.0
Final	5.9	5.2	5.7	5.8	6.5	5.5	6.4
pH Initial	7.4	7.4	7.6	7.5	7.6	7.6	7.6
Final	7.2	7.1	7.1	7.1	7.3	7.1	7.0

DILUTION 16 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.2	8.2	8.1	7.9	7.9	7.7
Final	6.0	5.4	5.5	5.5	6.5	5.4	6.1
pH Initial	7.4	7.5	7.5	7.5	7.5	7.6	7.6
Final	7.1	7.0	7.1	7.1	7.4	7.0	7.0

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
8.1	24	170	0.060	Biomonitoring #1 28-NOV-23
7.7	20	170	<0.05	Biomonitoring #2 29-NOV-23
9.0	28	160	<0.05	Biomonitoring #3 01-DEC-23

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
31	41	170	<0.05	192-6872-A-1
32	47	170	<0.05	192-7160-A-1

Appendix (Summary): Test 1002.0
 SUMMARY REPORTING FORMS
 CHRONIC BIOMONITORING
Ceriodaphnia dubia
 SURVIVAL AND REPRODUCTION

Permittee: Malvern Water Works

NPDES No.: AR0034126 AFIN 30-00040

Date and Time Test Initiated: November 28, 2023 at 1435

Date and Time Test Terminated: December 04, 2023 at 1623

Dilution water used:

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		5 %	7 %	9 %	12 %	16 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	90.0
6 day	80.0	100	90.0	80.0	100	90.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

Replicates	Control	Percent Effluent				
		5 %	7 %	9 %	12 %	16 %
A	33	30	22	4	34	32
B	21	18	29	21	26	17
C	26	26	0	27	19	32
D	28	30	29	28	27	0
E	30	30	34	30	30	32
F	12	28	28	35	27	35
G	31	32	33	36	30	28
H	35	41	32	35	37	31
I	5	32	28	13	28	32
J	31	35	30	34	32	27
Mean per Adult	25.2	30.2	26.5	26.3	29.0	26.6
Mean per Surviving Adult	29.4	30.2	29.4	30.8	29.0	29.6
CV %	14.9	19.7	12.0	17.0	17.0	17.8

CV = Coefficient of variation = standard deviation * 100 / mean
 (calculated based on young produced by surviving females)

Appendix (Summary): Test 1002.0
 SUMMARY REPORTING FORMS
 CHRONIC BIOMONITORING
Ceriodaphnia dubia
 SURVIVAL AND REPRODUCTION

1. Fisher's Exact Test:

Is the mean survival significantly different ($p=0.05$) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	<u> </u> YES	<u> </u> NO

2. Steel's Many-One Rank Test:

Is the mean number of young produced per female significantly different ($p=0.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	<u> </u> YES	<u> </u> NO

- 3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP3B)
- 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP3B)
- 5. NOEC Ceriodaphnia Lethality: 16 % (TOP3B)
- 6. LOEC Ceriodaphnia Lethality: 16 % (TXP3B)
- 7. NOEC Ceriodaphnia Sublethality: 16 % (TPP3B)
- 8. LOEC Ceriodaphnia Sublethality: 16 % (TYP3B)
- 9. Coefficient of variation for Ceriodaphnia Reproduction: 17 (TQP3B)
- 10. Sublethality for this test: 16 % (51710 or 51710Q)

Appendix (Summary): Test 1002.0
 CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
 CHEMICAL PARAMETERS CHART

PERMITTEE: Malvern Water Works
 NPDES NO.: AR0034126 AFIN 30-00040
 CONTACT: Mr. John Davis
 ANALYST: GCX6, V6YL, B6YF, QGL9, WK7B

Test Initiated: DATE: November 28, 2023 TIME: 1435
 Test Terminated: DATE: December 04, 2023 TIME: 1623

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.1	8.2	8.3	8.1	8.2	8.2
Final	8.2	7.3	8.0	7.9	7.8	7.5	--
pH Initial	7.3	7.5	7.5	7.6	7.7	7.7	7.7
Final	7.8	7.8	7.8	7.8	8.0	7.7	--

DILUTION 5 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.3	8.0	8.2	8.0	7.8	7.9
Final	8.3	7.7	7.8	7.8	8.0	7.3	--
pH Initial	7.4	7.5	7.5	7.6	7.6	7.6	7.6
Final	7.8	7.7	7.8	7.8	7.9	7.7	--

DILUTION 7 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.5	8.1	8.2	8.0	7.9	8.0
Final	7.9	7.6	7.5	7.6	8.1	7.5	--
pH Initial	7.4	7.5	7.5	7.6	7.6	7.6	7.6
Final	7.8	7.7	7.8	7.8	7.9	7.7	--

DILUTION 9 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	8.0	8.2	7.8	7.9	8.3
Final	8.5	7.7	7.6	7.7	8.1	7.4	--
pH Initial	7.5	7.5	7.4	7.5	7.6	7.6	7.6
Final	7.8	7.7	7.8	7.8	7.9	7.7	--

DILUTION 12 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	8.1	8.6	8.1	7.9	8.1	8.0
Final	8.2	7.6	7.6	7.8	8.2	7.6	--
pH Initial	7.4	7.4	7.6	7.5	7.6	7.6	7.6
Final	7.7	7.6	7.7	7.8	7.9	7.7	--

