

Project
1018316

Printed 08/10/2022 10:31

NASH-L

City of Nashville
Larry Dunaway
426 N Main
Nashville, AR 71852-

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Email: projectmanager@ana-lab.com



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SAMPLE CROSS REFERENCE

Project
1018316

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City of Nashville
 Larry Dunaway
 426 N Main
 Nashville, AR 71852-

Sample	Sample ID	Taken	Time	Received	
2106517	Bio Monitoring Qtr	07/11/2022	06:30:00	07/12/2022	
	Method Subcontract	Bottle	PrepSet	Preparation 07/11/2022	QcGroup Analytical 07/11/2022

Email: projectmanager@ana-lab.com



NASH-L

City of Nashville
 Larry Dunaway
 426 N Main
 Nashville, AR 71852-

Project
1018316

Printed: 08/10/2022

RESULTS

Sample Results

2106517 Bio Monitoring Qtr COMP: 7-10 0630 TO 7-11 0630 Received: 07/12/2022
 Non-Potable Water Collected by: Client City of Nashville PO:
 Composite Stop 06:30 7/11/22 Taken: 07/11/2022 06:30:00
 24 Hr Comp Quarterly
 client provides their auto-sampler

Subcontract	Prepared:	07/12/2019	12:00:00	Analyzed	07/12/2019	12:00:00	SUB
Parameter	Results	Units	RL	Flags	CAS		Bottle
Chronic Pimephales promelas	See Attached				BAL3		
Subcontract	Prepared:	07/11/2022	12:00:00	Analyzed	07/11/2022	12:00:00	SUB
Parameter	Results	Units	RL	Flags	CAS		Bottle
Chronic Ceriodaphnia dubia (SUB)	See Attached				BAL3		

Qualifiers:

We report results on an As Received (or Wet) basis unless marked 'Dry Weight'. Unless otherwise noted, testing was performed at Ana-lab corporate laboratory which holds International, Federal, and state accreditations. Please see <https://www.ana-lab-work.com/index.php/accreditations/>
 These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.
 RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Bill Peery

Bill Peery, MS, VP Technical Services



1018316 CoC Print Group 001 of 006



Ana-Lab Corp. P.O. Box 9000 Kilgore, TX 75663

Phone 903/984-0551 FAX 903/984-5914 e-Mail corp@ana-lab.com

LELAP-accredited #02008

Chain of Custody

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Report To

City of Nashville
Larry Dunaway
426 N Main
Nashville, AR 71852-

NASH-L
116

Phone 870/845-4522
Fax 870/845-7409

Bio Monitoring Or

Accredited Test Name TILQ Method

24 Hr Comp Quarterly
Matrix: Non-Potable Water

Sampler Printed Name KEVIN FUNDERBURK Sampler Affiliation City of Nashville, WWTP Sampler Signature *Kevin Funderburk*

1 Z -- No bottle required

- PuCh Sampling/Transport
- SK Skeeter's Attention
- QUES Question regarding TEST LIST CAS:N/A - N/a

1 Polyethylene Quart (White)

- Short HoldSubco #7CD Chronic Ceriodaphnia dubia Subcontract CAS:BIA1 (1.00 days)
- Short HoldSubco #7PF Chronic Pimephales promelas Subcontract CAS:BIA1 (1.00 days)

Ana-Lab #	Sample ID	Bottles	Date	Time	Notes
2106517	Bio-monitoring	6	10-7-2019	0630-0630	

Ambient Conditions/Comments

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Ark-La-Miss Region: 4720 Viking Dr. Suite A Bossier City LA 71111



NELAP-accredited #T104704201-19-15



1018316 CoC Print Group 001 of 006



Ana-Lab Corp. P.O. Box 9000 Kilgore, TX 75663

Phone 903/984-0551 FAX 903/984-5914 e-Mail corp@ana-lab.com

LELAP-accredited #02008

Chain of Custody

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Report To

City of Nashville
Larry Dunaway
426 N Main
Nashville, AR 71852-

NASH-L
116

Phone 870/845-4522
Fax 870/845-7409

Bio Monitoring Qtr

Date	Time	Relinquished	Received
11/20/2022	1515	Printed Name: KEVIN FUNDERBURK Affiliation: CITY OF NASHVILLE, WWTP Signature: <i>[Signature]</i>	Printed Name: Mark Hirsch Affiliation: Ana-lab Signature: <i>[Signature]</i>
7.11.22	1750	Printed Name: Mark Hirsch Affiliation: Ana-lab Signature: <i>[Signature]</i>	Printed Name: BA-3 Affiliation: [unclear] Signature: <i>[Signature]</i>
7/12/22	0805	Printed Name: [unclear] Affiliation: [unclear] Signature: <i>[Signature]</i>	Printed Name: RAYSHAWN THOMPSON Affiliation: ANA-LAB Signature: <i>[Signature]</i>
		Printed Name: [unclear] Affiliation: [unclear] Signature: [unclear]	Printed Name: [unclear] Affiliation: [unclear] Signature: [unclear]

Sample Received on Ice? Yes No Method of Shipment: UPS Bus FedEx Lone Star Hand Delivered Other

Cooler/Sample Secure? Yes No If Shipped: Tracking Number & Temp - See Attached Hand Delivered to Region

The accredited column designates accreditation by A - A2LA, N - NELAC, or z - not listed under scope of accreditation. Unless otherwise specified, ANA-LAB shall provide these ordered services pursuant to our Standard Terms & Conditions Agreement (available for download from the welcome page at <<http://www.ana-lab.com>>). Ana-Lab personnel collect samples as specified by Ana-Lab SOP #000323.

Comments

07/12/2022 0817 RDT
Temp: 3.0 / 3.2 C
Therm#: 6444 Corr Fact: 0.2 C

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Ark-La-Miss Region: 4720 Viking Dr. Suite A Bossier City LA 71111



NELAP-accredited #T104704201-19-15

Bio-Analytical Laboratories' Executive Summary

Permittee: Nashville Public Works
Nashville, AR 71852

Project #: X8394

Outfall: 001 (treated municipal wastewater)

Permit #: AR0021776/ AFIN #31-00036

Contact: Ana-Lab Corporation
4720 Viking Drive, Ste A
Bossier City, LA 71111

Test Dates: July 12 - 19, 2022

Test Type: Chronic Static Renewal Survival and Reproduction Test using
Ceriodaphnia dubia (EPA Method 1002.0)
Chronic Static Renewal Survival and Growth Test using
Pimephales promelas (EPA Method 1000.0)

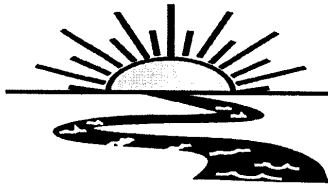
Results:**For *Ceriodaphnia dubia*:**

1. If the NOEC for survival is less than the critical dilution (78.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP3B - 0 - **Pass**
2. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP3B - 0 - **Pass**
3. Report the NOEC value for survival, Parameter TOP3B - 78.0%.
4. Report the NOEC value for reproduction, Parameter TPP3B - 78.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP3B - 16.40%
6. PMSD Reproduction- 23.23% (13.0 - 47.0%) moderate sensitivity, acceptable for passing test.

For *Pimephales promelas*:

1. If the NOEC for survival is less than the critical dilution (78.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP6C - 0 - **Pass**
2. If the NOEC for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP6C - 0 - **Pass**
3. Report the NOEC value for survival, Parameter TOP6C - 78.0%.
4. Report the NOEC value for growth, Parameter TPP6C - 78.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP6C - 14.70%.
6. PMSD Biomass- 35.97% (12.0 - 30.0%) see Results and Discussion.

This report contains a total of 54 pages, including this page. The results contained within pertain only to the samples listed on the chain of custody documents in Appendix A. The information meets the standards set forth by ADEQ. The chemical data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

(318) 745-2772
1-800-259-1246
Fax: (318) 745-2773

THE RESULTS OF TWO CHRONIC DEFINITIVE TOXICITY TESTS FOR OUTFALL 001

AT

NASHVILLE PUBLIC WORKS
Nashville, Arkansas

NPDES #AR0021776
AFIN #31-00036

EPA Methods 1000.0 and 1002.0

Project X8394

Test Dates: July 12 - 19, 2022

Report Date: August 2, 2022

Prepared for:

Ana-Lab Corporation
4720 Viking Drive, Ste A
Bossier City, LA 71111

Prepared by:

Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #88-0630

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1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two chronic definitive toxicity tests for Outfall 001 at Nashville Public Works, Nashville, Arkansas. The test organisms used were the cladoceran, *Ceriodaphnia dubia*, and the fathead minnow, *Pimephales promelas*. The purpose of this study is to determine if appropriately dilute effluent samples adversely affect the survival, reproduction and/or growth of the test organisms. Toxicity is defined as a statistically significant difference at the 95 percent confidence level between the survival, reproduction and/or growth of the test organism in the critical dilution (the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions) compared to the survival, reproduction and/or growth of the test organism in the control. The test endpoint is the No-Observed-Effect-Concentration (NOEC), the highest effluent concentration that is not significantly different from the control.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA-821-R-02-013), "Standard Methods for The Examination of Water and Wastewater, 22nd Edition" (APHA 2012), and BAL's standard operating procedure.

2.2 Test Organisms

The *Ceriodaphnia dubia* test organisms were cultured in-house at test temperature and dilution water hardness and were less than 24 hours old at test initiation. The neonates were released within the same 8-hour period. The fathead minnows were also raised in-house at test temperature and dilution water hardness and were less than 24 hours old at test initiation. Monthly chronic reference toxicant tests were conducted in order to document organism sensitivity and demonstration of capability.

2.3 Dilution Water

Moderately hard reconstituted water, made per method guidelines, was used as the dilution water and the control for the toxicity tests. Conductivity (SM 2510 B) and pH (SM 4500-H+ B) measurements, in umhos/cm and standard units, respectively, were checked on each lot of water prior to use to confirm water hardness.

2.4 Test Concentrations

The test concentrations used in the chronic toxicity tests (for a 3.5 MGD design flow) were 78.0, 59.0, 44.0, 33.0 and 25.0 percent effluent and a reconstituted water control. The critical dilution was 78.0 percent effluent. The *Ceriodaphnia* test was conducted using 10 replicates of one animal each for a total of 10 animals per concentration. The fathead minnow test was conducted using five replicates of eight animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Three 24-hour composite samples of Outfall 001 were collected by Nashville Public Works personnel on July 11, 13 and 15, 2022, at 0630, 0630 and 0715 hours, respectively. Upon collection and completion of each composite, the samples were packed in ice and delivered to the laboratory the day of collection by Ana-Lab Corporation, personnel. The sample temperature upon arrival of each sample was 1.2, 1.2 and 1.9⁰ Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number, and refrigerated unless needed. Prior to use, the samples were warmed to 25±1⁰ Celsius. Total residual chlorine levels were measured in milligrams/Liter (mg/L) using a test strip and recorded if present. Total ammonia levels were measured in mg/L using a test strip. Dissolved oxygen (SM 4500-0 G) and pH (SM 4500-H+ B) measurements, in mg/L and standard units, respectively, were measured on the control and each concentration at test initiation, at test renewal and at test termination. Conductivity (SM 2510 B) measurements, in umhos/cm, were also taken at test initiation and at each renewal. Alkalinity (SM 2320 B) and hardness (SM 2340 C) levels were measured in mg/L as CaCO₃ on the control and the undiluted effluent samples.

2.7 Monitoring of the Tests

The cladoceran test was run in a Precision^R dual-programmable, illuminated incubator at a temperature of 25±1⁰ Celsius. The fathead minnow test was run in a circulating waterbath, using a Remcor^R heated liquid circulator to keep a constant temperature of 25±1⁰ Celsius. Data-loggers were used to monitor diurnal test temperature. Test temperatures were recorded at the beginning of the day, after test renewal and at the end of the day. Light cycles and intensities were recorded twice a month.

2.8 Data Analysis

Ceriodaphnia dubia survival data was analyzed using Fisher’s Exact Test, an equality test comparing concentration data to control data. Reproduction data was analyzed using Steel’s Many-One Rank Test, a nonparametric test comparing concentration data to control data. Fathead minnow survival and growth (biomass) data was also analyzed using Steel’s Many-One Rank Test. Other endpoints were obtained by approved EPA methods of analysis.

