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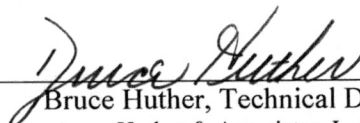
**NORTH LITTLE ROCK WASTEWATER UTILITY  
FAULKNER LAKE PLANT  
OUTFALL 001**

Chronic Biomonitoring Report  
Permit Number NPDES AR0020303  
AFIN 60-00274

*Ceriodaphnia dubia*  
*Pimephales promelas*

September 20, 2016

Reviewed by:



Bruce Huther, Technical Director

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TOXICITY TEST REPORT - CHRONIC

Client .....North Little Rock Wastewater Utility      Sample .....Outfall 001  
Facility .....Faulkner Lake Plant      Laboratory I.D. ....26045  
Permit No. ....NPDES AR0020303      Begin Date .....September 20, 2016

Results: **Pass** *Ceriodaphnia dubia* survival and reproduction and *Pimephales promelas* survival and growth at the critical low flow concentration (8% effluent).

SAMPLE COLLECTION

Composite effluent samples from North Little Rock Wastewater Utility, Faulkner Lake Plant were delivered by Greyhound Package Express courier to Huther & Associates on September 20, September 22, and September 24, 2016. Effluent samples were collected and composited from Outfall 001 using an automatic sampler by facility personnel. Two toxicity tests were requested: a seven-day *Ceriodaphnia dubia* survival and reproduction test (EPA Method 1002.0), and a seven-day *Pimephales promelas* larval survival and growth test (EPA Method 1000.0). Test organisms, procedures and quality assurance requirements were in accordance with the EPA manual, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013).

The effluent samples were analyzed for total residual chlorine (Standard Methods, 22<sup>nd</sup> Edition, 4500-Cl D) and contained <0.01 mg/L, <0.01 mg/L, and <0.01 mg/L, respectively. Effluent and laboratory dilution water hardness, alkalinity, conductivity, pH, and dissolved oxygen data were collected and recorded.

TEST SETUP  
*Ceriodaphnia dubia*



The seven-day *Ceriodaphnia dubia* survival and reproduction test was initiated at 1620 hours, September 20, 2016. Five concentrations were prepared (3%, 5%, 6%, 8%, and 11% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (Arkansas River). The test was conducted in 25 mL distilled water rinsed plastic beakers containing 15 mL of solution (one organism per beaker, ten beakers per concentration). *C. dubia* neonates were less than 24-hours-old and within eight hours of the same age at test initiation. Neonates were placed in beakers following a randomized block test design. Fresh solutions were prepared and renewed daily. Daily feeding consisted of 0.5 mL *Selenastrum capricornutum* and cerophyll per test chamber. The test proceeded for seven days during which survival, reproduction and water quality data were collected daily.

A control of ten replicate beakers containing one neonate each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1620 hours, September 27, 2016. Survival and reproduction data were statistically analyzed ( $p = 0.05$ ) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

**SURVIVAL*****Ceriodaphnia dubia***

There was 100% survival to *C. dubia* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

**LOEC: Not Applicable**

**NOEC: 11% Effluent**

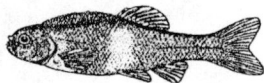
**REPRODUCTION*****Ceriodaphnia dubia***

*C. dubia* reproduction data were normally distributed at the 0.01 alpha level (13.277) using Chi-Square test for normality. Reproduction data were homogeneous using Bartlett's test at the 0.01 alpha level (15.09) without data transformations. Therefore, a parametric test was performed on the homogeneous data. Dunnett's test on *C. dubia* reproduction data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

**LOEC: Not Applicable**

**NOEC: 11% Effluent**

**PMSD: 9.6%**

**TEST SETUP*****Pimephales promelas***

The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1620 hours, September 20, 2016. Five concentrations were prepared (3%, 5%, 6%, 8%, and 11% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (Arkansas River). The test was conducted in 300 mL distilled water rinsed plastic beakers containing 250 mL of solution (eight larvae per beaker, five beakers per concentration). *P. promelas* larvae were less than 24-hours-old at test initiation and originated from a minimum of three in-house spawnings. Fresh solutions were prepared and renewed daily. Larvae in each test chamber were fed <24-hour-old *Artemia* (brine shrimp) three times per day. The test proceeded for seven days during which survival and water quality data were collected daily.

