

ENVIRONMENTAL ENTERPRISE GROUP  
 CITY OF CLARKSVILLE WWTP – OUTFALL 001  
 NPDES PERMIT NO. AR0022187  
 AFIN NO. 36-00038  
 BIOMONITORING REPORTING  
 TEST DATE: 10/20/15

II. *Ceriodaphnia dubia*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
B. If the No Observed Effect Concentration (NOEC) for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
C. Report the NOEC value for survival, Parameter No. TOP3B.	100%
D. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	7.93%

I. *Pimephales promelas*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP6C.	0
B. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP6C.	0
C. Report the NOEC value for survival, Parameter No. TCP6C.	100%
D. Report the NOEC value for growth, Parameter No. TPP6C.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.	6.34%

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II. *Ceriodaphnia dubia*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
B. If the No Observed Effect Concentration (NOEC) for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
C. Report the NOEC value for survival, Parameter No. TOP3B.	100%
D. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	7.93%

I. *Pimephales promelas*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP6C.	0
B. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP6C.	0
C. Report the NOEC value for survival, Parameter No. TCP6C.	100%
D. Report the NOEC value for growth, Parameter No. TPP6C.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.	6.34%

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BIOMONITORING REPORTING  
TEST DATE: 10/20/15

II. *Ceriodaphnia dubia*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
B. If the No Observed Effect Concentration (NOEC) for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
C. Report the NOEC value for survival, Parameter No. TOP3B.	100%
D. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	7.93%

I. *Pimephales promelas*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP6C.	0
B. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP6C.	0
C. Report the NOEC value for survival, Parameter No. TCP6C.	100%
D. Report the NOEC value for growth, Parameter No. TPP6C.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.	6.34%

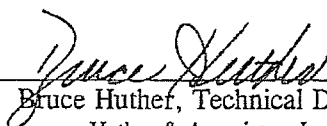
ENVIRONMENTAL ENTERPRISE GROUP  
CITY OF CLARKSVILLE WWTP  
OUTFALL 001

Chronic Biomonitoring Report  
Permit Number NPDES AR0022187  
AFIN Number 36-00038

*Ceriodaphnia dubia*  
*Pimephales promelas*

October 20, 2015

Reviewed by:



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TOXICITY TEST REPORT - CHRONIC

Client ..... Environmental Enterprise Group      Sample..... Outfall 001  
Facility ..... City of Clarksville WWTP      Laboratory I.D. .... 24791  
Permit No. .... NPDES AR0022187      Begin Date ..... October 20, 2015

Results: Pass *Ceriodaphnia dubia* survival and reproduction and *Pimephales promelas* survival and growth at the critical low flow concentration (100% effluent).

SAMPLE COLLECTION

Composite effluent samples from Environmental Enterprise Group, City of Clarksville WWTP were delivered by United Parcel Service courier to Huthur & Associates on October 20, October 22, and October 24, 2015. 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 and receiving water 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 receiving 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 1500 hours, October 20, 2015. Five concentrations were prepared (32%, 42%, 56%, 75%, and 100% effluent) utilizing receiving water (Lake Dardanelle) as dilution water. The test was conducted in 25 mL distilled water rinsed plastic beakers containing 15 mL of solution (one neonate 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 true control of ten replicate chambers containing one neonate each in receiving water was conducted concurrently with the test. There was 100% survival in the true control. In addition, a performance control of ten replicate chambers containing one neonate each in synthetic laboratory water was conducted concurrently with the test. The purpose of the performance control was to assess the health of the test organisms and to identify receiving water toxicity. The performance control data was not used in the statistical analysis of the test data. There was 100% survival in the performance control. The test ended at 1500 hours, October 27, 2015. 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: 100% 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: 100% Effluent**

**PMSD: 6.6%**

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

The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1615 hours, October 20, 2015. Five concentrations were prepared (32%, 42%, 56%, 75%, and 100% effluent) utilizing receiving water (Lake Dardanelle) as dilution water. 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 true control of five replicate chambers of eight larvae each in receiving water was conducted concurrently with the test. There was 100% survival in the true control. In addition, a performance control of five replicate chambers of eight larvae each in synthetic laboratory water was conducted concurrently with the test. The purpose of the performance control was to assess the health of the test larvae and to identify receiving water toxicity. The performance control data was not used in the statistical analysis of the test data. There was 100% survival in the performance control. At the end of the test, all larvae were sacrificed, dried, and weighed. The test ended at 1615 hours, October 27, 2015. 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: 100% 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: 100% Effluent**

**SUMMARY**

There were no statistically significant differences between the control and the critical low flow concentration (100% 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 AR0022187 for Environmental Enterprise Group, City of Clarksville WWTP, Outfall 001 passed for this testing period.