3.0 Results and Discussion

The results of the *Ceriodaphnia dubia* test can be found in Table 1. One hundred percent survival occurred in the control and in the 78.0 percent critical dilution after seven days of exposure. The average number of neonates per female after three broods in the control and in the critical dilution was 22.0 and 23.0, respectively. The No-Observed-Effect-Concentration (NOEC) for survival and reproduction in this test was 78.0 percent effluent (p=.05).

Table 1: Results of the Chronic Definitive *Ceriodaphnia dubia* Test

Percent Effluent	Percent Survival	Sig.*	Mean # Neonates-Surviving	Mean # Neonates -Total	Sig.*
Control	100.0		22.0	22.0	
25.0	80.0		22.0	20.0	
33.0	100.0		25.0	25.0	
44.0	100.0		25.0	25.0	
59.0	90.0		26.0	24.0	
78.0	100.0		23.0	23.0	

*significant when compared to the control (p=.05). Test validity based on mean number of neonates per surviving female. NOEC value based on total mean number of neonates.

The fathead minnow test results can be found in Table 2. After seven days of exposure, 85.0 percent survival occurred in the control and 90.0 percent survival occurred in the 78.0 percent critical dilution. The average weight gained in the control and in the 78.0 percent critical dilution was 0.890 and 0.940 milligram (mg), respectively. The PMSD biomass value for this test was 35.97 percent, which was an indication that the test may not be sensitive enough to detect toxic effects when analyzing the data for the NOEC test endpoints. Deviations from the method did not occur, the test was properly randomized and the %CV values were low (i.e., <40.0%) in all test concentrations. The IC₂₅ biomass point estimate value for this this test was >78.0 percent. The wight gained in the effluent test concentrations were higher than the average weight gained in the control. The NOEC for survival and growth (biomass) was 78.0 percent effluent (p=.05).

Table 2: Results of the Chronic Definitive Fathead Minnow Test

Percent Effluent	Percent Survival	Sig.*	Mean Dry Weight (mg)	Sig.*
Control	85.0		0.890	
25.0	92.0		0.870	
33.0	95.0		1.200	
44.0	92.0		0.960	
59.0	100.0		1.000	
78.0	90.0		0.940	

*significant when compared to the control (p=.05).

The most recent reference toxicant tests showed the test organisms to be within the respective sensitivity range. The graphs of the results of the chronic reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

4.0 Conclusions

The three composite samples of Outfall 001 collected on July 11, 13 and 15, 2022, from Nashville Public Works, Nashville, Arkansas, were not found to be lethally toxic to the *Ceriodaphnia dubia* test organisms nor the *Pimephales promelas* test organisms in the 78.0 percent critical dilution after seven days of exposure (p=.05). Sublethal effects (i.e., lack of growth or reproduction) were not noted in the 78.0 percent critical dilution in either test (p=>05).

5.0 References

- EPA, 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013, Office of Water.
- EPA, 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System. EPA-833-R-00-003, Office of Wastewater Management.
- EPA, 2000. Method Guidance and Recommendations for Whole Effluent (WET) Testing. EPA-821-B-00-04, Office of Water
- APHA, 2012. Standard Methods for The Examination of Water and Wastewater. 22nd Edition.

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ADEQ 880630
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**APPENDIX A
CHAIN-OF-CUSTODY DOCUMENTS**

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ADEQ 880630
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X 8394/C23357

Bio-Analytical Laboratories
3240 Spurgeon Rd
Doyline, LA 71023
(318)7452772

Temperature upon arrival: 12 °C
Promotor #: 27
EPL
7/11/22
Clear water
EPL

Date 7-11-22 Time 0630
Sampler Printed Name KEVIN FUNDERBURK
Sampler Signature CLIENT
Sampler Affiliation NASH

Please analyze the following samples:

Sample Identification	Client Code	Date	Time	Testing Required- FCSC
Bio Monitoring	NASH	^A 7-10-22	0630	Chronic ceriodaphnia dubia
		7-11-22	0630	Chronic pimephales promelas

Requires RUSH status (24 hr Turn Around Time) Requires E-mail as soon as completed (skeeter@ana-lab.com)

If you have any questions about the testing, contact Skeeter Ludewig at (903)984-0551.

Date	Time	Relinquished		Received	
7-11-22		Printed Name <u>MARCO FRESCHI</u>	Affiliation <u>ANA-LAB</u>	Printed Name	Affiliation
	1330	Signature <u>[Signature]</u>		Signature <u>[Signature]</u>	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	

X 8394/C23373

Bio-Analytical Laboratories
3240 Spurgeon Rd
Doyline, LA 71023
(318)7452772

Temp: 12.0C
#29
clear
no odor

Date 7-13-22 Time 0630
Sampler Printed Name KEVIN FUNDERSURK
Sampler Signature CLIENT
Sampler Affiliation NASH

Please analyze the following samples:

Sample Identification	Client Code	Date	Time	Testing Required- FCSC
Bio Monitoring	NASH	7-12-22	0630	Chronic ceriodaphnia dubia
		7-13-22	0630	Chronic pimephales promelas

Requires RUSH status (24 hr Turn Around Time) Requires E-mail as soon as completed
(skeeter@ana-lab.com)

If you have any questions about the testing, contact Skeeter Ludewig at (903)984-0551.

Date	Time	Relinquished		Received	
7.13.22	1415	Printed Name <u>Mark Hanson</u>	Affiliation <u>ANA-LAB</u>	Printed Name	Affiliation
		Signature <u>[Signature]</u>		Signature <u>[Signature]</u>	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	

1
2
3
4

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ADEQ 880630
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X8394/C23384
Temp. 19°C
#29
clear
no odor
EDW

Bio-Analytical Laboratories
3240 Spurgeon Rd
Doyline, LA 71023
(318)7452772

Date 7.15.22 Time 0715
 Sampler Printed Name KEVIN FUNDERBURG
 Sampler Signature CLIENT
 Sampler Affiliation NASH

Please analyze the following samples:

Sample Identification	Client Code	Date	Time	Testing Required- FCSC
Bio Monitoring	NASH	7.14.22	0715	Chronic ceriodaphnia dubia
		7.15.22	0715	Chronic pimephales promelas

Requires RUSH status (24 hr Turn Around Time) Requires E-mail as soon as completed
(skeeter@ana-lab.com)

If you have any questions about the testing, contact Skeeter Ludewig at (903)984-0551.

Date	Time	Relinquished		Received	
7.15.22	1315	Printed Name <u>Shane Hines</u>	Affiliation <u>ANA-LAB</u>	Printed Name <u>Dr. J. Breff</u>	Affiliation <u>BA</u>
		Signature <u>[Signature]</u>		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	
		Printed Name	Affiliation	Printed Name	Affiliation
		Signature		Signature	

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AQ374
ADEQ 880630
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**APPENDIX B
RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Project# X8394 Date start: 7/12/22 Date end: 7/14/22

Client/Contact: NASH/Nashville Public Works
 Address: 426 North Main, Nashville, AR 71852
 NPDES#: AR0021776/ AFIN 31-00036
 Sample Description: 001 Dilution Water: MH RECONSTITUTED
 Test Temperature(°C) 25±1° Technicians: EGB/EDW/AM

Adults isolated: Date 7-11-22 Time: 2300

Neonates collected: Date 7-12-22 Time: 0700 Board: X2384
 Dissolved Oxygen Meter: Model YSI550 Serial #02F0741 AH
 pH Meter: Model Orion 230A+ Serial #015253
 Conductivity Meter: Model YSI EC300A Serial#JC01155

Effluent Initial D.O. (mg/L & %)/Tech	Aerate?/Minutes /Final D.O. (mg/L & %)/Tech	Receiving Water Initial D.O. (mg/L & %)/Tech	Aerate?/Minutes /Final D.O. (mg/L & %)/Tech
0.9.4 112.4 /mv	0.4 7.6 77.8	0. 	0.
1.9.4 111.3 /gaw	1.4 68.5 100.2 /gaw	1. 	1.
2.9.3 100.0 /gaw	2. NO / EDW	2. 	2.
3.8.9 99.7 /gaw	3. NO / EDW	3. 	3.
4.8.7 110.1 /ELB	4.4 67.9 100.3 /ELB	4. 	4.
5.8.3 99.8 /ELB	5.4 128.0 95.7 /ELB	5. 	5.
6.8.6 100.2 /gaw	6. NO / gaw	6. 	6.
7.	7.	7. 	7.

Total Residual Chlorine (mg/L)/Tech	Dechlorinated? Amount?/Tech	Ammonia (NH3) (mg/L)/Tech	BAL Sample # Date in Use
1 <0.05 /mv	1. NO /mv	1. 0.0 /mv	1. C23357 7/12/22
2 <0.5 /gaw	2. NO /gaw	2. 0 /gaw	2. C23373 7/14/22
3 <0.5 /ELB	3. NO /ELB	3. <0.5 /ELB	3. C23384 7/14/22

Comments: 7/12/22 - No neonates in control @ 2330 hrs. ELB
 7/14/22 - 0630 hrs - Collected neonates in control ELB

1018316 CoC Print Group 002 of 006

BIO-ANALYTICAL LABORATORIES

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST-LIVE NEONATE PRODUCTION

ADEQ 880630
EPA 822-B-92-022

Project# Y837 Client Nashville Sample ID 001
 Test started: Date 7/12/22 Time 1120 Test ended: Date 7/19/22 Time 1430
 Date/Tech: Day 0 7/12/22 1 7/13/22 2 7/14/22 3 7/15/22 4 7/16/22 5 7/17/22 6 7/18/22 7 7/19/22 8
 Time: Day 0 1120 1 1500 2 1035 3 1050 4 1010 5 1005 6 1145 7 1430 8
 Temp. (°C): Day 0 24.3 1 24.0 2 23.0 3 24.9 4 23.9 5 24.0 6 24.6 7 23.2 8

Conc.	Day	1	2	3	4	5	6	7	8	9	10	Number of Live
0	1	0										10
	2	0										10
	3	0										10
	4	1/2	1/2	1/3	1/2	1/3	1/3	1/2	0	0	1/3	10
	5	0	2/7	2/7	0	2/5	0	0	0	1/5	2/5	10
	6	2/7	0	0	2/10	0	2/9	2/10	1/3	2/7	2/3	10
	7	3/13	3/15	3/16	3/12	3/13	3/10	3/13	2/10	3/13	3/2	10
	8											10
25	1	0										10
	2	0										10
	3	0										10
	4	0	1/2	1/5	1/3	1/5	0	0	1/4	0	1/2	10
	5	1/2	0	0	2/4	X	1/2	1/5	X	0	2/3	8
	6	2/7	2/9	2/10	2/3		2/5	2/7		1/3	2/5	8
	7	3/13	3/14	3/14	3/13		3/13	3/14		2/10	3/13	8
	8											10
33	1	0										10
	2	0										10
	3	0										10
	4	1/1	1/5	1/3	1/4	1/5	1/3	0	1/6	1/3	1/3	10
	5	1/3	2/7	2/5	2/8	2/8	0	1/7	1/1	0	2/9	10
	6	2/7	0	2/3	0	0	2/9	2/7	2/8	2/9	0	10
	7	3/12	3/13	3/10	3/13	3/10	3/13	3/13	3/12	3/13	3/14	10
	8											10
44	1	0										10
	2	0										10
	3	0										10
	4	0	1/5	1/4	1/2	1/4	1/8	0	1/2	1/2	1/2	10
	5	1/2	2/12	1/1	2/5	2/9	2/10	1/5	2/7	0	1/1	10
	6	2/7	0	2/8	2/3	0	0	2/9	0	2/10	2/8	10
	7	3/13	3/14	3/13	3/10	3/12	3/9	3/13	3/13	3/12	3/13	10
	8											10
59	1	0										10
	2	0										10
	3	0										10
	4	0	1/2	1/4	1/4	1/3	1/5	1/3	1/6	2/3	1/3	10
	5	1/2	2/3	2/7	1/3	2/12	0	2/10	0	0	2/7	10
	6	2/7	2/6	0	2/9	0	2/10	0	2/9	2/9	X	9
	7	3/13	3/12	3/13	3/13	3/13	3/14	3/13	3/13	3/14		9
	8											10
72	1	0										10
	2	0										10
	3	0										10
	4	0	1/3	1/3	1/2	1/4	1/3	1/3	1/3	0	1/3	10
	5	1/4	2/6	2/6	2/6	2/10	0	0	0	1/2	2/8	10
	6	2/7	0	0	0	0	2/9	2/11	2/2	2/7	0	10
	7	3/13	3/12	3/13	3/13	3/13	3/12	3/10	3/10	3/9	3/12	10
	8											10