DILUTION 16 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	8.2	8.2	8.1	7.9	7.9	7.7
Final	8.2	7.6	7.8	7.7	8.0	7.8	--
pH Initial	7.4	7.5	7.5	7.5	7.5	7.6	7.6
Final	7.6	7.7	7.8	7.8	7.9	7.7	--

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
8.1	24	170	0.060	Biomonitoring #1 28-NOV-23
7.7	20	170	<0.05	Biomonitoring #2 29-NOV-23
9.0	28	160	<0.05	Biomonitoring #3 01-DEC-23

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
31	41	170	<0.05	192-6872-A-1
32	47	170	<0.05	192-7160-A-1

CETIS Summary Report

Report Date: 18 Dec-23 09:29 (p 1 of 1)
 Test Code/ID: 274759_FH / 07-0183-4229

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Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	PMSD	TU
00-9669-2710	7d Survival Rate	Dunnett Multiple Comparison Test	16	>16	---	12.3%	6.2
13-0909-6015	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test	16	>16	---	23.4%	6.2

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	%	95% LCL	95% UCL	TU
03-4439-1808	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	IC25	>16	---	---	<6.2

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
00-9669-2710	7d Survival Rate	Control Resp	0.875	0.8	>>	Yes	Passes Criteria
03-4439-1808	Mean Dry Biomass-mg	Control Resp	0.5118	0.25	>>	Yes	Passes Criteria
13-0909-6015	Mean Dry Biomass-mg	Control Resp	0.5118	0.25	>>	Yes	Passes Criteria
13-0909-6015	Mean Dry Biomass-mg	PMSD	0.2339	0.12	0.3	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.8750	0.7653	0.9847	0.7500	1.0000	0.0395	0.0884	10.10%	0.00%
5		5	0.9000	0.8306	0.9694	0.8750	1.0000	0.0250	0.0559	6.21%	-2.86%
7		5	0.8500	0.7806	0.9194	0.7500	0.8750	0.0250	0.0559	6.58%	2.86%
9		5	0.9250	0.8400	1.0100	0.8750	1.0000	0.0306	0.0685	7.40%	-5.71%
12		5	0.9250	0.8400	1.0100	0.8750	1.0000	0.0306	0.0685	7.40%	-5.71%
16		5	0.9500	0.8650	1.0350	0.8750	1.0000	0.0306	0.0685	7.21%	-8.57%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	5	0.5118	0.3665	0.657	0.305	0.5925	0.05232	0.117	22.86%	0.00%
5		5	0.546	0.4882	0.6038	0.495	0.6	0.02082	0.04655	8.53%	-6.69%
7		5	0.5607	0.424	0.6975	0.4325	0.6912	0.04926	0.1102	19.64%	-9.57%
9		5	0.6062	0.53	0.6825	0.5487	0.695	0.02747	0.06142	10.13%	-18.47%
12		5	0.5908	0.5048	0.6767	0.4837	0.6712	0.03097	0.06924	11.72%	-15.44%
16		5	0.6282	0.5729	0.6836	0.5663	0.6912	0.01992	0.04455	7.09%	-22.76%

7d Survival Rate Detail

MD5: 951A3592084B0337A494D84EFDA5B54B

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.8750	1.0000	0.7500	0.8750	0.8750
5		0.8750	1.0000	0.8750	0.8750	0.8750
7		0.8750	0.7500	0.8750	0.8750	0.8750
9		0.8750	0.8750	0.8750	1.0000	1.0000
12		1.0000	0.8750	0.8750	1.0000	0.8750
16		0.8750	1.0000	1.0000	1.0000	0.8750

Mean Dry Biomass-mg Detail

MD5: 3DFD47D765BACB8445F03E81AB69ADA4

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.5425	0.56	0.305	0.5925	0.5588
5		0.495	0.6	0.5	0.56	0.575
7		0.4912	0.4325	0.6912	0.6575	0.5312
9		0.5888	0.5487	0.695	0.5575	0.6413
12		0.5987	0.6712	0.6225	0.4837	0.5775
16		0.6325	0.6325	0.5663	0.6187	0.6912

CETIS Analytical Report

Report Date: 18 Dec-23 09:29 (p 1 of 4)
 Test Code/ID: 274759_FH / 07-0183-4229

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Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Analysis ID: 00-9669-2710 Endpoint: 7d Survival Rate CETIS Version: CETIS v2.1.5
 Analyzed: 18 Dec-23 9:29 Analysis: Parametric-Control vs Treatments Status Level: 1
 Edit Date: 18 Dec-23 0:00 MD5 Hash: 951A3592084B0337A494D84EFDA5B54B Editor ID: 004-572-886-9

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Angular (Corrected)	C > T	16	>16	---	6.2	0.1075	12.28%