A control of five replicate chambers containing eight larvae each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1620 hours, September 27, 2016. At test termination, all larvae were sacrificed, dried for 24-hours, and weighed. Survival and growth (weight) data were statistically analyzed ( $p = 0.05$ ) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

**SURVIVAL**  
*Pimephales promelas*

There was 100% survival to *P. promelas* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

**LOEC: Not Applicable**  
**NOEC: 11% Effluent**

**GROWTH**  
*Pimephales promelas*

*P. promelas* growth data were normally distributed at the 0.01 alpha level (0.900) using Shapiro Wilk's test for normality. Growth data were homogeneous using Bartlett's test at the 0.01 alpha level (15.09) without data transformations. Therefore, a parametric test was performed on the homogeneous data. Dunnett's test on *P. promelas* growth data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

**LOEC: Not Applicable** **PMSD: 10.0%**  
**NOEC: 11% Effluent**

**SUMMARY**

There were no statistically significant differences between the control and the critical low flow concentration (8% effluent) for *C. dubia* survival and reproduction and *P. promelas* survival and growth. Based on biomonitoring requirements for Outfall 001 contained in Permit Number NPDES AR0020303 for North Little Rock Wastewater Utility, Faulkner Lake Plant, Outfall 001 **passed** for this testing period.

**Huth and Associates**  
**7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test**

CLIENT <b>North Little Rock, Faulkner Lake Plant</b>	SAMPLE TYPE <b>24 Hour Composite</b>
NPDES # <b>AR0020303</b>	DATE COLLECTED <b>09/19/16 09/21/16 09/23/16</b>
LAB ID # <b>26045</b>	DATE RECEIVED <b>09/20/16 09/22/16 09/24/16</b>
TEST TYPE <b>7 Day Chronic</b>	BEGIN DATE/TIME <b>09/20/16 1620</b>
TEST ORGANISM <b><i>Ceriodaphnia dubia</i></b>	END DATE/TIME <b>09/27/16 1620</b>
ORGANISM AGE <b>&lt; 24 Hours</b>	TEST TEMPERATURE (°C) <b>25 ± 1</b>
ORGANISM SOURCE <b>In House</b>	PHOTO PERIOD <b>16-hr. Light 8-hr. Dark</b>
RECEIVING WATER <b>Arkansas River</b>	LIGHT INTENSITY <b>50-100 ft. cndl.</b>
DILUTION WATER <b>Laboratory</b>	TECHNICIAN <b>M. Horner</b>

**SURVIVAL & REPRODUCTION SUMMARY**

Control											
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	
09/21/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/22/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/23/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/24/16	2	5	4	3	5	5	4	2	5	3	
	2	5	4	3	5	5	4	2	5	3	
09/25/16	A	A	A	A	A	A	A	A	A	A	
	2	5	4	3	5	5	4	2	5	3	
09/26/16	7	7	6	6	10	6	11	9	11	7	
	9	12	10	9	15	11	15	11	16	10	
09/27/16	15	12	13	13	13	12	14	14	13	12	
	24	24	23	22	28	23	29	25	29	22	
x # Young 24.9                      C.V. 11.11% x% Survival 100%                      C.V. 0.00%											

3% Effluent											
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	
09/21/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/22/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/23/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/24/16	3	4	5	3	3	2	5	4	2	3	
	3	4	5	3	3	2	5	4	2	3	
09/25/16	A	A	A	A	A	A	A	A	A	A	
	3	4	5	3	3	2	5	4	2	3	
09/26/16	10	7	11	11	7	7	10	9	11	8	
	13	11	16	14	10	9	15	13	13	11	
09/27/16	12	15	13	14	14	12	12	13	12	14	
	25	26	29	28	24	21	27	26	25	25	
x # Young 25.6                      C.V. 8.68% x% Survival 100%                      C.V. 0.00%											

5% Effluent											
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	
09/21/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/22/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/23/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/24/16	4	2	3	4	3	3	5	4	2	3	
	4	2	3	4	3	3	5	4	2	3	
09/25/16	A	A	A	A	A	A	A	A	A	A	
	4	2	3	4	3	3	5	4	2	3	
09/26/16	10	8	8	11	8	8	9	7	8	7	
	14	10	11	15	11	11	14	11	10	10	
09/27/16	14	13	12	13	15	13	12	13	14	14	
	28	23	23	28	26	24	26	24	24	24	
x # Young 25.0                      C.V. 7.54% x% Survival 100%                      C.V. 0.00%											

6% Effluent											
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	
09/21/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/22/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/23/16	A	A	A	A	A	A	A	A	A	A	
	0	0	0	0	0	0	0	0	0	0	
09/24/16	2	4	2	3	5	4	2	3	3	4	
	2	4	2	3	5	4	2	3	3	4	
09/25/16	A	A	A	A	A	A	A	A	A	A	
	2	4	2	3	5	4	2	3	3	4	
09/26/16	9	10	10	11	7	10	7	7	10	8	
	11	14	12	14	12	14	9	10	13	12	
09/27/16	14	12	14	13	13	14	12	13	13	12	
	25	26	26	27	25	28	21	23	26	24	
x # Young 25.1                      C.V. 8.07% x% Survival 100%                      C.V. 0.00%											

where: A = Alive  
 5 = Alive, 5 young  
 D = Dead  
 D5 = 5 Young, Female died

ex 1: 

A
4

 alive today  
 total young to date

ex 2: 