Key: X=dead adult, Xⁿ=adult had n neonates before death, M=male.
 B/N = Brood count/#neonates

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X2394clientNashville

Organism C. dubois

Date	Day 0 7/12/22 5183	Day 1 7/13/22	Day 2 7/14/22	Day 3 7/15/22	Day 4 7/16/22 5187	Day 5 7/17/22	Day 6 7/18/22	Day 7 7/19/22	Day 8
Concentration:	0 MH								
Temperature (°C)	21.5	25.4 24.2	24.1 24.4	24.3 23.7	24.1 24.0	23.9 24.1	24.1 23.3	23.3	
pH	7.0	7.0 7.3	7.4 7.7	7.3 7.3	7.2 7.8	7.8 7.8	7.6 7.4	7.5	
DO (mg/l)	7.0	7.7 7.9	7.3 7.6	7.2 8.2	8.2 7.9	8.1 7.0	7.9 8.1	8.2	
Cond (umhos/cm)	312	305 308	312	312	330	302	305		
Concentration:	25.0%								
Temperature (°C)	24.0	25.6 24.3	23.7 24.4	24.4 24.3	24.0 24.9	24.1 24.8	23.9 24.2	23.2	
pH	7.0	7.8 7.1	7.3 7.6	7.2 7.5	7.3 7.8	7.7 7.7	7.6 7.6	8.3	
DO (mg/l)	7.1	8.0 7.7	7.4 7.5	7.3 7.6	8.1 7.9	8.1 7.4	7.7 7.8	8.2	
Cond (umhos/cm)	331	322 329	327	327	335	325	325		
Concentration:	33.0%								
Temperature (°C)	24.4	25.4 24.3	23.5 24.3	23.9 24.5	24.1 25.3	24.0 24.7	24.1 24.2	23.3	
pH	7.5	7.8 7.3	7.5 7.5	7.4 7.5	7.5 7.8	7.7 7.6	7.9 7.5	8.2	
DO (mg/l)	7.2	8.0 7.6	7.4 7.6	7.3 7.7	8.2 7.9	8.2 7.8	7.8 7.8	7.9	
Cond (umhos/cm)	330	329 333	332	332	343	335	331		
Prerenewal Tech Initials/Time		ELB 1510	EDW 1035	EDW 1050	ELB 1010	EDW 1008	EDW 1145	EDW 1430	
Postrenewal Tech Initials/Time	1037 19M	EDW 0946	EDW 0930	EDW 0930	EDW 0805	ELB 0750	EDW 0850		

Control Alkalinity (mg/L as CaCO₃)

Control Hardness (mg/L as CaCO₃)

ID# 5183 Result 6.8 Date Tested 7/12/22 ID# 5183 Result 100 Date Tested 7/17/22
 ID# 5187 Result 1.0 Date Tested 7/12/22 ID# 5187 Result 8.8 Date Tested 7/12/22
 ID# _____ Result _____ Date Tested _____ ID# _____ Result _____ Date Tested _____

Sample Alkalinity (mg/L as CaCO₃)

Sample Hardness (mg/L as CaCO₃)

ID# 2335 Result 6.0 Date Tested 7/15/22 ID# 2335 Result 100 Date Tested 7/15/22
 ID# 23313 Result 6.8 Date Tested 7/15/22 ID# 23313 Result 11.6 Date Tested 7/15/22
 ID# 23324 Result 2.8 Date Tested 7/21/22 ID# 23324 Result 1.0 Date Tested 7/21/22

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Project# <u>2354</u> Client <u>Nashville</u> Organism <u>C. dubia</u>									
Concentration: <u>44.0%</u>									
Temperature (°C)	24.6 7.5	25.3 24.5	23.1 24.3	24.3 24.5	23.8 25.5	24.0 24.7	23.9 24.1	23.4	
pH	7.5 7.2	7.8 7.3	7.3 7.5	7.3 7.5	7.5 7.7	7.7 7.5	7.6 7.4	7.9	
DO (mg/l)	7.8	8.5 7.5	7.4 7.5	7.3 7.4	8.2 7.9	8.2 7.8	7.9 7.7	8.3	
Cond (umhos/cm)	337	341	341	340	357	353	336		
Concentration: <u>59.0%</u>									
Temperature (°C)	24.6	25.3 24.4	23.4 24.1	23.9 24.4	23.8 25.6	24.1 24.5	24.1 24.0	23.5	
pH	7.5	7.8 7.3	7.5 7.5	7.4 7.5	7.5 7.6	7.7 7.5	7.4 7.4	7.9	
DO (mg/l)	7.9	8.5 7.6	7.7 7.3	7.6 7.5	8.2 7.9	8.2 7.8	7.6 7.9	8.3	
Cond (umhos/cm)	344	346	351	353	373	367	351		
Concentration: <u>72.0%</u>									
Temperature (°C)	24.5	25.3 24.3	23.4 24.1	23.5 24.5	23.9 25.8	24.2 24.5	22.9 24.0	23.8	
pH	7.5	7.8 7.3	7.5 7.4	7.4 7.4	7.5 7.5	7.7 7.5	7.6 7.4	7.9	
DO (mg/l)	7.9	8.6 7.7	7.6 7.3	7.5 7.3	8.2 7.9	8.3 7.9	7.4 7.9	8.3	
Cond (umhos/cm)	357	360	368	367	389	379	361		
Prerenewal Tech Initials/Time		EWB 1510	EDW 1035	EDW 1050	EWB 1010	EWB 1008	EDW 1145	EDW 1430	
Postrenewal Tech Initials/Time	1037 19M	EDW 0940	EDW 0930	EDW 0930	EWB 0825	EWB 0752	EDW 0850		

Control Alkalinity (mg/L as CaCO₃)

Control Hardness (mg/L as CaCO₃)

ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____
ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____
ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____

Sample Alkalinity (mg/L as CaCO₃)

Sample Hardness (mg/L as CaCO₃)

ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____
ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____
ID# _____	Result _____	Date Tested _____	ID# _____	Result _____	Date Tested _____

CETIS Test Data Worksheet

Report Date: 11 Jul-22 08:58 (p 1 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test											Bio-Analytical Laboratories			
Conc-%	Code	Rep	Pos	# Exposed	1d Surv	2d Surv	3d Surv	4d Surv	5d Surv	6d Surv	7d Surv	8d Surv	2d Neo	
33		8	1	1										
78		3	2	1										
33		4	3	1										
25		8	4	1										
78		7	5	1										
78		1	6	1										
78		10	7	1										
44		6	8	1										
59		4	9	1										
25		7	10	1										
44		3	11	1										
59		3	12	1										
0	D	2	13	1										
59		2	14	1										
78		5	15	1										
59		5	16	1										
44		5	17	1										
78		6	18	1										
59		10	19	1										
44		8	20	1										
0	D	4	21	1										
0	D	10	22	1										
33		5	23	1										
25		9	24	1										
0	D	8	25	1										
44		9	26	1										
44		10	27	1										
59		7	28	1										
44		7	29	1										
59		9	30	1										
0	D	7	31	1										
0	D	1	32	1										
0	D	9	33	1										
33		3	34	1										
33		7	35	1										
44		1	36	1										
0	D	5	37	1										
0	D	3	38	1										
25		2	39	1										
78		2	40	1										
25		5	41	1										
33		9	42	1										

1
2
3
4
5

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ADEQ 880630
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CETIS Test Data Worksheet

Report Date: 11 Jul-22 08:58 (p 2 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Conc.%	Code	Rep	Pos	# Exposed	1d Surv	2d Surv	3d Surv	4d Surv	5d Surv	6d Surv	7d Surv	8d Surv	2d Neo
59		6	43	1									
0	D	6	44	1									
33		6	45	1									
78		8	46	1									
33		2	47	1									
33		10	48	1									
33		1	49	1									
78		9	50	1									
59		8	51	1									
25		6	52	1									
44		2	53	1									
25		3	54	1									
25		4	55	1									
59		1	56	1									
25		10	57	1									
44		4	58	1									
25		1	59	1									
78		4	60	1									

1
2
3
4
5

BIO-ANALYTICAL LABORATORIES
CERIODAPHNIA DUBIA CHRONIC TEST
PARENTAL BLOCK ASSIGNMENT RANDOM NUMBER TEMPLATE #2
FOR 6 CONCENTRATION TEST

X 8386
+
S 35

MV
\$ 7/12/22

Set #1

5,3,6,2,1,4 Parent# EH

Set #2

4,6,2,3,5,1 Parent# O-6 X 8386

Set #3

3,2,1,5,6,4 Parent# O-8 X 8386

Set #4

6,4,3,5,1,2 Parent# O-7 X 8386

Set #5

5,2,1,3,6,4 Parent# 7H

Set #6

1,2,3,4,6,5 Parent# O-4 X 8386

Set #7

4,1,5,3,6,2 Parent# 6D

Set #8

6,5,4,2,1,3 Parent# 2G

Set #9

4,6,5,1,2,3 Parent# SJ

Set #10

3,5,2,6,1,4 Parent# 3G

BIO-ANALYTICAL LABORATORIES
PIMEPHALES PROMELAS SURVIVAL AND GROWTH DATA SHEET

Project# X8394 Date started: 7/12/22 Date ended 7/14/22

Client/Contact NASH/Nashville Public Works
Address 426 North Main, Nashville, AR 71852
NPDES# AR0021776/AFIN 31-00036
Sample Description 001 Dilution Water MH Reconstituted
Test Temperature (°C) 25+1° Celsius Technicians EGB/EDW/AM
Test organism age L24 hours Vendor/ID# BAL071122

Day	Feeding Times		
	AM	NOON	PM
0			
1	EDW 10850/0.10ml	EDW 11002/0.10ml	EW 1745/0.2ml
2	EDW 10800/0.10ml	EDW 11320/0.10ml	EGB 1720/0.10ml
3	EW 10850/0.1ml	EW 11300/0.1ml	EGB 11000/0.10ml
4	EGB 10150/0.10ml	EW 11045/0.1ml	EW 1550/0.1ml
5	EGB 10145/0.10ml	EW 11000/0.1ml	EGB 11010/0.10ml
6	EW 10810/0.1ml	EW 11210/0.1ml	EGB 11050/0.10ml

Dissolved Oxygen Meter: Model YSI550 Serial #02F0741 AH
pH Meter: Model Orion 230A+ Serial #015253
Conductivity Meter: Model YSI EC300A Serial #JC01155

Effluent Initial DO (mg/L & %)/Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech	Receiving Water Initial DO (mg/L & %)/Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech
0.4/112.4/1.1/EM	0.4/7.6/99.8	/	/
1.9/111.39/EDW	1.4/68.5/100.2/EDW	/	/
2.9/100.12/EDW	2. NO/EDW	/	/
3.8/99.79/EDW	3. NO/EDW	/	/
4.8/110.1/1.6/EGB	4.4/67.9/100.3/1.6/EDW	/	/
5.8/99.8%/EGB	5.4/128.0/95.7%/EGB	/	/
6.8/100.22/EDW	6. NO/EDW	/	/

Total Residual Chlorine (mg/L)/Tech	Dechlorinated? Amount?/Tech	Ammonia (NH3) (mg/L)/Tech	BAL Sample # Date in use
1. 0.45/1.1/EM	1. NO/1.1/EM	1. 0.0/1.1/EM	1. C23357 7/12/22
2. <0.5/EDW	2. NO/EDW	2. 0/EDW	2. C23373 7/14/22
3. <0.5/EGB	3. NO/EGB	3. <0.5/EGB	3. C23384 7/14/22