Dunnnett Multiple Comparison Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		5	8	-0.5247	2.362	0.146	CDF	0.9434	Non-Significant Effect
		7	8	0.594	2.362	0.146	CDF	0.6052	Non-Significant Effect
		9	8	-1.119	2.362	0.146	CDF	0.9881	Non-Significant Effect
		12	8	-1.119	2.362	0.146	CDF	0.9881	Non-Significant Effect
		16	8	-1.713	2.362	0.146	CDF	0.9981	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.875	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.067957	0.0135914	5	1.422	0.2523	Non-Significant Effect
Error	0.229423	0.0095593	24			
Total	0.29738		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	1.184	15.09	0.9464	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9654	0.9031	0.4220	Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.8750	0.7653	0.9847	0.8750	0.7500	1.0000	0.0395	10.10%	0.00%
5		5	0.9000	0.8306	0.9694	0.8750	0.8750	1.0000	0.0250	6.21%	-2.86%
7		5	0.8500	0.7806	0.9194	0.8750	0.7500	0.8750	0.0250	6.58%	2.86%
9		5	0.9250	0.8400	1.0000	0.8750	0.8750	1.0000	0.0306	7.40%	-5.71%
12		5	0.9250	0.8400	1.0000	0.8750	0.8750	1.0000	0.0306	7.40%	-5.71%
16		5	0.9500	0.8650	1.0000	1.0000	0.8750	1.0000	0.0306	7.21%	-8.57%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.2140	1.0620	1.3660	1.2090	1.0470	1.3930	0.0548	10.09%	0.00%
5		5	1.2460	1.1440	1.3480	1.2090	1.2090	1.3930	0.0367	6.59%	-2.67%
7		5	1.1770	1.0870	1.2670	1.2090	1.0470	1.2090	0.0325	6.16%	3.03%
9		5	1.2830	1.1580	1.4080	1.2090	1.2090	1.3930	0.0450	7.84%	-5.70%
12		5	1.2830	1.1580	1.4080	1.2090	1.2090	1.3930	0.0450	7.84%	-5.70%
16		5	1.3200	1.1950	1.4450	1.3930	1.2090	1.3930	0.0450	7.62%	-8.73%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.8750	1.0000	0.7500	0.8750	0.8750
5		0.8750	1.0000	0.8750	0.8750	0.8750
7		0.8750	0.7500	0.8750	0.8750	0.8750
9		0.8750	0.8750	0.8750	1.0000	1.0000
12		1.0000	0.8750	0.8750	1.0000	0.8750
16		0.8750	1.0000	1.0000	1.0000	0.8750

Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Analysis ID: 00-9669-2710	Endpoint: 7d Survival Rate	CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:29	Analysis: Parametric-Control vs Treatments	Status Level: 1
Edit Date: 18 Dec-23 0:00	MD5 Hash: 951A3592084B0337A494D84EFDA5B54B	Editor ID: 004-572-886-9

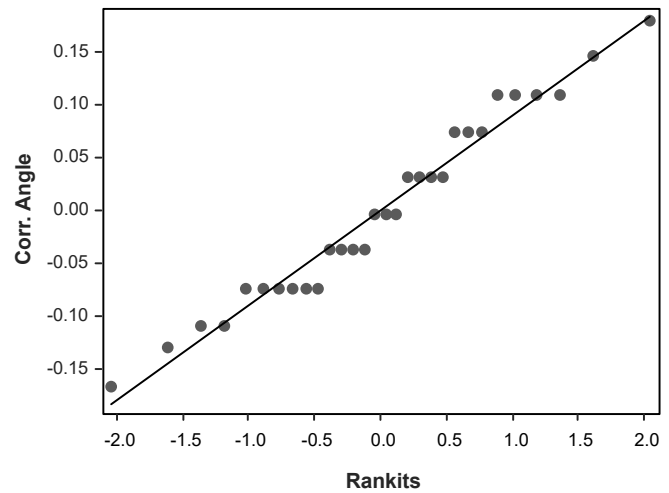
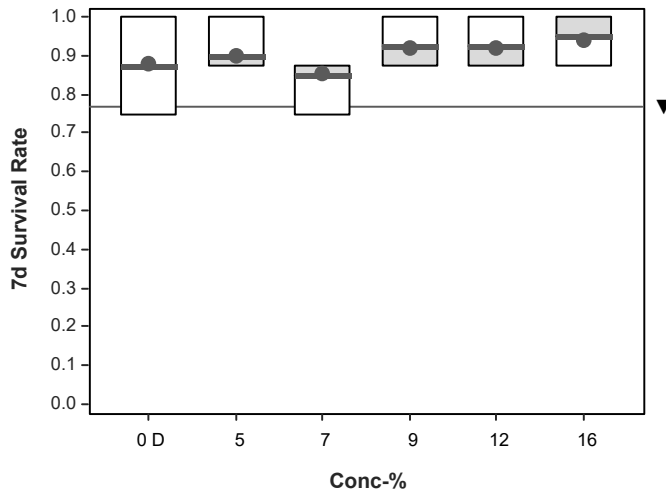
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.2090	1.3930	1.0470	1.2090	1.2090
5		1.2090	1.3930	1.2090	1.2090	1.2090
7		1.2090	1.0470	1.2090	1.2090	1.2090
9		1.2090	1.2090	1.2090	1.3930	1.3930
12		1.3930	1.2090	1.2090	1.3930	1.2090
16		1.2090	1.3930	1.3930	1.3930	1.2090

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	7/8	8/8	6/8	7/8	7/8
5		7/8	8/8	7/8	7/8	7/8
7		7/8	6/8	7/8	7/8	7/8
9		7/8	7/8	7/8	8/8	8/8
12		8/8	7/8	7/8	8/8	7/8
16		7/8	8/8	8/8	8/8	7/8

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Analysis ID: 13-0909-6015	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:29	Analysis: Parametric-Control vs Treatments	Status Level: 1
Edit Date: 18 Dec-23 0:00	MD5 Hash: 3DFD47D765BACB8445F03E81AB69ADA4	Editor ID: 004-572-886-9