5
12

 alive, 5 young today  
 total young to date

Huth and Associates  
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

NLR, Faulkner

Lab ID# 26045

Test Date: September 20, 2016

8% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
09/21/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/22/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/23/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/24/16	3	5	2	4	2	2	3	4	3	4
	3	5	2	4	2	2	3	4	3	4
09/25/16	A	A	A	A	A	A	A	A	A	A
	3	5	2	4	2	2	3	4	3	4
09/26/16	9	11	7	8	8	9	9	8	11	7
	12	16	9	12	10	11	12	12	14	11
09/27/16	15	12	12	13	13	13	14	12	13	13
	27	28	21	25	23	24	26	24	27	24
x # Young 24.9                      C.V. 8.56% x% Survival 100%                      C.V. 0.00%										

11% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
09/21/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/22/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/23/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
09/24/16	5	4	2	2	3	5	2	5	4	4
	5	4	2	2	3	5	2	5	4	4
09/25/16	A	A	A	A	A	A	A	A	A	A
	5	4	2	2	3	5	2	5	4	4
09/26/16	11	6	10	11	7	11	7	8	10	9
	16	10	12	13	10	16	9	13	14	13
09/27/16	14	12	13	13	14	12	12	12	13	14
	30	22	25	26	24	28	21	25	27	27
x # Young 25.5                      C.V. 10.66% x% Survival 100%                      C.V. 0.00%										

where: A = Alive  
 5 = Alive, 5 young  
 D = Dead  
 D5 = 5 Young, Female died

ex 1: 

A
4

 alive today  
 total young to date

ex 2: 

5
12

 alive, 5 young today  
 total young to date

Huthner and Associates  
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

NLR, Faulkner

Lab ID# 26045

Test Date: September 20, 2016

**WET CHEMISTRY MEASUREMENTS**

Date	Time	Temp	Samp. No.	pH of Solution						Analyst
				CON	3%	5%	6%	8%	11%	
09/20/16	Start	25.0	1	8.04	8.11	8.11	8.07	8.05	8.09	LT
09/21/16	24 Hr.	25.4	1	8.22	8.29	8.31	8.24	8.23	8.14	TB
09/21/16	Renew	25.4	1	8.11	8.16	8.09	8.10	8.03	8.06	RP
09/22/16	48 Hr.	25.1	1	7.97	7.99	7.99	7.96	7.98	7.99	LT
09/22/16	Renew	25.0	2	8.13	8.12	8.06	8.05	8.04	8.01	LT
09/23/16	72 Hr.	25.1	2	8.10	8.04	7.99	7.99	7.97	7.96	LT
09/23/16	Renew	25.2	2	8.30	8.24	8.19	8.15	8.15	8.04	LT
09/24/16	96 Hr.	25.1	2	8.12	8.11	8.04	8.02	8.01	7.97	RP
09/24/16	Renew	25.1	3	8.09	8.07	8.02	8.01	7.98	7.94	RP
09/25/16	120 Hr.	25.5	3	7.90	7.84	7.83	7.82	7.83	7.80	RP
09/25/16	Renew	25.0	3	7.90	7.91	7.89	7.85	7.83	7.82	RP
09/26/16	144 Hr.	25.3	3	7.95	7.92	7.86	7.84	7.83	7.80	RP
09/26/16	Renew	24.8	3	7.86	7.84	7.83	7.81	7.80	7.76	RP
09/27/16	168 Hr.	24.3	3	8.15	8.12	8.09	8.08	8.09	8.08	LT

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst
				CON	3%	5%	6%	8%	11%	
09/20/16	Start	25.0	1	7.64	7.40	7.52	7.45	7.39	7.55	LT
09/21/16	24 Hr.	25.4	1	7.81	7.64	7.55	7.46	7.53	7.51	TB
09/21/16	Renew	25.4	1	7.55	7.54	7.65	7.38	7.37	7.46	RP
09/22/16	48 Hr.	25.1	1	7.57	7.76	7.68	7.72	7.72	7.84	LT
09/22/16	Renew	25.0	2	7.75	7.69	7.76	7.71	7.67	7.68	LT
09/23/16	72 Hr.	25.1	2	8.21	7.83	7.76	7.45	7.40	7.51	LT
09/23/16	Renew	25.2	2	7.17	7.02	6.95	7.10	6.99	6.97	LT
09/24/16	96 Hr.	25.1	2	7.47	7.39	7.63	7.69	7.56	8.12	RP
09/24/16	Renew	25.1	3	8.04	7.83	7.67	7.46	7.65	7.54	RP
09/25/16	120 Hr.	25.5	3	7.39	7.32	7.27	7.47	7.46	7.57	RP
09/25/16	Renew	25.0	3	7.58	7.58	7.72	7.57	7.91	7.64	RP
09/26/16	144 Hr.	25.3	3	7.79	7.76	7.73	7.73	7.73	7.72	RP
09/26/16	Renew	24.8	3	7.82	7.75	7.64	7.74	7.58	7.65	RP
09/27/16	168 Hr.	24.3	3	7.13	7.34	7.87	7.62	7.41	8.00	LT



Huther and Associates  
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

NLR, Faulkner

Lab ID# 26045

Test Date: September 20, 2016

**INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT**

Date	Samp. No.	pH <sup>1</sup>	DO <sup>1</sup>	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. μS/cm <sup>1</sup>	Resid.Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
09/20/16	1	6.93	8.53	52	46	315	<0.01	N/A	RK
09/22/16	2	7.19	8.60	56	34	424	<0.01	N/A	RK
09/24/16	3	6.79	8.44	60	40	366	<0.01	N/A	RK
09/20/16	Con	8.04	7.64	108	62	370	-	-	RK

<sup>1</sup> Measurements taken in 100% solution.