Comments: 1W under supervision of EDW + EGB

BIO-ANALYTICAL LABORATORIES 7-DAY CHRONIC MINNOW SURVIVAL DATA- EPA 1000, ADEQ 880630
 Project# X8394 Test started: Date 7/17/22 Time 3:00 A0334
OE002 of 54

Client Nashville Sample ID 021 Test ended: Date 7/19/22 Time 1:30
 Date/Tech: Day 0 7/17/22 1 7/18/22 2 7/19/22 3 7/15/22 4 7/16/22 5 7/17/22 6 7/18/22 7 7/19/22

Time: Day 0 12:00 1 13:25 2 12:10 3 10:20 4 10:09 5 09:01 6 09:00 7 11:30

Temp (°C) Day 0 25.4 1 24.9 2 23.1 3 24.1 4 24.8 5 24.5 6 24.8 7 25.4

Conc./	Rep.	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
0	1	8	8	8	8	8	7	7	6
	2	8	8	8	7	7	6	6	6
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	7
	5	8	8	8	8	8	8	7	7
25	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	6	6
	4	8	8	8	8	8	8	7	7
	5	8	8	8	8	8	8	8	8
33	1	8	8	8	8	8	7	7	7
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	7	7	7	7
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	8	8
44	1	8	8	8	8	7	7	7	7
	2	8	8	8	8	8	8	8	7
	3	8	8	8	8	8	8	8	8
	4	8	8	8	7	7	7	7	7
	5	8	8	8	8	8	8	8	8
59	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	8	8
78	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	7	7	7	7
	4	8	8	8	8	7	7	6	6
	5	8	8	8	8	7	7	7	7

BIO-ANALYTICAL LABORATORIES MINNOW LARVAL GROWTH DATA SHEET (Minnow3 Rev ^{A0394} Page 23 of 54)

Project#/Client ^{X8394} Nashville Temp Start (°C) 90.0 Tech SDM Date: 7/19/22 Time: 1130
 Temp End (°C) 112.4 Tech LW Date: 7/20/22 Time: 0754

Conc.	Replicate/ Pan number	Wt. of pan(g)/ Date weighed: <u>7/19/22</u> Tech: <u>LW</u>	Wt. of pan + larvae(g)/ Date weighed: <u>7/20/22</u> Tech: <u>LW</u>	Total wt. of larvae (g)	Original # of larvae at test initiation	Mean Dry wt. of larvae (mg)	Mean Dry wt. - surviving larvae (mg) Control Only*
010	1 91	1.0289	1.0358				
	2 92	1.0251	1.0330				
	3 93	1.0396	1.0469				
	4 94	1.0163	1.0224				
	5 95	1.0270	1.0345				
25	1 96	1.0353	1.0427				
	2 97	1.0387	1.0455				
	3 98	1.0356	1.0416				
	4 99	1.0398	1.0476				
	5 100	1.0384	1.0451				
33	1 101	1.0300	1.0380				
	2 102	1.0341	1.0438				
	3 103	1.0498	1.0568				
	4 104	1.0377	1.0444				
	5 105	1.0479	1.0551				
44	1 106	1.0429	1.0509				
	2 107	1.0458	1.0523				
	3 108	1.0450	1.0541				
	4 109	1.0423	1.0495				
	5 110	1.0337	1.0413				
59	1 111	1.0389	1.0473				
	2 112	1.0446	1.0543				
	3 113	1.0557	1.0635				
	4 114	1.0321	1.0393				
	5 115	1.0388	1.0472				
78	1 116	1.0399	1.0484				
	2 117	1.0333	1.0414				
	3 118	1.0418	1.0498				
	4 119	1.0375	1.0432				
	5 120	1.0504	1.0577				

* Test acceptance of control weight based on surviving larvae at end of test.

Calculated by: CETIS Calculations checked by: EBB 7/28/22

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X0394 client Nashville Organism D. promelas

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
	7/12/22 5180	7/13/22	7/14/22	7/15/22	7/16/22 5188	7/17/22	7/18/22	7/19/22	
Concentration:	OMH								
Temperature (°C)	25.1	25.0	24.4	25.0	24.6	24.9	24.8	24.1	
pH	7.4	7.4	7.3	7.1	7.0	7.8	7.4	7.3	
DO (mg/l)	7.9	7.7	7.4	7.3	7.3	8.0	8.2	7.0	
Cond (umhos/cm)	310	8.6	7.9	7.7	7.9	7.6	7.8		
Concentration:	25.0%								
Temperature (°C)	25.1	25.2	23.9	25.1	24.7	25.0	24.9	23.9	
pH	7.6	7.2	7.3	7.1	7.0	7.3	7.1	7.3	
DO (mg/l)	7.8	7.2	7.4	7.7	7.4	7.8	7.9	7.2	
Cond (umhos/cm)	335	7.3	7.9	7.4	7.2	7.7	7.9		
Concentration:	33.0%								
Temperature (°C)	25.1	25.2	24.1	25.0	25.0	25.0	24.9	24.0	
pH	7.6	7.3	7.4	7.1	7.1	7.1	7.1	7.2	
DO (mg/l)	7.9	7.3	7.3	6.2	6.2	6.1	6.3	7.0	
Cond (umhos/cm)	333	7.9	7.9	7.3	7.2	7.7	8.1		
Prerenewal Tech Initials/Time		EDW 1325	EDW 1210	EDW 1024	EDW 1011	EDW 0902	EDW 0933	EDW 1130	
Postrenewal Tech Initials/Time	EDW 0915 12M	EDW 0925	EDW 0925	EDW 0930	EDW 0830	EDW 0749	EDW 0845		

Control Alkalinity (mg/L as CaCO₃) _____ Control Hardness (mg/L as CaCO₃) _____

ID# 5180 Result 6.4 Date Tested 7/17/22 ID# 5180 Result 28 Date Tested 7/12/22
 ID# 5188 Result 5.6 Date Tested 7/12/22 ID# 5188 Result 24.0 Date Tested 7/12/22
 ID# _____ Result _____ Date Tested _____ ID# _____ Result _____ Date Tested _____

Sample Alkalinity (mg/L as CaCO₃) _____ Sample Hardness (mg/L as CaCO₃) _____

ID# C2337 Result 6.0 Date Tested 7/15/22 ID# C2335 Result 10.0 Date Tested 7/15/22
 ID# C2337 Result 10.8 Date Tested 7/15/22 ID# C2337 Result 11.6 Date Tested 7/15/22
 ID# C2324 Result 28 Date Tested 7/12/22 ID# C2324 Result 10.0 Date Tested 7/12/22

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X8394 client Nashville Organism P. promelas

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Concentration: <u>44.0%</u>									
Temperature (°C)	25.0	25.2 24.4	24.1 24.5	25.1 24.7	25.0 25.7	25.2 25.0	25.0 24.5	23.9	
pH	7.5	7.3 7.3	7.4 7.4	7.1 7.6	7.1 7.4	7.0 7.5	7.0 7.6	7.8	
DO (mg/l)	7.9	7.1 7.4	7.2 7.9	6.6 7.4	6.1 7.8	5.7 7.7	6.0 8.1	7.0	
Cond (umhos/cm)	340	337 343	343	341	349	340	337		
Concentration: <u>59.0%</u>									
Temperature (°C)	25.0	24.9 24.4	23.9 24.4	25.2 24.6	25.0 25.7	25.2 24.9	25.0 24.3	20.3	
pH	7.4	7.2 7.3	7.5 7.4	7.1 7.5	7.0 7.4	7.0 7.5	6.9 7.6	7.2	
DO (mg/l)	7.9	7.3 7.6	7.4 8.1	6.2 7.9	5.1 7.8	5.2 7.2	5.2 8.2	7.3	
Cond (umhos/cm)	350	348 353	353	352	363	358	348		
Concentration: <u>78.1%</u>									
Temperature (°C)	25.0	25.3 24.4	24.2 24.4	25.4 24.6	25.0 25.9	25.4 24.7	25.2 24.1	24.1	
pH	7.4	7.2 7.3	7.4 7.4	7.1 7.5	7.0 7.4	7.0 7.5	6.9 7.5	7.2	
DO (mg/l)	8.0	7.1 7.9	7.5 8.2	6.6 7.9	5.1 7.2	5.4 7.8	5.6 8.3	6.9	
Cond (umhos/cm)	361	362 369	369	367	384	368	367		
Prerenewal Tech Initials/Time		EW 1325	EW 1210	EW 1024	EW 1011	EW 0903	EW 0933	EW 1130	
Postrenewal Tech Initials/Time	CFK 1911	EW 0925	EW 0925	EW 0930	EW 0830	EW 0749	EW 0845		

Control Alkalinity (mg/L as CaCO ₃)			Control Hardness (mg/L as CaCO ₃)		
ID#	Result	Date Tested	ID#	Result	Date Tested
ID#	Result	Date Tested	ID#	Result	Date Tested
ID#	Result	Date Tested	ID#	Result	Date Tested

Sample Alkalinity (mg/L as CaCO ₃)			Sample Hardness (mg/L as CaCO ₃)		
ID#	Result	Date Tested	ID#	Result	Date Tested
ID#	Result	Date Tested	ID#	Result	Date Tested
ID#	Result	Date Tested	ID#	Result	Date Tested

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CETIS Test Data Worksheet

Report Date: 11 Jul-22 09:00 (p 1 of 1)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test											Bio-Analytical Laboratories	
Start Date: 12 Jul-22		Species: Pimephales promelas				Sample Code: 2CD145C5						
End Date: 19 Jul-22		Protocol: EPA/821/R-02-013 (2002)				Sample Source: AR0021776						
Sample Date: 12 Jul-22		Material: POTW Effluent				Sample Station: 001						
Conc-%	Code	Rep	Pos	# Exposed	1d Survival	2d Survival	3d Survival	4d Survival	5d Survival	6d Survival	7d Survival	Tot Weigh
44		3	1									
25		5	2									
59		4	3									
78		1	4									
59		3	5									
33		4	6									
25		1	7									
44		4	8									
25		2	9									
0	D	4	10									
25		3	11									
0	D	3	12									
44		5	13									
33		5	14									
78		2	15									
78		4	16									
59		1	17									
59		5	18									
78		3	19									
33		1	20									
44		1	21									
0	D	1	22									
0	D	5	23									
44		2	24									
59		2	25									
25		4	26									
0	D	2	27									
33		2	28									
33		3	29									
78		5	30									

1018316 CoC Print Group 003 of 006

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ADEQ 880630
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**APPENDIX C
STATISTICAL ANALYSES**

CETIS Analytical Report

Report Date: 22 Jul-22 08:58 (p 1 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test Bio-Analytical Laboratories

Analysis ID: 08-4773-8152 Endpoint: 7d Survival Rate CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 8:58 Analysis: STP 2xK Contingency Tables Status Level: 1
Edit Date: 22 Jul-22 8:31 MD5 Hash: B8FA0BA023299ADF6FC9EEFE109ADF89 Editor ID: 008-522-314-5

Batch ID: 20-1529-8029 Test Type: Reproduction-Survival (2-8d) Analyst: Lab Tech
Start Date: 12 Jul-22 11:20 Protocol: EPA/821/R-02-013 (2002) Diluent: Receiving Water *Reconstituted*
Ending Date: 19 Jul-22 14:30 Species: Ceriodaphnia dubia Brine:
Test Length: 7d 3h Taxon: Branchiopoda Source: In-House Culture Age: <24

Sample ID: 11-8097-1602 Code: 46643252 Project: WET Monthly Compliance Test (JUL)
Sample Date: 11 Jul-22 06:30 Material: POTW Effluent Source: AR0021776 (AR0021776)
Receipt Date: 11 Jul-22 13:00 CAS (PC): Station: 001
Sample Age: 29h (1.2 °C) Client: Nashville Public Works