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Untransformed	C > T	16	>16	---	6.2	0.1197	23.39%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Dilution Water		5	8	-0.6757	2.362	0.1197	CDF	0.9607	Non-Significant Effect
		7	8	-0.9667	2.362	0.1197	CDF	0.9817	Non-Significant Effect
		9	8	-1.864	2.362	0.1197	CDF	0.9989	Non-Significant Effect
		12	8	-1.559	2.362	0.1197	CDF	0.9969	Non-Significant Effect
		16	8	-2.298	2.362	0.1197	CDF	0.9997	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.5118	0.25	>>	Yes	Passes Criteria
PMSD	0.2339	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0454905	0.0090981	5	1.416	0.2541	Non-Significant Effect
Error	0.154163	0.0064235	24			
Total	0.199653		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	6.172	15.09	0.2898	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9674	0.9031	0.4709	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.5118	0.3665	0.657	0.5588	0.305	0.5925	0.05232	22.86%	0.00%
5		5	0.546	0.4882	0.6038	0.56	0.495	0.6	0.02082	8.53%	-6.69%
7		5	0.5607	0.424	0.6975	0.5312	0.4325	0.6912	0.04926	19.64%	-9.57%
9		5	0.6062	0.53	0.6825	0.5888	0.5487	0.695	0.02747	10.13%	-18.47%
12		5	0.5908	0.5048	0.6767	0.5987	0.4837	0.6712	0.03097	11.72%	-15.44%
16		5	0.6282	0.5729	0.6836	0.6325	0.5663	0.6912	0.01992	7.09%	-22.76%

Mean Dry Biomass-mg Detail

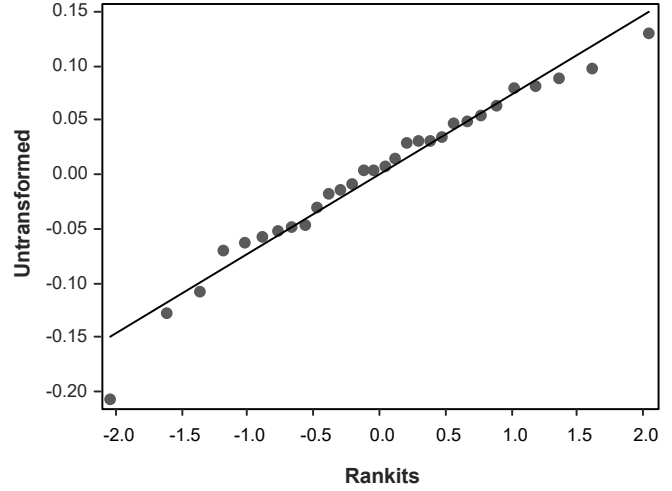
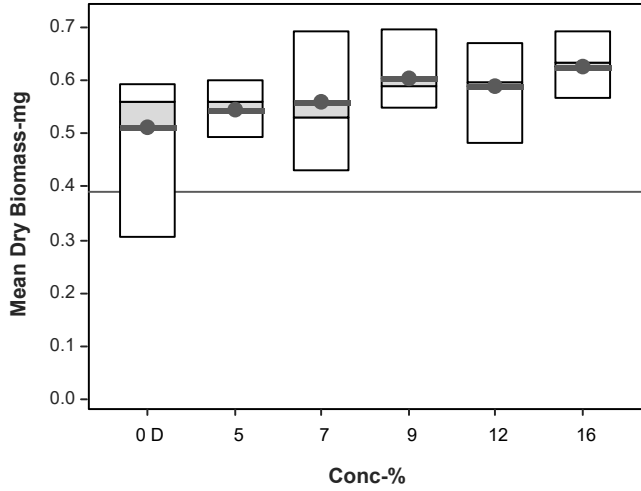
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.5425	0.56	0.305	0.5925	0.5588
5		0.495	0.6	0.5	0.56	0.575
7		0.4912	0.4325	0.6912	0.6575	0.5312
9		0.5888	0.5487	0.695	0.5575	0.6413
12		0.5987	0.6712	0.6225	0.4837	0.5775
16		0.6325	0.6325	0.5663	0.6187	0.6912

Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Analysis ID: 13-0909-6015 Endpoint: Mean Dry Biomass-mg CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:29 Analysis: Parametric-Control vs Treatments Status Level: 1
Edit Date: 18 Dec-23 0:00 MD5 Hash: 3DFD47D765BACB8445F03E81AB69ADA4 Editor ID: 004-572-886-9

Graphics



Fathead Minnow 7-d Larval Survival and Growth Test

Eurofins Arkansas

Analysis ID: 03-4439-1808	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:29	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Edit Date: 18 Dec-23 0:00	MD5 Hash: 3DFD47D765BACB8445F03E81AB69ADA4	Editor ID: 004-572-886-9

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	630849	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.5118	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
IC25	>16	---	---	<6.2	---	---