**7-DAY CHRONIC TOXICITY TEST  
PIMEPHALES PROMELAS (fathead minnow) SURVIVAL**

CLIENT/FACILITY NLR-FALKNER  
 OUTFALL # 001 PROJECT # 26045  
 ORGANISM ID# PPO-16-263

DATE/TIME STARTED 9-20-16 MH 1620  
 DATE/TIME ENDED 9-27-16 MH 1620

Conc.	A					B					C					D					E									
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E					
CON	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
3	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
11	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Initials Date/Time	9-21-16 RB 1620					9-22-16 RB 0825					9-23-16 RK 0810					9-24-16 RB 0820					9-25-16 RB 0900									

Conc.	A					B					Mean Survival	C.V. %
	A	B	C	D	E	A	B	C	D	E		
CON	8	8	8	8	8	8	8	8	8	8	100.0	0.00
3	8	8	8	8	8	8	8	8	8	8	100.0	0.00
5	8	8	8	8	8	8	8	8	8	8	100.0	0.00
6	8	8	8	8	8	8	8	8	8	8	100.0	0.00
8	8	8	8	8	8	8	8	8	8	8	100.0	0.00
11	8	8	8	8	8	8	8	8	8	8	100.0	0.00
Initials Date/Time	9-26-16 RK 0820					9-27-16 MH 1620						





Huther and Associates, Inc.

environmental toxicologists, biologists, and consultants

Client / Facility NLR - Faulkner  
Lab ID Number 26045  
Outfall Number 001  
Test Date 9-20-16

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH	DO	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. umhos/cm <sup>1</sup>	Resid. Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
9-20	1	6.93	8.53	52	46	315	<0.01	N/A	RK
9-22	2	7.19	8.60	56	34	424	↓	↓	↓
9-24	3	6.79	8.44	60	40	366	↓	↓	↓
9-20	Con	8.04	7.64	108	62	370	—	—	↓

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp. No.	pH	DO	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. umhos/cm <sup>1</sup>	Resid. Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst

Notes:

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**APPENDIX B**  
**REFERENCE TOXICANTS**



**CHRONIC REFERENCE TOXICANT TEST RESULTS**

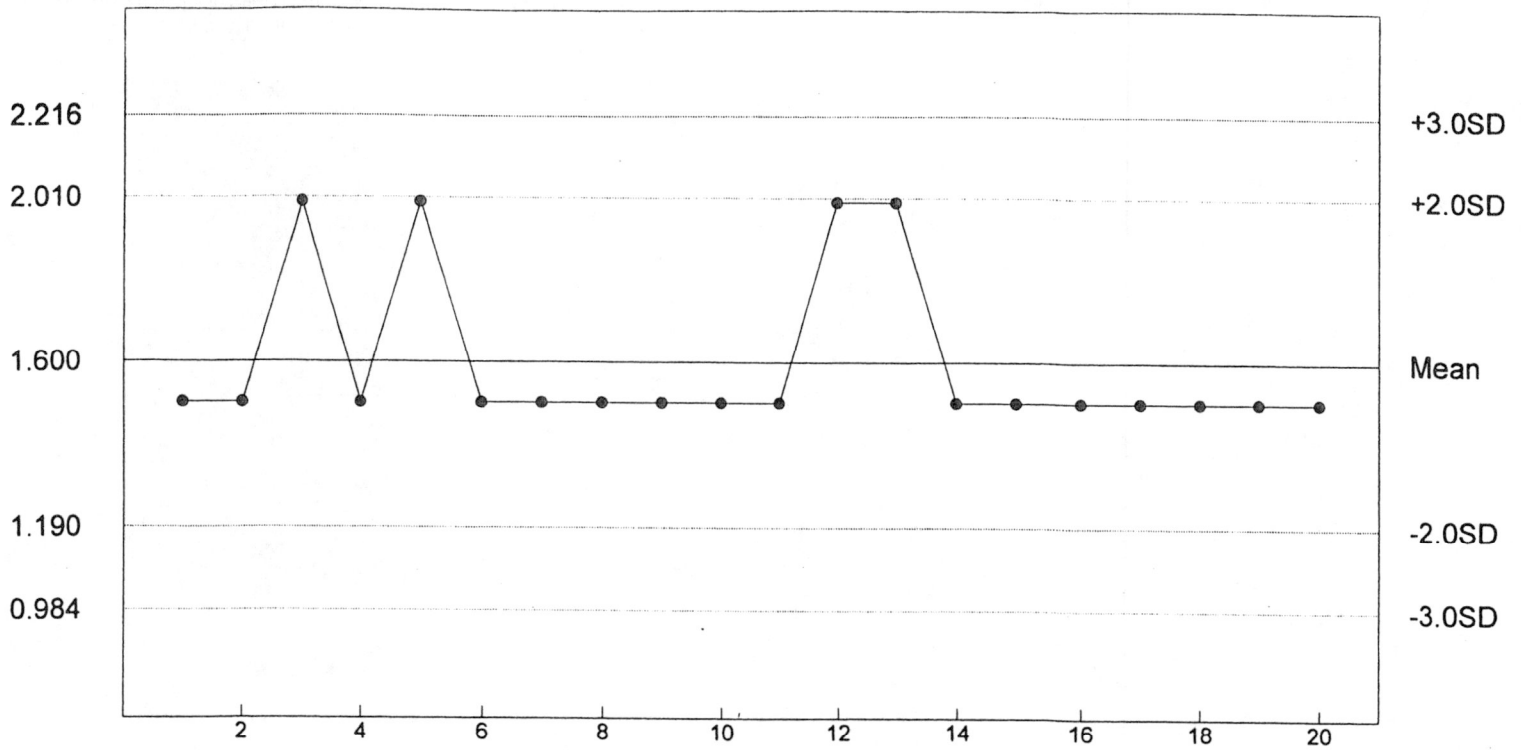
SPECIES: *Ceriodaphnia dubia*  
CHEMICAL: Sodium Chloride  
DURATION: 7-Days  
TEST NUMBER: 9  
TEST DATE: 09/01/16 - 09/08/16  
1600 Hrs - 1600 Hrs  
STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	1
2.0	10	4
2.5	10	10
3.0	10	10

LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR REPRODUCTION	NOEC FOR REPRODUCTION
2.0 g/L	1.5 g/L	1.0 g/L	0.5 g/L

Reference Tox Sodium Chloride g/L

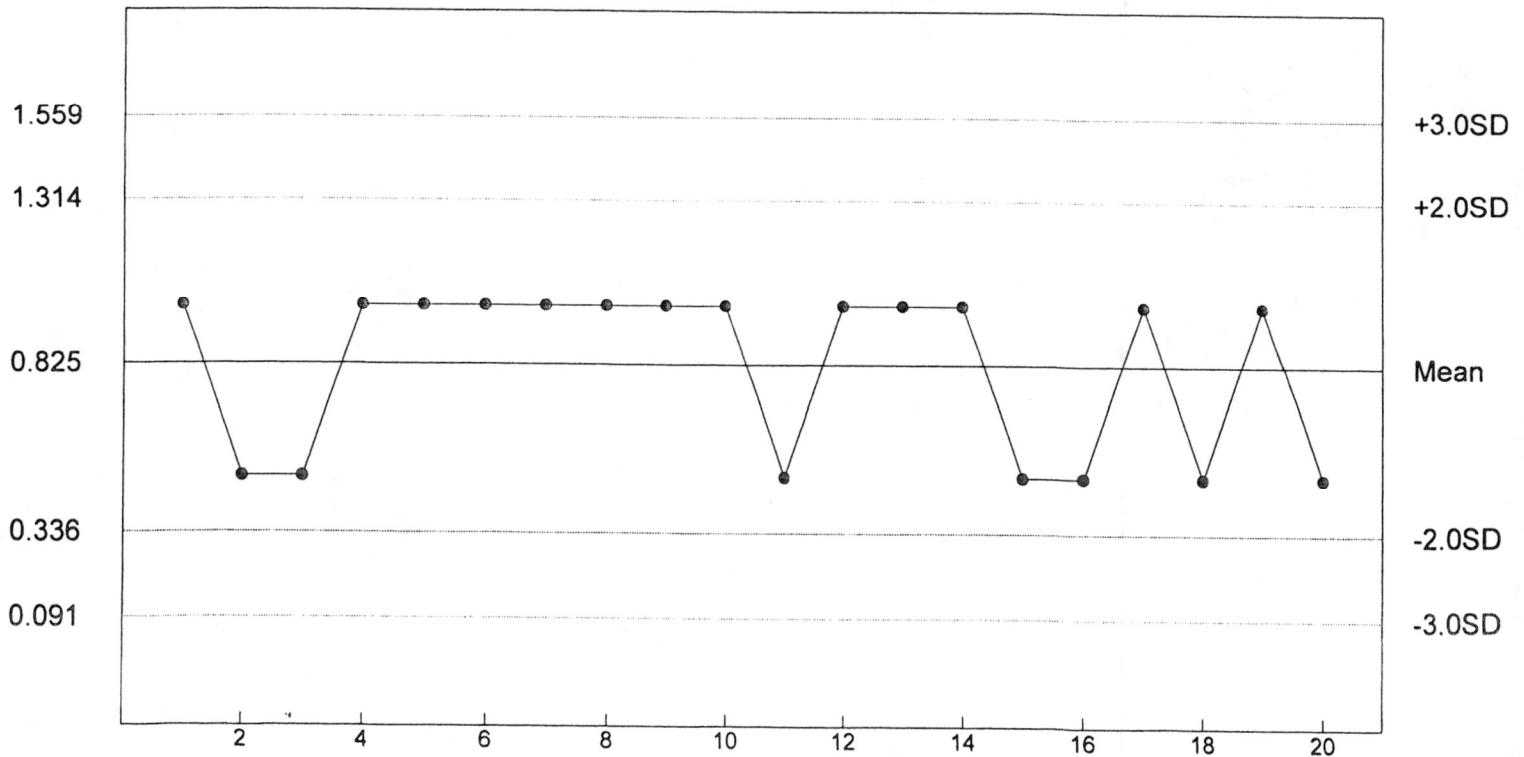
C. dubia Survival - NOEC



n= 20 Mean= 1.600 SD= 0.205 CV= 12.82% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.825 SD= 0.245 CV= 29.66% Min= 0.500 Max= 1.000