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

CLIENT	EEG, City of Clarksville WWTP	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0022187	DATE COLLECTED	10/19/15 10/21/15 10/23/15
LAB ID #	24791	DATE RECEIVED	10/20/15 10/22/15 10/24/15
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	10/20/15 1500
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	10/27/15 1500
ORGANISM AGE	< 24 Hours	TEST TEMPERATURE (°C)	25 ± 1
ORGANISM SOURCE	In House	PHOTO PERIOD	16-hr. Light 8-hr. Dark
RECEIVING WATER	Lake Dardanelle	LIGHT INTENSITY	50-100 ft. candl.
DILUTION WATER	Lake Dardanelle	TECHNICIAN	R. Kasper

**SURVIVAL & REPRODUCTION SUMMARY**

Performance Control										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	3	3	4	4	2	3	2	3	5	5
10/25/15	3	3	4	4	2	3	2	3	5	5
	7	9	6	7	7	8	7	10	7	9
10/26/15	10	12	10	11	9	11	9	13	12	14
	13	12	14	13	13	12	14	12	13	13
10/27/15	23	24	24	24	22	23	23	25	25	27
x# Young 24.0                      C.V. 5.89% x% Survival 100%                  C.V. 0.00%										

True Control										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	5	2	4	2	3	2	4	5	2	3
10/25/15	5	2	4	2	3	2	4	5	2	3
	6	7	7	9	10	8	7	7	10	8
10/26/15	11	9	11	11	13	10	11	12	12	11
	14	12	13	12	12	14	13	13	12	13
10/27/15	25	21	24	23	25	24	24	25	24	24
x# Young 23.9                      C.V. 5.01% x% Survival 100%                  C.V. 0.00%										

32% Effluent										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	2	4	3	3	2	4	2	4	3	3
10/25/15	2	4	3	3	2	4	2	4	3	3
	8	7	6	9	10	6	7	8	7	7
10/26/15	10	11	9	12	12	10	9	12	10	10
	14	12	15	12	12	14	13	12	13	14
10/27/15	24	23	24	24	24	22	24	23	24	24
x# Young 23.6                      C.V. 2.96% x% Survival 100%                  C.V. 0.00%										

42% Effluent										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	3	5	5	2	4	5	4	2	4	2
10/25/15	3	5	5	2	4	5	4	2	4	2
	7	10	7	8	8	9	6	10	7	11
10/26/15	10	15	12	10	12	14	10	12	11	13
	12	12	13	12	14	12	14	12	13	12
10/27/15	22	27	25	22	26	28	24	24	24	25
x# Young 24.5                      C.V. 6.73% x% Survival 100%                  C.V. 0.00%										

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

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

EEG, City of Clarksville WWTP

Lab ID# 24791

Test Date: October 20, 2015

56% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/25/15	5	4	2	5	3	3	2	5	3	4
	5	4	2	5	3	3	2	5	3	4
10/26/15	6	8	7	10	9	7	8	7	6	8
	11	12	9	15	12	10	10	12	9	12
	14	13	12	12	14	13	12	13	14	12
10/27/15	25	25	21	27	26	23	22	25	23	24
x# Young 24.1                      C.V. 7.69% x% Survival 100%                      C.V. 0.00%										

75% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/25/15	5	2	4	2	5	2	4	5	5	3
	5	2	4	2	5	2	4	5	5	3
10/26/15	10	9	7	6	8	10	7	6	6	9
	15	11	11	8	13	12	11	11	11	12
	12	14	12	14	13	12	13	14	12	13
10/27/15	27	25	23	22	26	24	24	25	23	25
x# Young 24.4                      C.V. 6.17% x% Survival 100%                      C.V. 0.00%										

100% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/21/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/23/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/24/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/25/15	3	2	3	2	5	2	5	5	3	4
	3	2	3	2	5	2	5	5	3	4
10/26/15	8	7	7	8	10	7	6	9	7	10
	11	9	10	10	15	9	11	14	10	14
	14	13	13	12	12	13	14	12	13	12
10/27/15	25	22	23	22	27	22	25	26	23	26
x# Young 24.1                      C.V. 7.93% x% Survival 100%                      C.V. 0.00%										

where: A = Alive                      ex 1: 

A
---

 alive today                      ex 2: 

5
---

 alive, 5 young today

5 = Alive, 5 young                      

4
---

 total young to date                      

12
----

 total young to date

D = Dead

D5 = 5 Young, Female died

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

EEG, City of Clarksville WWTP

Lab ID# 24791

Test Date: October 20, 2015

**WET CHEMISTRY MEASUREMENTS**

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/20/15	Start	25.0	1	7.57	7.39	7.41	7.41	7.41	7.37	7.29	GP
10/21/15	24 Hr.	24.6	1	7.42	7.46	7.44	7.43	7.42	7.33	7.26	TB
10/21/15	Renew	25.0	1	7.79	7.30	7.23	7.20	7.16	7.09	7.03	TB
10/22/15	48 Hr.	24.5	1	7.88	7.73	7.67	7.61	7.57	7.49	7.38	GP
10/22/15	Renew	25.0	2	7.75	7.34	7.30	7.29	7.28	7.23	7.14	GP
10/23/15	72 Hr.	24.6	2	7.77	7.34	7.47	7.25	7.55	7.53	7.98	GP
10/23/15	Renew	24.1	2	7.01	7.99	7.90	7.72	7.37	7.81	7.15	GP
10/24/15	96 Hr.	24.7	2	7.62	7.27	7.31	7.85	7.45	7.43	7.86	CA
10/24/15	Renew	24.1	3	7.00	7.30	7.71	7.48	7.91	7.69	7.28	CA
10/25/15	120 Hr.	24.8	3	7.74	7.10	7.60	7.53	7.07	7.52	7.83	CA
10/25/15	Renew	24.1	3	7.13	7.28	7.99	7.57	7.11	7.94	7.48	CA
10/26/15	144 Hr.	24.6	3	7.84	7.56	7.71	7.39	7.29	7.02	7.43	CA
10/26/15	Renew	24.2	3	7.57	7.63	7.49	7.27	7.01	7.58	7.09	CA
10/27/15	168 Hr.	24.1	3	7.91	7.72	7.64	7.59	7.55	7.49	7.49	GP

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/20/15	Start	25.0	1	8.28	8.52	8.49	8.43	8.60	8.42	8.37	GP
10/21/15	24 Hr.	24.6	1	8.14	8.12	8.00	8.47	8.41	8.29	8.01	TB
10/21/15	Renew	25.0	1	8.38	8.31	8.24	8.45	8.24	8.43	8.47	TB
10/22/15	48 Hr.	24.5	1	7.62	8.57	7.86	7.90	7.93	7.56	7.67	GP
10/22/15	Renew	25.0	2	8.25	8.62	8.98	8.95	8.90	8.95	8.59	GP
10/23/15	72 Hr.	24.6	2	8.22	8.71	8.90	7.60	7.68	7.96	8.77	GP
10/23/15	Renew	24.1	2	8.99	7.58	7.85	7.69	8.90	7.63	8.08	GP
10/24/15	96 Hr.	24.7	2	7.72	8.65	8.20	8.59	7.84	8.04	8.42	CA
10/24/15	Renew	24.1	3	8.93	8.36	8.11	8.45	7.61	8.39	8.52	CA
10/25/15	120 Hr.	24.8	3	8.89	7.52	8.27	8.71	8.99	8.51	8.03	CA
10/25/15	Renew	24.1	3	7.65	8.50	7.74	8.65	8.16	7.64	7.69	CA
10/26/15	144 Hr.	24.6	3	8.58	7.69	7.74	8.54	8.19	8.94	8.69	CA
10/26/15	Renew	24.2	3	7.94	8.53	8.35	7.74	7.53	7.74	7.95	CA
10/27/15	168 Hr.	24.1	3	8.63	7.94	7.79	8.68	8.04	8.02	7.98	GP