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	78	>78	---	1.282

Fisher Exact/Bonferroni-Holm Test

Control	vs	Conc-%	Test Stat	P-Type	P-Value	Decision(α:5%)
Dilution Water		25	0.24	Exact	1.0000	Non-Significant Effect
		33	1.00	Exact	1.0000	Non-Significant Effect
		44	1.00	Exact	1.0000	Non-Significant Effect
		59	0.50	Exact	1.0000	Non-Significant Effect
		78	1.00	Exact	1.0000	Non-Significant Effect

7d Survival Rate Frequencies

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	10	0	10	1.00	0.00	0.00%
25		8	2	10	0.80	0.20	20.00%
33		10	0	10	1.00	0.00	0.00%
44		10	0	10	1.00	0.00	0.00%
59		9	1	10	0.90	0.10	10.00%
78		10	0	10	1.00	0.00	0.00%

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
25		10	0.80	0.50	1.00	1.00	0.00	1.00	0.13	52.70%	20.00%
33		10	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
44		10	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
59		10	0.90	0.67	1.00	1.00	0.00	1.00	0.10	35.14%	10.00%
78		10	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
25		1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
33		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
44		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
59		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
78		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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CETIS Analytical Report

Report Date: 22 Jul-22 08:56 (p 2 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test

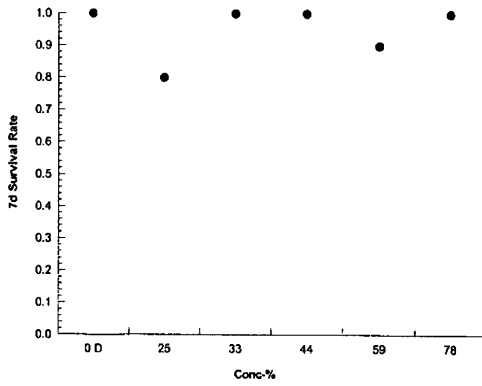
Bio-Analytical Laboratories

Analysis ID: 02-1419-3255 Endpoint: 7d Survival Rate CETIS Version: CETISv1.9.7
 Analyzed: 22 Jul-22 8:55 Analysis: STP 2xK Contingency Tables Status Level: 1
 Edit Date: 22 Jul-22 8:31 MD5 Hash: B8FA0BA023299ADF6FC9EEFE109ADF89 Editor ID: 008-522-314-5

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	0/1	1/1	1/1
33		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
44		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
59		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
78		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 22 Jul-22 08:59 (p 1 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test **SURVIVING** Bio-Analytical Laboratories

Analysis ID: 03-4825-0621 Endpoint: Reproduction
Analyzed: 22 Jul-22 8:58 Analysis: Nonparametric-Multiple Comparison
Edit Date: 22 Jul-22 8:31 MD5 Hash: 38E2732ECE0FEA21679CE06DDF90244F
CETIS Version: CETISv1.9.7
Status Level: 1
Editor ID: 008-522-314-5

Batch ID: 20-1529-8029 Test Type: Reproduction-Survival (2-8d)
Start Date: 12 Jul-22 14:28 Protocol: EPA/821/R-02-013 (2002)
Ending Date: 19 Jul-22 14:30 Species: Ceriodaphnia dubia
Test Length: 7d 3h Taxon: Branchiopoda
Analyst: Lab Tech
Diluent: Receiving Water Reconstituted
Brine:
Source: In-House Culture Age: <24

Sample ID: 11-8097-1602 Code: 46643252
Sample Date: 11 Jul-22 06:30 Material: POTW Effluent
Receipt Date: 11 Jul-22 13:00 CAS (PC):
Sample Age: 29h (1.2 °C) Client: Nashville Public Works
Project: WET Monthly Compliance Test (JUL)
Source: AR0021776 (AR0021776)
Station: 001

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSDu	PMSD
Untransformed	C > T	78	>78	---	1.282	4.5	19.84%

Wilcoxon/Bonferroni Adj Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		25	84	---	4	16	Exact	1.0000	Non-Significant Effect
		33	130	---	4	18	Exact	1.0000	Non-Significant Effect
		44	120	---	4	18	Exact	1.0000	Non-Significant Effect
		59	120	---	4	17	Exact	1.0000	Non-Significant Effect
		78	100	---	5	18	Exact	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	124.876	24.9753	5	1.4	0.2242	Non-Significant Effect
Error	881.264	17.2797	51			
Total	1006.14		56			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	26	15	8.1E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.89	0.94	6.4E-05	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	22	20	25	24	13	26	1.2	16.40%	0.00%
25		8	22	15	29	24	5	30	3.1	39.59%	2.78%
33		10	25	23	26	25	21	27	0.6	7.65%	-9.78%
44		10	25	23	27	26	20	31	1	12.65%	-11.11%
59		9	26	24	28	26	22	29	0.87	10.03%	-16.05%
78		10	23	21	25	24	18	27	0.8	10.98%	-1.78%

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	22	24	26	24	21	22	25	13	25	23
25		22	27	29	5	30	26	13	23		
33		23	25	21	25	23	25	27	27	25	26
44		22	31	26	20	25	27	27	22	26	24
59		22	23	24	29	28	29	26	28	26	
78		24	21	22	21	27	24	24	25	18	23

MV
7/22/22
OEB
7/28/22

CETIS Analytical Report

Report Date: 22 Jul-22 08:57 (p 1 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test Bio-Analytical Laboratories

Analysis ID: 18-7009-8647	Endpoint: Reproduction	CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 8:56	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 22 Jul-22 8:31	MD5 Hash: D9CDBD9906CB3AB3B98092B42A5B3C9	Editor ID: 008-522-314-5
Batch ID: 20-1529-8029	Test Type: Reproduction-Survival (2-8d)	Analyst: Lab Tech
Start Date: 12 Jul-22 11:20	Protocol: EPA/821/R-02-013 (2002)	Diluent: Receiving Water <i>Reconstituted</i>
Ending Date: 19 Jul-22 14:30	Species: Ceriodaphnia dubia	Brine:
Test Length: 7d 3h	Taxon: Branchiopoda	Source: In-House Culture Age: <24
Sample ID: 11-8097-1602	Code: 46643252 <i>X8394</i>	Project: WET Monthly Compliance Test (JUL)
Sample Date: 11 Jul-22 06:30	Material: POTW Effluent	Source: AR0021776 (AR0021776)
Receipt Date: 11 Jul-22 19:00-13:30	CAS (PC):	Station: 001
Sample Age: 29h (1.2 °C)	Client: Nashville Public Works	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSDu	PMSD
Untransformed	C > T	78	>78	—	1.282	5.2	23.23%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		25	110	75	4	18	CDF	0.8746	Non-Significant Effect
		33	130	75	4	18	CDF	0.9986	Non-Significant Effect
		44	120	75	4	18	CDF	0.9974	Non-Significant Effect
		59	130	75	4	18	CDF	0.9988	Non-Significant Effect
		78	100	75	5	18	CDF	0.7709	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	167	33.4	5	1.3	0.2855	Non-Significant Effect
Error	1407.6	26.0667	54			
Total	1574.6		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	31	15	1.1E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.87	0.95	1.3E-05	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	22	20	25	24	13	26	1.2	16.40%	0.00%
25		10	20	13	27	23	4	30	3	47.18%	10.22%
33		10	25	23	26	25	21	27	0.6	7.65%	-9.78%
44		10	25	23	27	26	20	31	1	12.65%	-11.11%
59		10	24	20	29	26	10	29	1.8	23.11%	-8.89%
78		10	23	21	25	24	18	27	0.8	10.98%	-1.78%

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	22	24	26	24	21	22	25	13	25	23
25		22	27	29	23	5	30	26	4	13	23
33		23	25	21	25	23	25	27	27	25	26
44		22	31	26	20	25	27	27	22	26	24
59		22	23	24	29	28	29	26	28	26	10
78		24	21	22	21	27	24	24	25	18	23

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CETIS Analytical Report

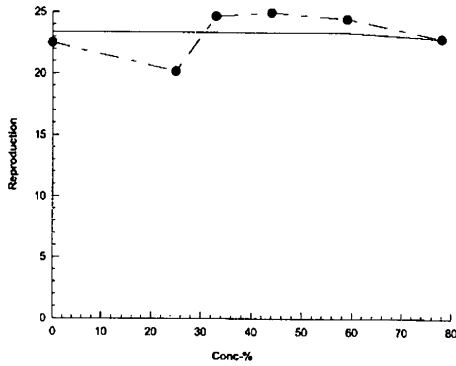
Report Date: 22 Jul-22 08:57 (p 2 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test

Bio-Analytical Laboratories

Analysis ID: 03-2565-0062	Endpoint: Reproduction	CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 8:57	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Edit Date: 22 Jul-22 8:31	MD5 Hash: D9CDBD9906CB3AB3B98092B42A5B3C9	Editor ID: 008-522-314-5

Graphics



CETIS Analytical Report

Report Date: 22 Jul-22 08:57 (p 1 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test			Bio-Analytical Laboratories		
Analysis ID: 03-2565-0062	Endpoint: Reproduction	CETIS Version: CETISv1.9.7			
Analyzed: 22 Jul-22 8:57	Analysis: Linear Interpolation (ICPIN)	Status Level: 1			
Edit Date: 22 Jul-22 8:31	MD5 Hash: D9CDBD9906CB3AB3B98092B42A5B3C9	Editor ID: 008-522-314-5			
Batch ID: 20-1529-8029	Test Type: Reproduction-Survival (2-8d)	Analyst: Lab Tech	6 Reconstituted		
Start Date: 12 Jul-22 11:20	Protocol: EPA/821/R-02-013 (2002)	Diluent: Receiving Water			
Ending Date: 19 Jul-22 14:30	Species: Ceriodaphnia dubia	Brine:			
Test Length: 7d 3h	Taxon: Branchiopoda	Source: In-House Culture	Age: <24		
Sample ID: 11-8097-1602	Code: 46643252 X83914	Project: WET Monthly Compliance Test (JUL)			
Sample Date: 11 Jul-22 06:30	Material: POTW Effluent	Source: AR0021776 (AR0021776)			
Receipt Date: 11 Jul-22 13:00 13:30 CAS (PC):		Station: 001			
Sample Age: 29h (1.2 °C)	Client: Nashville Public Works				

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	119319	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC10	>78	---	---	<1.282	---	---
IC15	>78	---	---	<1.282	---	---
IC20	>78	---	---	<1.282	---	---
IC25	>78	---	---	<1.282	---	---
IC40	>78	---	---	<1.282	---	---
IC50	>78	---	---	<1.282	---	---

Reproduction Summary

Conc-%	Code	Count	Calculated Variate					Isotonic Variate		
			Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	10	22	24	13	26	16.40%	0.00%	23	0.00%
25		10	20	23	4	30	47.18%	10.22%	23	0.00%
33		10	25	25	21	27	7.65%	-9.78%	23	0.00%
44		10	25	26	20	31	12.65%	-11.11%	23	0.00%
59		10	24	26	10	29	23.11%	-8.89%	23	0.00%
78		10	23	24	18	27	10.98%	-1.78%	23	2.05%

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	22	24	26	24	21	22	25	13	25	23
25		22	27	29	23	5	30	26	4	13	23
33		23	25	21	25	23	25	27	27	25	26
44		22	31	26	20	25	27	27	22	26	24
59		22	23	24	29	28	29	26	28	26	10
78		24	21	22	21	27	24	24	25	18	23

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CETIS Analytical Report

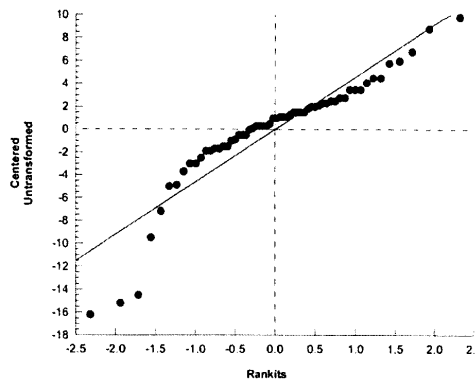
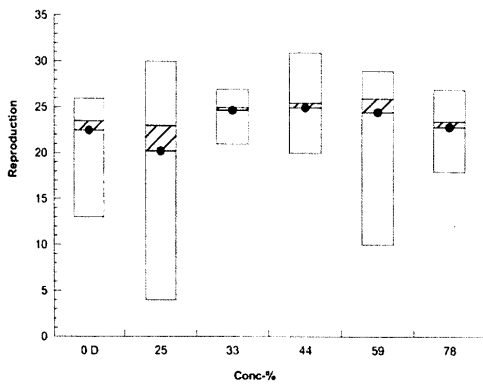
Report Date: 22 Jul-22 08:57 (p 2 of 2)
Test Code/ID: 1355BD9A / 03-2438-6202