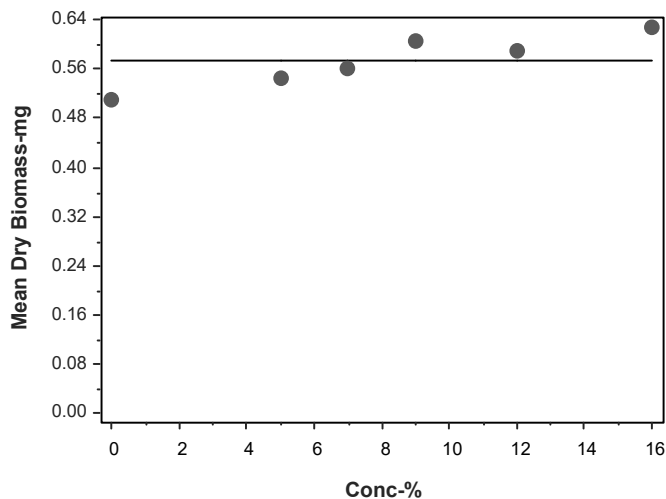
Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Calculated Variate						Isotonic Variate	
			Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	5	0.5118	0.5588	0.305	0.5925	22.86%	0.00%	0.574	0.00%
5		5	0.546	0.56	0.495	0.6	8.53%	-6.69%	0.574	0.00%
7		5	0.5607	0.5312	0.4325	0.6912	19.64%	-9.57%	0.574	0.00%
9		5	0.6062	0.5888	0.5487	0.695	10.13%	-18.47%	0.574	0.00%
12		5	0.5908	0.5987	0.4837	0.6712	11.72%	-15.44%	0.574	0.00%
16		5	0.6282	0.6325	0.5663	0.6912	7.09%	-22.76%	0.574	0.00%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.5425	0.56	0.305	0.5925	0.5588
5		0.495	0.6	0.5	0.56	0.575
7		0.4912	0.4325	0.6912	0.6575	0.5312
9		0.5888	0.5487	0.695	0.5575	0.6413
12		0.5987	0.6712	0.6225	0.4837	0.5775
16		0.6325	0.6325	0.5663	0.6187	0.6912

Graphics



CETIS Summary Report

Report Date: 18 Dec-23 09:15 (p 1 of 1)
 Test Code/ID: 274759_CD / 06-5960-1940

1
2
3

Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	PMSD	TU
02-1253-7967	6d Survival Rate	Fisher Exact/Bonferroni-Holm Test	16	>16	---	---	6.2
13-6301-0724	Reproduction	Steel Many-One Rank Sum Test	16	>16	---	36.3%	6.2

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	%	95% LCL	95% UCL	TU
07-6199-3773	Reproduction	Linear Interpolation (ICPIN)	IC25	>16	---	---	<6.2

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits			Overlap	Decision
				Lower	Upper			
07-6199-3773	Reproduction	Control Resp	25.2	15	>>	Yes	Passes Criteria	
13-6301-0724	Reproduction	Control Resp	25.2	15	>>	Yes	Passes Criteria	
13-6301-0724	Reproduction	PMSD	0.3627	0.13	0.47	Yes	Passes Criteria	

6d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	10	0.8000	0.4984	1.1020	0.0000	1.0000	0.1333	0.4216	52.70%	0.00%
5		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-25.00%
7		10	0.9000	0.6738	1.1260	0.0000	1.0000	0.1000	0.3162	35.14%	-12.50%
9		10	0.8000	0.4984	1.1020	0.0000	1.0000	0.1333	0.4216	52.70%	0.00%
12		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-25.00%
16		10	0.9000	0.6738	1.1260	0.0000	1.0000	0.1000	0.3162	35.14%	-12.50%

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	10	25.2	18.23	32.17	5	35	3.083	9.75	38.69%	0.00%
5		10	30.2	25.95	34.45	18	41	1.879	5.94	19.67%	-19.84%
7		10	26.5	19.42	33.58	0	34	3.128	9.891	37.32%	-5.16%
9		10	26.3	18.67	33.93	4	36	3.373	10.67	40.56%	-4.37%
12		10	29	25.48	32.52	19	37	1.556	4.922	16.97%	-15.08%
16		10	26.6	19.03	34.17	0	35	3.347	10.59	39.79%	-5.56%

6d Survival Rate Detail

MD5: 5181EA345324749C4C70EE5FD4B8A31A

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	0.0000	1.0000
5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
12		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16		1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Reproduction Detail

MD5: 1BD4C7ABF8CB4B9C684D4044D71A2C2D

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	33	21	26	28	30	12	31	35	5	31
5		30	18	26	30	30	28	32	41	32	35
7		22	29	0	29	34	28	33	32	28	30
9		4	21	27	28	30	35	36	35	13	34
12		34	26	19	27	30	27	30	37	28	32
16		32	17	32	0	32	35	28	31	32	27

Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Analysis ID: 02-1253-7967 Endpoint: 6d Survival Rate CETIS Version: CETIS v2.1.5
 Analyzed: 18 Dec-23 9:14 Analysis: STP 2xK Contingency Tables Status Level: 1
 Edit Date: 18 Dec-23 0:00 MD5 Hash: 5181EA345324749C4C70EE5FD4B8A31A Editor ID: 004-572-886-9

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units
Untransformed	C > T	16	>16	---	6.2

Fisher Exact/Bonferroni-Holm Test

Control	vs	Conc-%	Test Stat	P-Type	P-Value	Decision(α:5%)
Dilution Water		5	1.0000	Exact	1.0000	Non-Significant Effect
		7	0.8947	Exact	1.0000	Non-Significant Effect
		9	0.7090	Exact	1.0000	Non-Significant Effect
		12	1.0000	Exact	1.0000	Non-Significant Effect
		16	0.8947	Exact	1.0000	Non-Significant Effect