**CHRONIC REFERENCE TOXICANT TEST RESULTS**

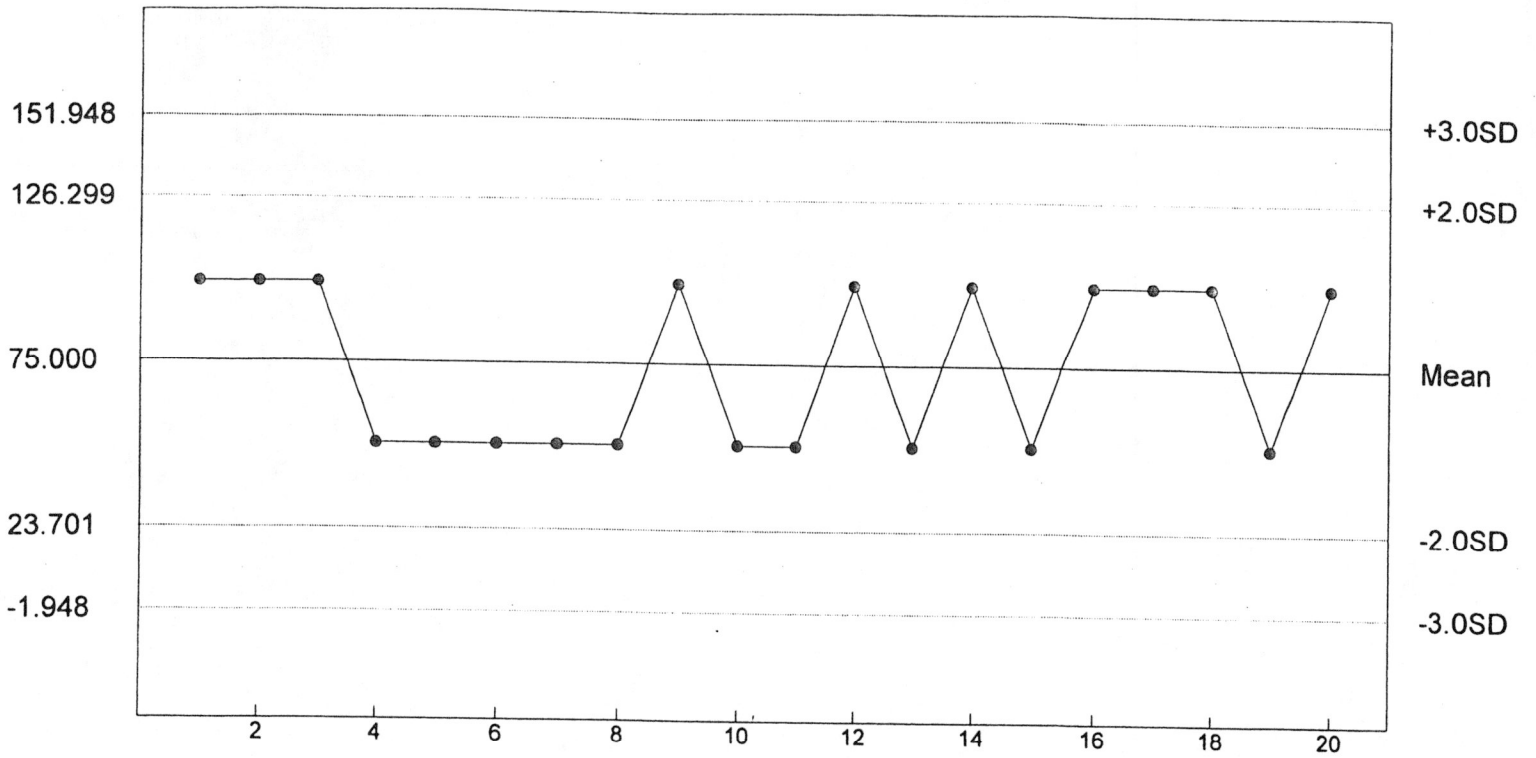
SPECIES: *Pimephales promelas*  
 CHEMICAL: Copper Nitrate  
 DURATION: 7-Days  
 TEST NUMBER: 9  
 TEST DATE: 09/01/16 - 09/08/16  
 1500 Hrs - 1500 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
25	40	0
50	40	0
100	40	2
200	40	19
400	40	40
800	40	40

LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
<b>200 ug/L</b>	<b>100 ug/L</b>	N/A	<b>100 ug/L</b>

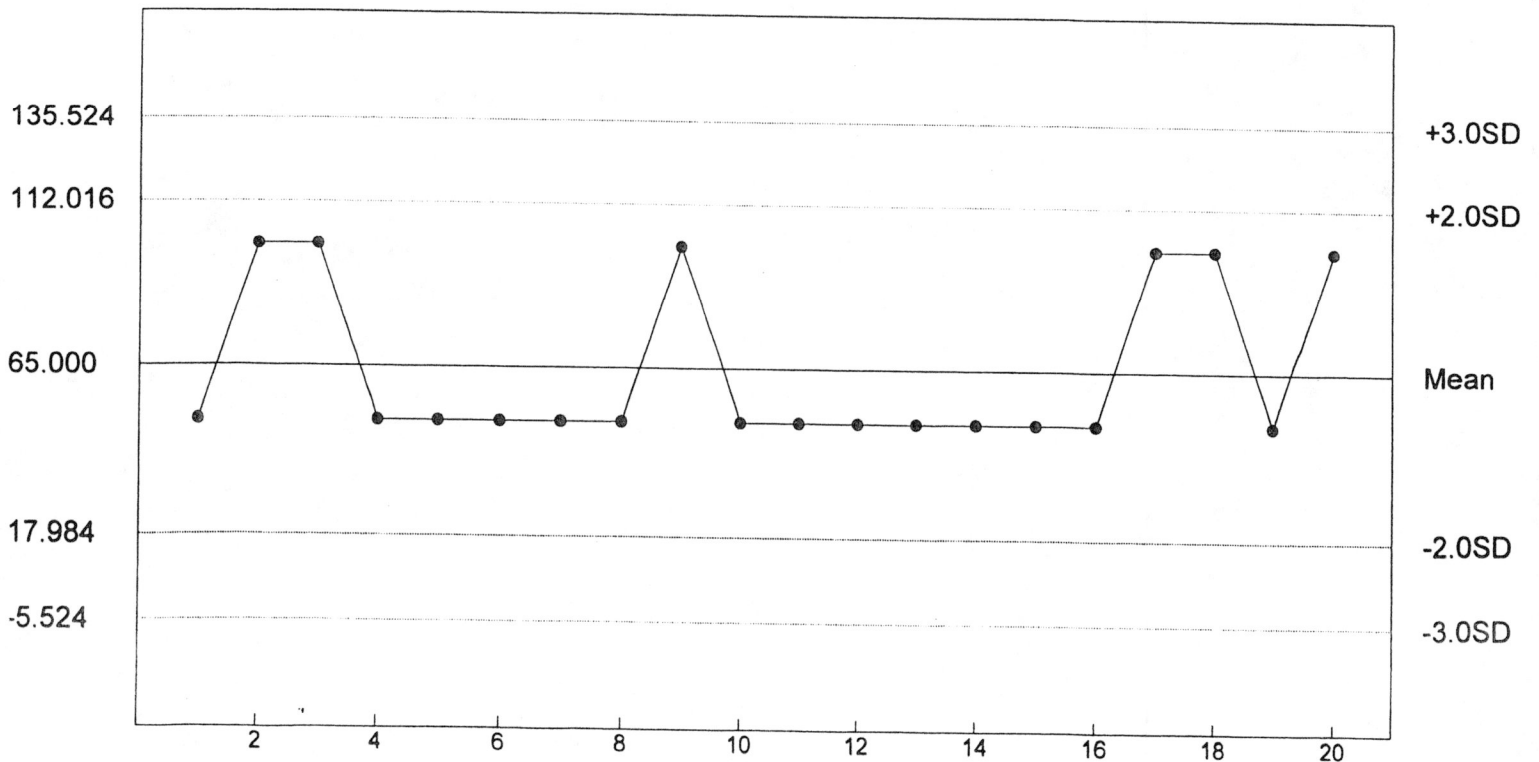


Reference Tox Copper Nitrate ug/L  
P. promelas Chronic Survival - NOEC



n= 20 Mean= 75.000 SD= 25.649 CV= 34.20% Min= 50.000 Max= 100.000

Reference Tox Copper Nitrate ug/L  
P. promelas Growth - NOEC



n= 20 Mean= 65.000 SD= 23.508 CV= 36.17% Min= 50.000 Max= 100.000

**APPENDIX C**  
**CHAIN OF CUSTODY SHEETS**

HUTHER & ASSOCIATES  
 1156 NORTH BONNIE BRAE STREET  
 DENTON, TX 76201  
 (940) 387-1025 • FAX (940) 387-1036

### CHAIN OF CUSTODY RECORD

PROJECT # 26045 PROJECT NAME North Little Rock - Falkner PERMIT# AR 020303

#### OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other \_\_\_\_\_

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
	<u>Phillip Spence</u>	<u>9/18/16 0150</u>	<u>9/19/16 0720</u>		<input checked="" type="checkbox"/>			<u>1</u>

PO# 162091  
Q2 = 0.05

#### RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'NG) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
<i>(Large diagonal line through table)</i>				

TYPE OF TEST 7 day 4/-

NAME OF RECEIVING WATER Arkansas River

DILUTION WATER USED FOR THIS TEST Lab

RELINQUISHED BY: Phillip Spence DATE: 9-19-16 TIME: 1330 RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

METHOD OF SHIPMENT: Greyhound  Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other \_\_\_\_\_

RECEIVED: Matt Horner DATE: 9-20-16 TIME: 1115 SAMPLE TEMP. @ RECEIPT. 0.4 IRI

HUTHER & ASSOCIATES  
 1156 NORTH BONNIE BRAE STREET  
 DENTON, TX 76201  
 (940) 387-1025 • FAX (940) 387-1036

### CHAIN OF CUSTODY RECORD

PROJECT # 26045 PROJECT NAME North Little Rock - Faulkner PERMIT# AR020303

#### OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other \_\_\_\_\_

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
	<u>Phillip Spence</u>	<u>9/24/16 0120</u>	<u>9/21/16 0120</u>	<u>96</u>	<u>X</u>			<u>1</u>

PO# 162091  
Cl<sub>2</sub> = 0.07

#### RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'NG) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
<del>_____</del>				

TYPE OF TEST 7day CF  
 NAME OF RECEIVING WATER Arkansas River  
 DILUTION WATER USED FOR THIS TEST Lab