Ceriodaphnia 7-d Survival and Reproduction Test

Bio-Analytical Laboratories

Analysis ID: 18-7009-8647	Endpoint: Reproduction	CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 8:56	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 22 Jul-22 8:31	MD5 Hash: D9CDBD9906CB3AB3B98092B42A5B3C9	Editor ID: 008-522-314-5

Graphics



11/22/22
EUP
11/28/22

CETIS Analytical Report

Report Date: 22 Jul-22 11:22 (p 1 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test			Bio-Analytical Laboratories		
Analysis ID: 19-6459-5019	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.9.7	Analyst: Lab Tech	Age: <24	
Analyzed: 22 Jul-22 11:22	Analysis: Nonparametric-Control vs Treatments	Status Level: 1	Diluent: Reconstituted Water		
Edit Date: 22 Jul-22 11:05	MD5 Hash: FBC56D3BB79CEB039F3470C94F292D5B	Editor ID: 008-522-314-5	Brine:		
Batch ID: 17-0721-6836	Test Type: Growth-Survival (7d)		Source: In-House Culture		
Start Date: 12 Jul-22 13:00	Protocol: EPA/821/R-02-013 (2002)				
Ending Date: 19 Jul-22 11:30	Species: Pimephales promelas				
Test Length: 6d 22h	Taxon: Actinopterygii				
Sample ID: 07-5191-2389	Code: 2CD145C5 X8394	Project: WET Monthly Compliance Test (JUL)			
Sample Date: 12 Jul-22	Material: POTW Effluent	Source: AR0021776 (AR0021776)			
Receipt Date: 12 Jul-22	CAS (PC):	Station: 001			
Sample Age: 13h (1.2 °C)	Client: Nashville Public Works				

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSD _u	PMSD
Angular (Corrected)	C > T	78	>78	---	1.282	0.14	16.49%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		25	32	16	3	8	CDF	0.9870	Non-Significant Effect
		33	34	16	2	8	CDF	0.9969	Non-Significant Effect
		44	33	16	2	8	CDF	0.9907	Non-Significant Effect
		59	38	16	1	8	CDF	0.9998	Non-Significant Effect
		78	31	16	3	8	CDF	0.9676	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.85	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.124207	0.0248415	5	1.7	0.1676	Non-Significant Effect
Error	0.346006	0.0144169	24			
Total	0.470213		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.97	0.9	0.6745	Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.85	0.72	0.98	0.88	0.75	1.00	0.05	12.30%	0.00%
25		5	0.92	0.79	1.00	1.00	0.75	1.00	0.05	12.09%	-8.82%
33		5	0.95	0.86	1.00	1.00	0.88	1.00	0.03	7.21%	-11.76%
44		5	0.92	0.84	1.00	0.88	0.88	1.00	0.03	7.40%	-8.82%
59		5	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	-17.65%
78		5	0.90	0.77	1.00	0.88	0.75	1.00	0.05	11.62%	-5.88%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.20	1.00	1.40	1.20	1.00	1.40	0.06	12.15%	0.00%
25		5	1.30	1.10	1.50	1.40	1.00	1.40	0.07	12.12%	-8.97%
33		5	1.30	1.20	1.40	1.40	1.20	1.40	0.05	7.62%	-11.71%
44		5	1.30	1.20	1.40	1.20	1.20	1.40	0.05	7.84%	-8.60%
59		5	1.40	1.40	1.40	1.40	1.40	1.40	0.00	0.00%	-17.93%
78		5	1.30	1.10	1.40	1.20	1.00	1.40	0.07	11.68%	-5.86%

Signature: *[Handwritten Signature]*

CETIS Analytical Report

Report Date: 22 Jul-22 11:22 (p 2 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 19-6459-5019 Endpoint: 7d Survival Rate CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 11:22 Analysis: Nonparametric-Control vs Treatments Status Level: 1
Edit Date: 22 Jul-22 11:05 MD5 Hash: FBC56D3BB79CEB039F3470C94F292D5B Editor ID: 008-522-314-5

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.75	0.75	1.00	0.88	0.88
25		1.00	1.00	0.75	0.88	1.00
33		0.88	1.00	0.88	1.00	1.00
44		0.88	0.88	1.00	0.88	1.00
59		1.00	1.00	1.00	1.00	1.00
78		1.00	1.00	0.88	0.75	0.88

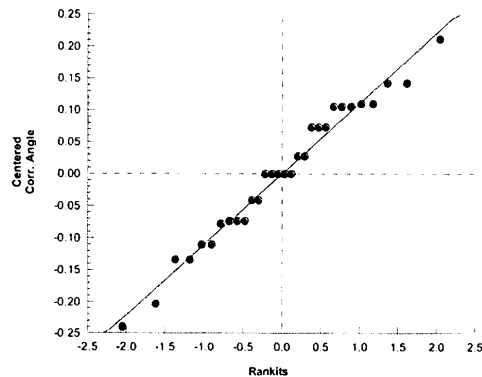
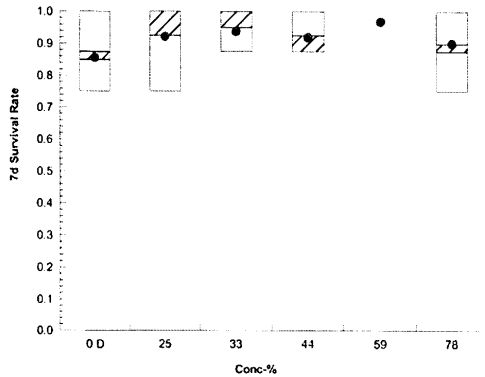
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.00	1.00	1.40	1.20	1.20
25		1.40	1.40	1.00	1.20	1.40
33		1.20	1.40	1.20	1.40	1.40
44		1.20	1.20	1.40	1.20	1.40
59		1.40	1.40	1.40	1.40	1.40
78		1.40	1.40	1.20	1.00	1.20

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	6/8	6/8	8/8	7/8	7/8
25		8/8	8/8	6/8	7/8	8/8
33		7/8	8/8	7/8	8/8	8/8
44		7/8	7/8	8/8	7/8	8/8
59		8/8	8/8	8/8	8/8	8/8
78		8/8	8/8	7/8	6/8	7/8

Graphics



Handwritten notes: 9/5, 7/28/22

CETIS Analytical Report

Report Date: 22 Jul-22 11:22 (p 1 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test Bio-Analytical Laboratories

Analysis ID: 00-6712-6640	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 11:22	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 22 Jul-22 11:05	MD5 Hash: ED91D5F0C590A336BBFDFBA1A494695A	Editor ID: 008-522-314-5
Batch ID: 17-0721-6836	Test Type: Growth-Survival (7d)	Analyst: Lab Tech
Start Date: 12 Jul-22 13:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 19 Jul-22 11:30	Species: Pimephales promelas	Brine:
Test Length: 6d 22h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 07-5191-2389	Code: 2CD145C5	Project: WET Monthly Compliance Test (JUL)
Sample Date: 12 Jul-22	Material: POTW Effluent	Source: AR0021776 (AR0021776)
Receipt Date: 12 Jul-22	CAS (PC):	Station: 001
Sample Age: 13h (1.2 °C)	Client: Nashville Public Works	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSDu	PMSD
Untransformed	C > T	78	>78	---	1.282	0.32	35.97%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		25	24	16	0	8	CDF	0.5394	Non-Significant Effect
		33	33	16	0	8	CDF	0.9907	Non-Significant Effect
		44	32	16	0	8	CDF	0.9821	Non-Significant Effect
		59	36	16	0	8	CDF	0.9991	Non-Significant Effect
		78	32	16	0	8	CDF	0.9821	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits			Decision
		Lower	Upper	Overlap	
Control Resp	0.89	0.25	>>	Yes	Passes Criteria
PMSD	0.36	0.12	0.3	Yes	Above Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.33822	0.067644	5	1.5	0.2383	Non-Significant Effect
Error	1.10886	0.0462023	24			
Total	1.44708		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	20	15	0.0014	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.81	0.9	0.0001	Non-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	0.89	0.79	1	0.91	0.76	0.99	0.038	9.58%	0.00%
25		5	0.87	0.76	0.97	0.85	0.75	0.97	0.039	9.96%	2.80%
33		5	1.2	0.61	1.8	1	0.84	2	0.21	39.15%	-32.77%
44		5	0.96	0.81	1.1	0.95	0.81	1.1	0.054	12.60%	-7.56%
59		5	1	0.89	1.2	1	0.9	1.2	0.052	11.17%	-16.25%
78		5	0.94	0.77	1.1	1	0.71	1.1	0.062	14.70%	-5.32%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.86	0.99	0.91	0.76	0.94
25		0.92	0.85	0.75	0.97	0.84
33		1	1.2	2	0.84	0.9
44		1	0.81	1.1	0.9	0.95
59		1.1	1.2	0.98	0.9	1
78		1.1	1	1	0.71	0.91

EW
7/28/22

CETIS Analytical Report

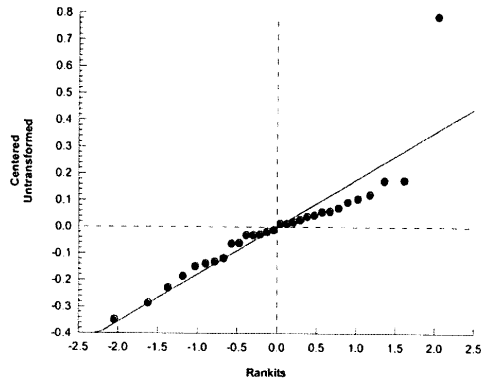
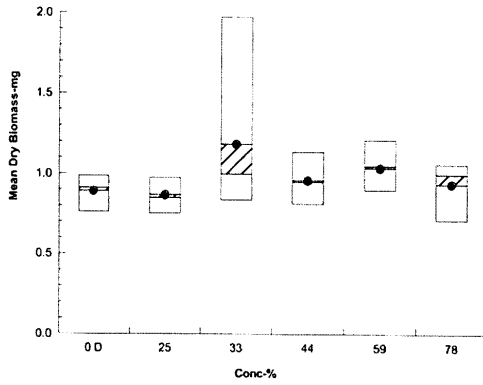
Report Date: 22 Jul-22 11:22 (p 2 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 00-6712-6640	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 22 Jul-22 11:22	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 22 Jul-22 11:05	MD5 Hash: ED91D5F0C590A336BBBDFBA1A494695A	Editor ID: 008-522-314-5

Graphics



CETIS Analytical Report

Report Date: 02 Aug-22 13:56 (p 1 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test Bio-Analytical Laboratories

Analysis ID: 06-2194-0358	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 02 Aug-22 13:55	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Edit Date: 22 Jul-22 11:05	MD5 Hash: ED91D5F0C590A336BBFDFBA1A494695A	Editor ID: 008-522-314-5
Batch ID: 17-0721-6836	Test Type: Growth-Survival (7d)	Analyst: Lab Tech
Start Date: 13 Jul-22 15:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 20 Jul-22 09:55	Species: Pimephales promelas	Brine:
Test Length: 6d 19h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 07-5191-2389	Code: X8394	Project: WET Monthly Compliance Test (JUL)
Sample Date: 12 Jul-22	Material: POTW Effluent	Source: AR0021776 (AR0021776)
Receipt Date: 12 Jul-22	CAS (PC):	Station: 001
Sample Age: 39h (1.2 °C)	Client: Nashville Public Works	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	2116754	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.89	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC10	>78	---	---	<1.282	---	---
IC15	>78	---	---	<1.282	---	---
IC20	>78	---	---	<1.282	---	---
IC25	>78	---	---	<1.282	---	---
IC40	>78	---	---	<1.282	---	---
IC50	>78	---	---	<1.282	---	---