6d Survival Rate Frequencies

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	8	2	10	0.8000	0.2000	0.00%
5		10	0	10	1.0000	0.0000	-25.00%
7		9	1	10	0.9000	0.1000	-12.50%
9		8	2	10	0.8000	0.2000	0.00%
12		10	0	10	1.0000	0.0000	-25.00%
16		9	1	10	0.9000	0.1000	-12.50%

6d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	0.8000	0.4984	1.0000	1.0000	0.0000	1.0000	0.1333	52.70%	0.00%
5		10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-25.00%
7		10	0.9000	0.6738	1.0000	1.0000	0.0000	1.0000	0.1000	35.14%	-12.50%
9		10	0.8000	0.4984	1.0000	1.0000	0.0000	1.0000	0.1333	52.70%	0.00%
12		10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-25.00%
16		10	0.9000	0.6738	1.0000	1.0000	0.0000	1.0000	0.1000	35.14%	-12.50%

6d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	0.0000	1.0000
5		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7		1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
12		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16		1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

6d Survival Rate Binomials

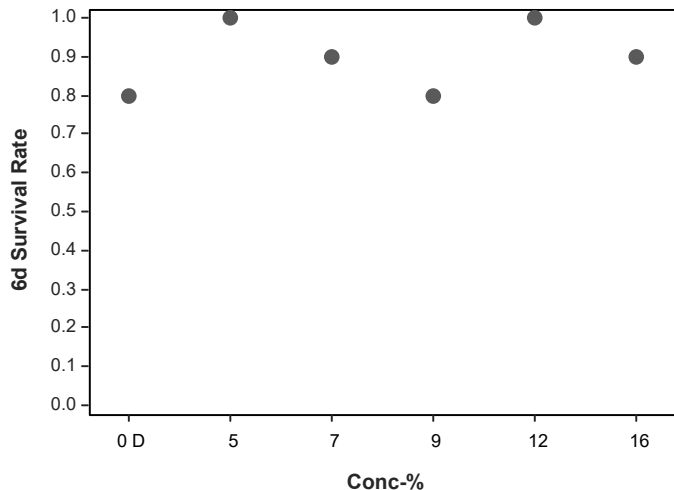
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	0/1	1/1
5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
7		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
9		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
16		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1

Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Analysis ID: 02-1253-7967 Endpoint: 6d Survival Rate CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:14 Analysis: STP 2xK Contingency Tables Status Level: 1
Edit Date: 18 Dec-23 0:00 MD5 Hash: 5181EA345324749C4C70EE5FD4B8A31A Editor ID: 004-572-886-9

Graphics



Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Analysis ID: 13-6301-0724	Endpoint: Reproduction	CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:14	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 18 Dec-23 0:00	MD5 Hash: 1BD4C7ABF8CB4B9C684D4044D71A2C2	Editor ID: 004-572-886-9

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	Tox Units	MSDu	PMSD
Untransformed	C > T	16	>16	---	6.2	9.14	36.27%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Dilution Water		5	18	117	75	4	CDF	0.9803	Non-Significant Effect
		7	18	108	75	3	CDF	0.8923	Non-Significant Effect
		9	18	111.5	75	4	CDF	0.9403	Non-Significant Effect
		12	18	111	75	3	CDF	0.9347	Non-Significant Effect
		16	18	114	75	3	CDF	0.9629	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	25.2	15	>>	Yes	Passes Criteria
PMSD	0.3627	0.13	0.47	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	178.4	35.68	5	0.4476	0.8131	Non-Significant Effect
Error	4304.2	79.7074	54			
Total	4482.6		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	8.008	15.09	0.1558	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8411	0.9459	<1.0E-05	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	25.2	18.23	32.17	29	5	35	3.083	38.69%	0.00%
5		10	30.2	25.95	34.45	30	18	41	1.879	19.67%	-19.84%
7		10	26.5	19.42	33.58	29	0	34	3.128	37.32%	-5.16%
9		10	26.3	18.67	33.93	29	4	36	3.373	40.56%	-4.37%
12		10	29	25.48	32.52	29	19	37	1.556	16.97%	-15.08%
16		10	26.6	19.03	34.17	31.5	0	35	3.347	39.79%	-5.56%

Reproduction Detail

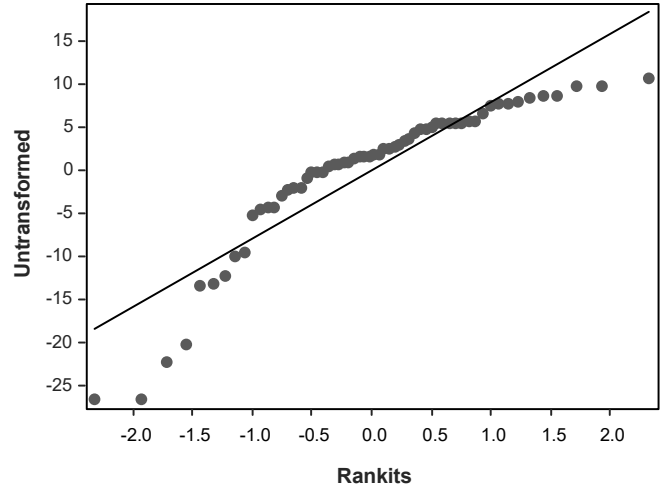
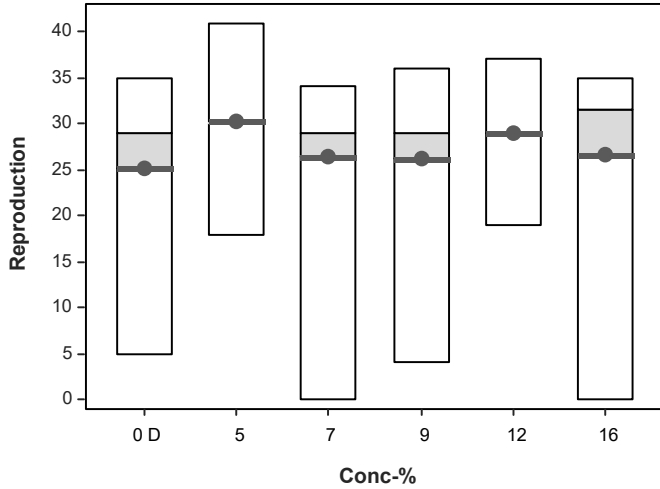
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	33	21	26	28	30	12	31	35	5	31
5		30	18	26	30	30	28	32	41	32	35
7		22	29	0	29	34	28	33	32	28	30
9		4	21	27	28	30	35	36	35	13	34
12		34	26	19	27	30	27	30	37	28	32
16		32	17	32	0	32	35	28	31	32	27

Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Analysis ID: 13-6301-0724 Endpoint: Reproduction CETIS Version: CETIS v2.1.5
Analyzed: 18 Dec-23 9:14 Analysis: Nonparametric-Control vs Treatments Status Level: 1
Edit Date: 18 Dec-23 0:00 MD5 Hash: 1BD4C7ABF8CB4B9C684D4044D71A2C2 Editor ID: 004-572-886-9

Graphics



CETIS Analytical Report

Report Date: 18 Dec-23 09:15 (p 1 of 1)
 Test Code/ID: 274759_CD / 06-5960-1940

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Ceriodaphnia 7-d Survival and Reproduction Test

Eurofins Arkansas

Analysis ID: 07-6199-3773 Endpoint: Reproduction CETIS Version: CETIS v2.1.5
 Analyzed: 18 Dec-23 9:14 Analysis: Linear Interpolation (ICPIN) Status Level: 1
 Edit Date: 18 Dec-23 0:00 MD5 Hash: 1BD4C7ABF8CB4B9C684D4044D71A2C2 Editor ID: 004-572-886-9

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	315946	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	25.2	15	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	Tox Units	95% LCL	95% UCL
IC25	>16	---	---	<6.2	---	---

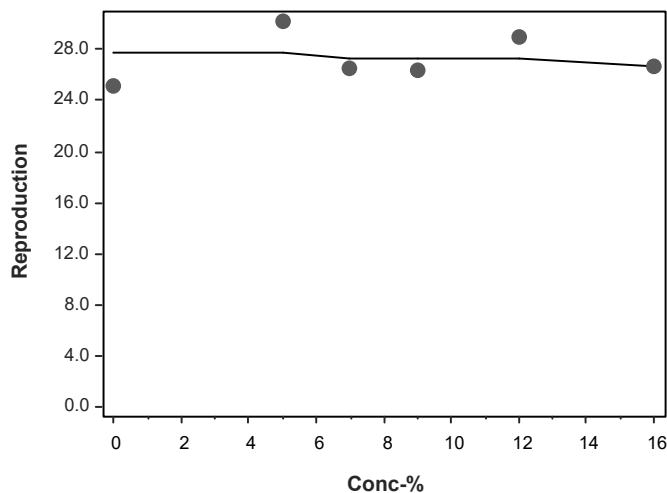
Reproduction Summary

Conc-%	Code	Count	Calculated Variate						Isotonic Variate	
			Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	10	25.2	29	5	35	38.69%	0.00%	27.7	0.00%
5		10	30.2	30	18	41	19.67%	-19.84%	27.7	0.00%
7		10	26.5	29	0	34	37.32%	-5.16%	27.27	1.56%
9		10	26.3	29	4	36	40.56%	-4.37%	27.27	1.56%
12		10	29	29	19	37	16.97%	-15.08%	27.27	1.56%
16		10	26.6	31.5	0	35	39.79%	-5.56%	26.6	3.97%

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	33	21	26	28	30	12	31	35	5	31
5		30	18	26	30	30	28	32	41	32	35
7		22	29	0	29	34	28	33	32	28	30
9		4	21	27	28	30	35	36	35	13	34
12		34	26	19	27	30	27	30	37	28	32
16		32	17	32	0	32	35	28	31	32	27

Graphics





Client Information
 Client Contact: Devan Bayga
 Phone: 501-224-5060
 Lab PM: Devan Bayga
 Carrier Tracking No(s): 192-7200 COC
 E-Mail: devan@eurofins.com
 State of Origin: AR
 Page: 1

Company: MWWM Waste Water
 Address: 192-7200 COC
 City: Little Rock
 State Zip: 72204
 Phone: 501-224-5060
 Email: devan@eurofins.com
 Project #: 192-7200 COC
 Site: 192-7200 COC

Analysis Requested
 Due Date Requested: 11-28-23
 TAT Requested (days): 3
 Compliance Project: Yes No
 PO #: 192-7200 COC
 WO #: 192-7200 COC
 Project #: 192-7200 COC
 SSOW#: 192-7200 COC