RELINQUISHED BY: Phillip Spence DATE: 9/24/16 TIME: 1330 RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

METHOD OF SHIPMENT: Greyhound  Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other \_\_\_\_\_

RECEIVED: Matt Horner DATE: 9-22-16 TIME: 1030 SAMPLE TEMP. @ RECEIPT. 01 IRI

HUTHER & ASSOCIATES  
 1156 NORTH BONNIE BRAE STREET  
 DENTON, TX 76201  
 (940) 387-1025 • FAX (940) 387-1036

CHAIN OF CUSTODY RECORD

PROJECT # 26045 PROJECT NAME North Little Rock - Faulkner PERMIT# AR 020303

OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other \_\_\_\_\_

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
	<u>P. Spence</u>	<u>9-22-16 0152</u>	<u>9-23-16 0130</u>	<u>96</u>	<u>X</u>			<u>1</u>

tot 162091  
cl2 = 0.06

RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'NG) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
<u>_____</u>				

TYPE OF TEST 7 day 9F

NAME OF RECEIVING WATER Arkansas River

DILUTION WATER USED FOR THIS TEST Lab

RELINQUISHED BY: Phillip Spence DATE: 9/23/16 TIME: 1330 RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_

METHOD OF SHIPMENT: Greyhound  Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other \_\_\_\_\_

RECEIVED: Matt Horner DATE: 9-24-16 TIME: 1000 SAMPLE TEMP. @ RECEIPT. 12.8

NORTH LITTLE ROCK WASTEWATER UTILITY  
 FAULKNER LAKE PLANT  
 NPDES PERMIT NO. AR0020303  
 AFIN NO. 60-00274  
 OUTFALL 001 DMR REPORTING  
 TEST DATE: 09/20/16

**I. *Ceriodaphnia dubia***

	Response
(A) If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP3B.</b>	0
(B) Report the NOEC value for survival, <b>Parameter No. TOP3B.</b>	11%
(C) Report the NOEC value for reproduction, <b>Parameter No. TPP3B.</b>	11%
(D) If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP3B.</b>	0
(E) Report the higher (critical dilution or control) Coefficient of Variation, <b>Parameter No. TQP3B.</b>	11.11%

**II. *Pimephales promelas* (fathead minnow)**

	Response
(A) If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP6C.</b>	0
(B) Report the NOEC value for survival, <b>Parameter No. TOP6C.</b>	11%
(C) Report the NOEC value for growth, <b>Parameter No. TPP6C.</b>	11%
(D) If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP6C.</b>	0
(E) Report the highest (critical dilution or control) Coefficient of Variation, <b>Parameter No. TQP6C.</b>	7.20%