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Calculated Variate						Isotonic Variate	
			Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	5	0.89	0.91	0.76	0.99	9.58%	0.00%	0.99	0.00%
25		5	0.87	0.85	0.75	0.97	9.96%	2.80%	0.99	0.00%
33		5	1.2	1	0.84	2	39.15%	-32.77%	0.99	0.00%
44		5	0.96	0.95	0.81	1.1	12.60%	-7.56%	0.99	0.00%
59		5	1	1	0.9	1.2	11.17%	-16.25%	0.99	0.00%
78		5	0.94	1	0.71	1.1	14.70%	-5.32%	0.94	4.91%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.86	0.99	0.91	0.76	0.94
25		0.92	0.85	0.75	0.97	0.84
33		1	1.2	2	0.84	0.9
44		1	0.81	1.1	0.9	0.95
59		1.1	1.2	0.98	0.9	1
78		1.1	1	1	0.71	0.91

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CETIS Analytical Report

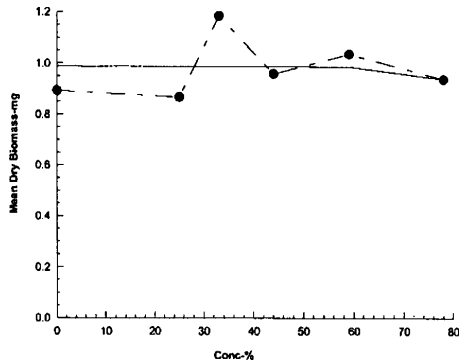
Report Date: 02 Aug-22 13:56 (p 2 of 2)
Test Code/ID: 61BB9A62 / 16-3968-4706

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 06-2194-0358	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 02 Aug-22 13:55	Analysis: Linear interpolation (ICPIN)	Status Level: 1
Edit Date: 22 Jul-22 11:05	MD5 Hash: ED91D5F0C590A336BBDFBA1A494695A	Editor ID: 008-522-314-5

Graphics



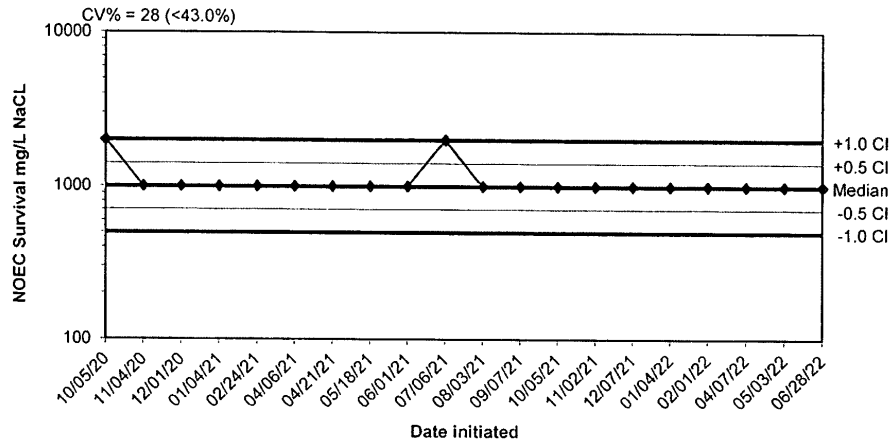
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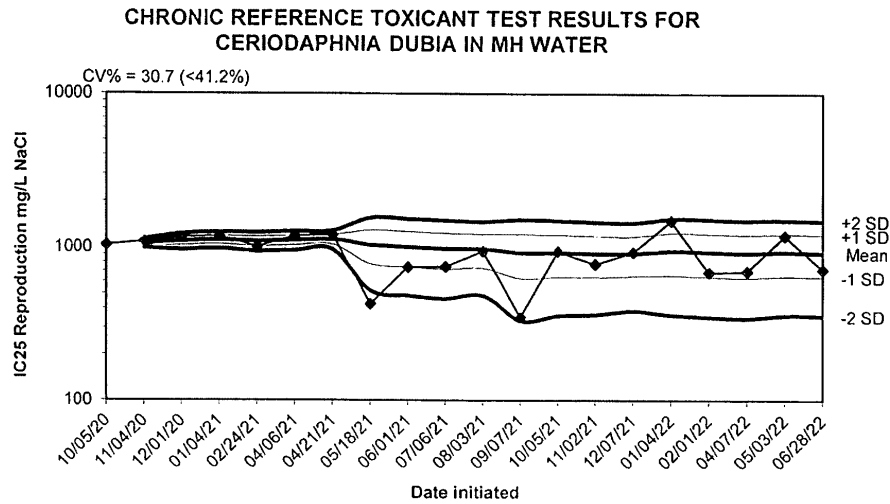
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**APPENDIX D
QUALITY ASSURANCE CHARTS**

CHRONIC REFERENCE TOXICANT TEST RESULTS FOR CERIODAPHNIA DUBIA IN MH WATER

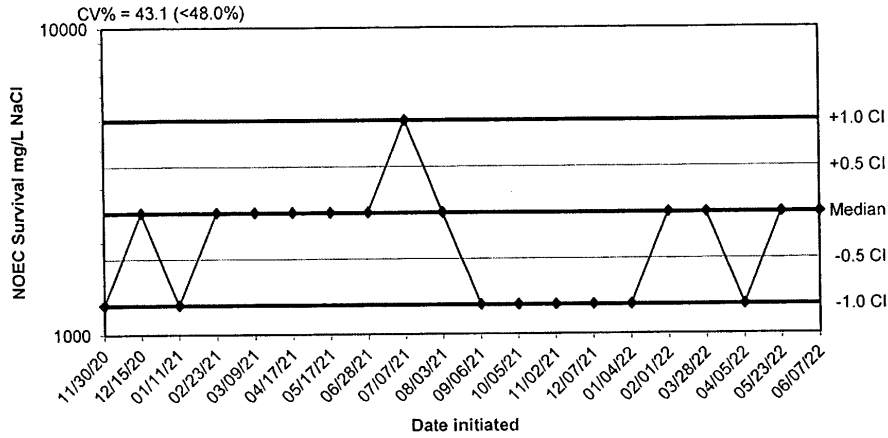


Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
10/05/20	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/04/20	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/01/20	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/04/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/24/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/06/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/21/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/18/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/01/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
07/06/21	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
08/03/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
09/07/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/05/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/02/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/07/21	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/04/22	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/01/22	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/07/22	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/03/22	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/28/22	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000



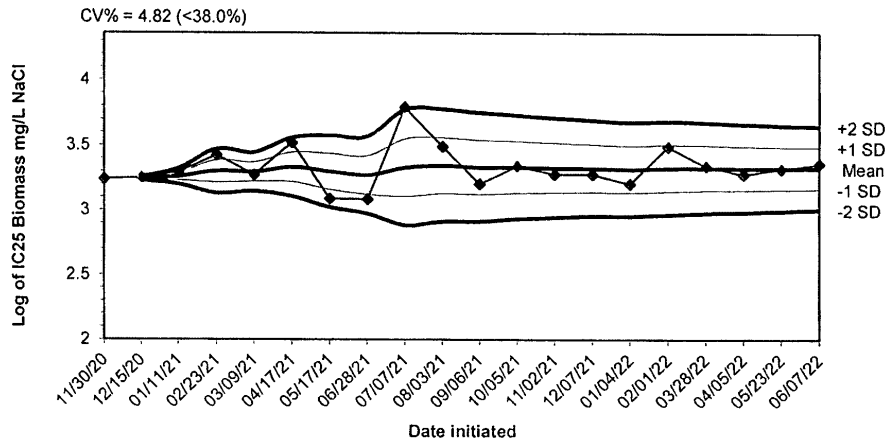
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
10/05/20	1039.6000					
11/04/20	1090.7000	1065.1500	1029.0168	992.8837	1101.2832	1137.4163
12/01/20	1169.5000	1099.9333	1034.4930	969.0526	1165.3737	1230.8141
01/04/21	1187.5000	1121.8250	1052.7458	983.6665	1190.9042	1259.9835
02/24/21	1011.4000	1099.7400	1022.1662	944.5924	1177.3138	1254.8876
04/06/21	1192.5000	1115.2000	1036.1543	957.1086	1194.2457	1273.2914
04/21/21	1210.6000	1128.8286	1048.1625	967.4964	1209.4947	1290.1608
05/18/21	428.1000	1041.2375	782.4808	523.7242	1299.9942	1558.7508
06/01/21	744.7000	1008.2889	746.8388	485.3888	1269.7389	1531.1890
07/06/21	750.0000	982.4600	722.7827	463.1053	1242.1373	1501.8147
08/03/21	950.0000	979.5091	732.9632	486.4173	1226.0550	1472.6009
09/07/21	350.0000	927.0500	629.9264	332.8027	1224.1736	1521.2973
10/05/21	940.0000	928.0462	643.5493	359.0524	1212.5430	1497.0399
11/02/21	780.0000	917.4714	641.2867	365.1020	1193.6561	1469.8408
12/07/21	930.0000	918.3067	652.1488	385.9909	1184.4646	1450.6225
01/04/22	1500.0000	954.6625	659.2555	363.8485	1250.0695	1545.4765
02/01/22	690.0000	939.0941	645.9532	352.8123	1232.2350	1525.3759
04/07/22	700.0000	925.8111	635.8927	345.9743	1215.7295	1505.6479
05/03/22	1200.0000	940.2421	651.5556	362.8691	1228.9286	1517.6151
06/28/22	720.0000	929.2300	643.9601	358.6902	1214.4999	1499.7698

**CHRONIC REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES
PROMELAS IN MH WATER**



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
11/30/20	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
12/15/20	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
01/11/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
02/23/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
03/09/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
04/17/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
05/17/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
06/28/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
07/07/21	5000.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
08/03/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
09/06/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
10/05/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
11/02/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
12/07/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
01/04/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
02/01/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
03/28/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
04/05/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
05/23/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
06/07/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000

**CHRONIC REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES
PROMELAS IN MH WATER**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/30/20	3.2384					
12/15/20	3.2489	3.2437	3.2363	3.2289	3.2511	3.2585
01/11/21	3.2962	3.2612	3.2304	3.1996	3.2920	3.3228
02/23/21	3.4237	3.3018	3.2168	3.1317	3.3869	3.4719
03/09/21	3.2733	3.2961	3.2214	3.1466	3.3709	3.4456
04/17/21	3.5199	3.3334	3.2202	3.1070	3.4466	3.5599
05/17/21	3.0878	3.2983	3.1594	3.0205	3.4373	3.5762
06/28/21	3.0854	3.2717	3.1227	2.9737	3.4208	3.5698
07/07/21	3.7924	3.3296	3.1070	2.8844	3.5522	3.7748
08/03/21	3.4914	3.3458	3.1297	2.9137	3.5618	3.7778
09/06/21	3.2041	3.3329	3.1235	2.9142	3.5422	3.7516
10/05/21	3.3424	3.3337	3.1341	2.9344	3.5333	3.7329
11/02/21	3.2788	3.3294	3.1377	2.9460	3.5212	3.7129
12/07/21	3.2788	3.3258	3.1411	2.9564	3.5105	3.6952
01/04/22	3.2041	3.3177	3.1370	2.9562	3.4985	3.6792
02/01/22	3.4914	3.3286	3.1486	2.9687	3.5085	3.6884
03/28/22	3.3424	3.3294	3.1551	2.9809	3.5036	3.6779
04/05/22	3.2788	3.3266	3.1571	2.9876	3.4960	3.6655
05/23/22	3.3222	3.3263	3.1616	2.9970	3.4910	3.6557
06/07/22	3.3617	3.3281	3.1676	3.0071	3.4886	3.6491

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**APPENDIX E
AGENCY FORMS**

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia Survival and Reproduction