Sample Identification
 Sample Date: 11-27-23
 Sample Time: 8:25 AM
 Sample Type (C=comp, G=grab): C
 Matrix (W=water, S=solid, O=wastefoil, AT=tissue, A=air): C
 Preservation Code: C
 Field Filtered Sample (Yes or No):
 Perform MS/MSD (Yes or No):
 Total Number of Containers: 1
 Special Instructions/Note: Biomonitoring #1
LIMS: 274759
TALS: 105

Preservation Codes:
 A - HCL
 B - NaOH
 C - Zn Acetate
 D - Nitric Acid
 E - NaHSO4
 F - MeOH
 G - Amchlor
 H - Ascorbic Acid
 I - Ice
 J - DI Water
 K - EDTA
 L - EDA
 Other: None
 M - Hexane
 N - None
 O - AsNaO2
 P - Na2O4S
 Q - Na2SO3
 R - Na2SO4
 S - H2SO4
 T - TSP Dodecahydrate
 U - Acetone
 V - MCAA
 W - pH 4-5
 Y - Trizma
 Z - other (specify)

Possible Hazard Identification
 Non-Hazard Flammable Skin Irritant Poison B Unknown Radiological
 Deliverable Requested I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For 1 Months

Special Instructions/QC Requirements

Relinquished by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Received by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Relinquished by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Received by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Custody Seals Intact: Yes
 Custody Seal No: 1

Method of Shipment: 11-28-23 11:05 AM
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Relinquished by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

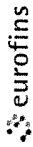
Received by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Relinquished by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Received by: Devan Bayga
 Date/Time: 11-28-23 11:05 AM
 Company: Devan Bayga

Cooler Temperature(s) °C and Other Remarks: 1

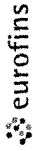
Chain of Custody Record



environmental Testing

Client Information		Sample: <u>Devon Bay</u>		Carrier Tracking No(s)	COC No:
Client Contact:		Phone: <u>Devon Bay</u>		State of Origin	Page:
Company: <u>Malvern Waste Water</u>		PWSID		Job #:	
Address:		Due Date Requested		Analysis Requested	
City:		TAT Requested (days):		Preservation Codes	
State/Zip		Compliance Project <input type="checkbox"/> Yes <input type="checkbox"/> No		M - Hexane N - None O - AsNaO2 P - Na2OAS Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Y - Trizma Z - other (specify)	
Phone		PO #		Total Number of containers	
Email:		WO #		Special Instructions/Note:	
Project Name		Project #:		<input type="checkbox"/> Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/> N <input type="checkbox"/> Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> N <input type="checkbox"/> Biomonitoring <u>Y</u>	
Site:		SSOW#:			
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (None, Urine, Blood, Other)
<u>MMW Biomonitoring #2</u>		<u>11-28-23</u>	<u>11:24:38 AM</u>	<u>C</u>	<u>Other</u>
Possible Hazard Identification		Sample Date		Special Instructions/Note:	
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological		Sample Time		<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	
Deliverable Requested I II III IV, Other (specify)		Sample Date		Special Instructions/QC Requirements	
Empty Kit Relinquished by		Date		Method of Shipment:	
Relinquished by <u>Devon Bay</u>		Date <u>11-29-23 11:13 AM</u>		Date/Time	
Relinquished by		Date/Time		Date/Time	
Relinquished by		Date/Time		Date/Time	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No		Cooler Temperature(s) °C and Other Remarks	
				12	

Chain of Custody Record



Client Information		Sampler: <u>Devon Bough</u>		Lab PM:		Carrier Tracking No(s):		COC No.	
Client Contact:		Phone		E-Mail		State of Origin		Page	
Company: <u>Malvern Waste Water</u>		PWSID		Analysis Requested		Job #:		Preservation Codes:	
Address:		Due Date Requested		Field Filtered Sample (Yes or No)		Total Number of Containers		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Y - Trizma Z - other (specify)	
City:		TAT Requested (days)		Perform MS/MSD (Yes or No)		Special Instructions/Note:		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
State Zip		Compliance Project: <input type="checkbox"/> Yes <input type="checkbox"/> No		Matrix (Viewwater, S-solids, On-water, A-air)		Special Instructions/Note:		LIMS: 274759 TALS: 7200	
Phone		PO #:		Sample Type (C=comp, G=grab)		Special Instructions/Note:			
Email		WO #:		Sample Time		Special Instructions/Note:			
Project Name		Project #:		Sample Date		Special Instructions/Note:			
Site		SSOW#:		Sample Date		Special Instructions/Note:			
Sample Identification		Sample Date		Sample Time		Special Instructions/Note:			
<u>Malvern Waste Water Biomonitoring #3</u>		<u>11-30-23-12-1-23</u>		<u>8:00am-7:00pm with Time C</u>		Special Instructions/Note:			
Possible Hazard Identification		Poison B <input type="checkbox"/>		Unknown <input type="checkbox"/>		Radiological <input type="checkbox"/>		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	
Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/>		Poison B <input type="checkbox"/>		Unknown <input type="checkbox"/>		Radiological <input type="checkbox"/>		Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	
Deliverable Requested I, II, III, IV, Other (specify)		Empty Kit Relinquished by		Date		Special Instructions/QC Requirements			
Relinquished by: <u>Devon Bough</u>		Date/Time		Date		Method of Shipment:			
Relinquished by:		Date/Time		Date		Received by:		Date/Time	
Relinquished by:		Date/Time		Date		Received by:		Date/Time	
Custody Seals Intact. <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No		Cooler Temperature(s) °C and Other Remarks:		Company		Company	
						Company		Company	
						Company		Company	