Permittee: Nashville Public Works NPDES No.: AR0021776/ AFIN 31-00036

	Time	Date	To	Time	Date
Composite 1 Collected From	0630	07/10/22	To	0630	07/11/22
Composite 2 Collected From	0630	07/12/22	To	0630	07/13/22
Composite 3 Collected From	0715	07/14/22	To	0715	07/15/22
Test initiated:	1120	am/pm			07/12/22 Date
Test terminated:	1430	am/pm			07/19/22 Date
Dilution water used:	Receiving		X		Reconstituted

PERCENT SURVIVAL

Time of Reading	Percent Effluent					
	0	25.0	33.0	44.0	59.0	78.0
24h	100.0	100.0	100.0	100.0	100.0	100.0
48h	100.0	100.0	100.0	100.0	100.0	100.0
End of test	100.0	80.0	100.0	100.0	90.0	100.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ END OF TEST

Rep	0	25.0	33.0	44.0	59.0	78.0
A	22	22	23	22	22	24
B	24	27	25	31	23	21
C	26	29	21	26	24	22
D	24	23	25	20	29	21
E	21	5	23	25	28	27
F	22	30	25	27	29	24
G	25	26	27	27	26	24
H	13	4	27	22	28	25
I	25	13	25	26	26	18
J	23	23	26	24	10	23
Surv. Mean	22.0	22.0	25.0	25.0	26.0	23.0
Total Mean	22.0	20.0	25.0	25.0	24.0	23.0
CV%*	16.40	39.59	7.65	12.65	10.03	10.98

*coefficient of variation = standard deviation x 100/mean. D=dead adult
PMSD = 23.23%

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Ceriodaphnia dubia
Survival and Reproduction (continued)

1. Fisher's Exact Test:

Is the mean survival at the end of the test significantly different (p=.05) than the control survival for the % effluent corresponding to (lethality):

a) LOW FLOW OR CRITICAL DILUTION (78.0%):	YES	X	NO
b) ½ LOW FLOW DILUTION (NA%):	YES		NO

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different (p=.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 (78.0%):	YES	X	NO
b) ½ LOW FLOW DILUTION (NA%):	YES		NO

- 3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0
- 4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):
- 5. Enter response to item 3 on DMR Form, parameter #TEP3B.
- 6. Enter response to item 4 on DMR Form, parameter #TFP3B.
- 7. Enter percent effluent corresponding to each NOEC below:
 - a) NOEC survival: 78.0 % effluent
 - b) NOEC reproduction: 78.0 % effluent

Biomonitoring Form
Chronic Toxicity Summary Form for *Ceriodaphnia dubia*
Chemical Parameters Chart

Permittees: Nashville Public Works
 NPDES#: ARO021776/AFIN 31-00036
 Contact: Larry Dunaway
 Analysts: Ware, Briggs

Sample #1 Collected: 7/11/2022 Time: 630
 Sample #2 Collected: 7/13/2022 Time: 630
 Sample #3 Collected: 7/15/2022 Time: 715
 Test Begin: 7/12/2022 Time: 1120
 Test End: 7/19/2022 Time: 1430

Dilution:		44.0%						
Day:		1	2	3	4	5	6	7
T (°C)		24.0	23.0	24.4	23.9	24.0	24.6	23.2
DO Initial		7.7	7.3	7.2	8.2	8.1	7.9	8.3
DO Final		7.9	7.6	8.2	7.9	7.6	8.1	
pH Initial		7.6	7.4	7.3	7.2	7.8	7.6	7.5
pH Final		7.3	7.7	7.3	7.8	7.8	7.4	
Conductivity		309.0	308.0	312.0	330.0	302.0	305.0	
Alkalinity		68.0			60.0			
Hardness		100.0			88.0			
Chlorine		<0.5			<0.5			
Dilution:		25.0%						
Day:		1	2	3	4	5	6	7
T (°C)		24.0	23.0	24.4	23.9	24.0	24.6	23.2
DO Initial		8.6	7.4	7.3	8.1	8.1	7.7	8.2
DO Final		7.7	7.5	7.6	7.9	7.7	7.8	
pH Initial		7.8	7.3	7.2	7.3	7.7	7.6	8.3
pH Final		7.1	7.6	7.5	7.8	7.7	7.6	
Conductivity		322.0	329.0	327.0	335.0	325.0	325.0	
Alkalinity								
Hardness								
Chlorine								
Dilution:		33.0%						
Day:		1	2	3	4	5	6	7
T (°C)		24.0	23.0	24.4	23.9	24.0	24.6	23.2
DO Initial		8.6	7.7	7.3	8.2	8.2	7.8	7.9
DO Final		7.6	7.6	7.7	7.9	7.8	7.8	
pH Initial		7.8	7.5	7.4	7.5	7.7	7.9	8.2
pH Final		7.3	7.5	7.5	7.8	7.6	7.5	
Conductivity		325.0	333.0	332.0	343.0	335.0	331.0	
Alkalinity								
Hardness								
Chlorine								
Dilution:		78.0%						
Day:		1	2	3	4	5	6	7
T (°C)		24.0	23.0	24.4	23.9	24.0	24.6	23.2
DO Initial		8.6	7.6	7.5	8.2	8.3	7.4	8.3
DO Final		7.7	7.3	7.3	7.9	7.9	7.9	
pH Initial		7.8	7.5	7.4	7.5	7.7	7.6	7.9
pH Final		7.3	7.4	7.4	7.4	7.5	7.4	
Conductivity		360.0	368.0	367.0	389.0	379.0	361.0	
Alkalinity		60.0	68.0	68.0	88.0			
Hardness		100.0	116.0	100.0	100.0			
Chlorine		<0.5	<0.5	<0.5	<0.5			

Comments:

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**SUMMARY REPORTING FORMS CHRONIC BIOMONITORING
FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(*Pimephales promelas*)**

Permittee: Nashville Public Works NPDES No.: AR0021776/ AFIN 31-00036

	Time	Date	To	Time	Date
Composite 1 Collected from:	0630	07/10/22		0630	07/11/22
Composite 2 Collected from:	0630	07/12/22		0630	07/13/22
Composite 3 Collected from:	0715	07/14/22		0715	07/15/22
Test initiated:	1300	am/pm		07/12/22	date
Test terminated:	1130	am/pm		07/19/22	date
Dilution water used:		Receiving	X	Reconstituted	

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV%*
	A	B	C	D	E	24h	48h	7 days	
0	75.0	75.0	100.0	88.0	88.0	100.0	100.0	85.0	12.15
25.0	100.0	100.0	75.0	88.0	100.0	100.0	100.0	92.0	12.12
33.0	88.0	100.0	88.0	100.0	100.0	100.0	100.0	95.0	7.62
44.0	88.0	88.0	100.0	88.0	100.0	100.0	100.0	92.0	7.84
59.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.00
78.0	100.0	100.0	88.0	75.0	88.0	100.0	100.0	90.0	11.68

DATA TABLE FOR GROWTH

Effluent Conc. %	Average Dry Weight in milligrams in replicate chambers					Mean Dry Weight mg	CV*
	A	B	C	D	E		
0	0.860	0.990	0.910	0.760	0.940	0.890	9.58
25.0	0.920	0.850	0.750	0.970	0.840	0.870	9.96
33.0	1.000	1.200	2.000	0.840	0.900	1.200	39.15
44.0	1.000	0.810	1.100	0.900	0.950	0.960	12.60
59.0	1.100	1.200	0.980	0.900	1.000	1.000	11.17
78.0	1.100	1.100	1.100	0.710	0.910	0.940	14.70

*coefficient of variation = standard deviation x 100/mean.

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FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL (cont)
(Pimephales promelas)

1. Dunnett's Procedure or Steels Many-One Rank Test as appropriate:

Is the mean survival at 7 days significantly different (p=.05) than the control survival for the % effluent corresponding to:

a) LOW FLOW OR CRITICAL DILUTION (78.0 %)	YES	X	NO
b) 1/2 LOW FLOW DILUTION (NA %)	YES		NO

2. Dunnett's Procedure (or appropriate test):

Is the mean dry weight (growth) at 7 days significantly different (p=.05) than the control's dry weight for the % effluent corresponding to (significant non-lethal effects):

a) LOW FLOW OR CRITICAL DILUTION (78.0 %)	YES	X	NO
b) 1/2 LOW FLOW DILUTION (NA %)	YES		NO

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):

5. Enter response to item 3 on DMR Form, parameter #TEP6C.

6. Enter response to item 4 on DMR Form, parameter #TFP6C.

7. Enter percent effluent corresponding to each NOEC below:

a.) NOEC survival	78.0% effluent.
b.) NOEC growth	78.0% effluent.

Biomonitoring Form
Chronic Toxicity Summary Form for *Zlmeqbales.zromsias*
Chemical Parameters Chart

Permittee:		Nashville Public Works		Sample #1 Collected:		7/11/2022		Time:		630	
MPDES#:		AR0021776/AFIN 31-00036		Sample #2 Collected:		7/13/2022		Time:		630	
Contact:		Larry Dunaway		Sample #3 Collected:		7/15/2022		Time:		715	
Analyst:		Ware, Ware, Briggs, Morado		Test Begin:		7/12/2022		Time:		1300	
Dilution:		0%		Test End:		7/19/2022		Time:		1130	
Dilution:	0%	1	2	3	4	5	6	7			
Day:		1	2	3	4	5	6	7			
T (°C)	24.9	25.1	24.6	24.8	24.5	24.8	24.8	25.4			
DO Initial	7.7	7.6	6.8	6.3	6.0	6.1	6.1	7.0			
DO Final	8.0	7.9	7.7	7.9	7.6	7.8					
pH Initial	7.4	7.3	7.1	7.0	7.8	7.4	7.4	7.3			
pH Final	7.3	7.4	7.3	7.3	8.0	8.2					
Conductivity	310.0	316.0	313.0	304.0	308.0	302.0					
Alkalinity	64.0			56.0							
Hardness	88.0			84.0							
Chlorine	<0.5			<0.5							
Dilution:	25.0%	1	2	3	4	5	6	7			
Day:		1	2	3	4	5	6	7			
T (°C)	24.9	25.1	24.6	24.8	24.5	24.8	24.8	25.4			
DO Initial	7.2	7.5	6.1	6.2	6.0	6.1	6.1	7.2			
DO Final	7.9	7.9	7.4	7.2	7.7	7.9					
pH Initial	7.2	7.3	7.1	7.0	7.3	7.1	7.1	7.3			
pH Final	7.2	7.4	7.7	7.4	7.8	7.9					
Conductivity	324.0	331.0	328.0	327.0	325.0	321.0					
Alkalinity											
Hardness											
Chlorine											
Dilution:	33.0%	1	2	3	4	5	6	7			
Day:		1	2	3	4	5	6	7			
T (°C)	24.9	25.1	24.6	24.8	24.5	24.8	24.8	25.4			
DO Initial	7.3	7.3	6.2	6.2	6.1	6.3	6.3	7.0			
DO Final	7.9	7.9	7.3	7.2	7.7	8.1					
pH Initial	7.3	7.4	7.1	7.1	7.1	7.1	7.1	7.2			
pH Final	7.3	7.40	7.6	7.4	7.7	7.7					
Alkalinity											
Hardness											
Conductivity	330.0	335.0	332.0	338.0	335.0	329.0					
Chlorine											

Comments:

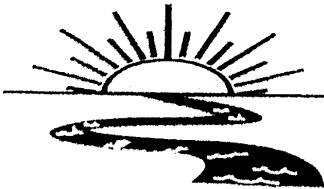
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**APPENDIX F
REPORT QUALITY ASSURANCE FORM**



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

(318) 745-2772
1-800-250-1248
Fax: (318) 745-2773

REPORT QUALITY ASSURANCE FORM

Client: Nashville Public Works

Project#: X8394

Chain of Custody Documents Checked by: Emilia 7/25/22
Technician/Date

Raw Data Documents Checked by: Emilia 7/25/22
Technician/Date

Statistical Analysis Package Checked by: EOB 7/28/22
Quality Manager/Date

Quality Control Data Checked by: EOB 8/2/22
Quality Manager/Date

Report Checked by: EOB 8/2/22
Quality Manager/Date

I certify that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information contained in this document, to the best of my knowledge, is true, accurate and complete.

Erin D. Bragg BS
Quality Manager

8/2/22
Date

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