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

EEG, City of Clarksville WWTP

Lab ID# 24791

Test Date: October 20, 2015

**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
10/20/15	1	7.29	8.37	76	38	513	<0.01	N/A	TG
10/22/15	2	7.14	8.59	76	54	517	<0.01	N/A	TG
10/24/15	3	7.28	8.52	80	38	538	<0.01	N/A	TG

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

**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
10/20/15	RS1	7.39	8.52	344	118	1564	<0.01	N/A	TG
10/22/15	RS2	7.34	8.62	344	116	1553	<0.01	N/A	TG
10/24/15	RS3	7.30	8.36	352	120	1486	<0.01	N/A	TG

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

Huther and Associates, Inc.  
 Begin Date: October 20, 2015  
 Lab I.D.# 24791

**CERIODAPHNIA DUBIA STATISTICAL ANALYSES**  
 Reproduction

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	10	21.000	25.000	23.900
2	32% Effluent	10	22.000	24.000	23.600
3	42% Effluent	10	22.000	27.000	24.500
4	56% Effluent	10	21.000	27.000	24.100
5	75% Effluent	10	22.000	27.000	24.400
6	100% Effluent	10	22.000	27.000	24.100

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	1.433	1.197	0.379	5.01
2	32% Effluent	0.489	0.699	0.221	2.96
3	42% Effluent	2.722	1.650	0.522	6.73
4	56% Effluent	3.433	1.853	0.586	7.69
5	75% Effluent	2.267	1.506	0.476	6.17
6	100% Effluent	3.656	1.912	0.605	7.93

Chi-Square Test For Normality: Actual And Expected Frequencies

Interval	< -1.5	-1.5 to -0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
Expected	4.020	14.520	22.920	14.520	4.020
Observed	6	13	21	16	4

Calculated Chi-Square goodness of fit test statistic = 1.4461

Table Chi-Square value (alpha = 0.01) = 13.277

Data Pass normality test. Continue analysis.

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 9.40

Table Chi-square value = 15.09 (alpha = 0.01, DF = 5)

Table Chi-square value = 11.07 (alpha = 0.05, DF = 5)

Data Pass B1 homogeneity test at 0.01 level. Continue analysis.

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	5.400	1.080	0.463
Within (Error)	54	126.000	2.333	
Total	59	131.400		

Critical F value = 2.45 (0.05,5,40)

Since F < Critical F Fail to Reject Ho: All equal

Dunnett's Test - Table 1 of 2 Ho: Control < Treatment

Grp	Identification	Mean		T Stat	Sig
		Transformed Mean	Calculated In Original Units		
1	Control	23.900	23.900		
2	32% Effluent	23.600	23.600	0.439	
3	42% Effluent	24.500	24.500	-0.878	
4	56% Effluent	24.100	24.100	-0.293	
5	75% Effluent	24.400	24.400	-0.732	
6	100% Effluent	24.100	24.100	-0.293	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, DF=40,5)

No statistically significant difference

Dunnett's Test - Table 1 of 2 Ho: Control < Treatment

Grp	Identification	Num of Reps	Minimum Sig Diff (In Orig. Units)	% of Control	Difference from Control
1	Control	10			
2	32% Effluent	10	1.578	6.6	0.300
3	42% Effluent	10	1.578	6.6	-0.600
4	56% Effluent	10	1.578	6.6	-0.200
5	75% Effluent	10	1.578	6.6	-0.500
6	100% Effluent	10	1.578	6.6	-0.200

Huther and Associates  
7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

CLIENT	EEG, City of Clarksville WWTP	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0022187	DATE COLLECTED	10/19/15 10/21/15 10/23/15
LAB ID #	24791	DATE RECEIVED	10/20/15 10/22/15 10/24/15
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	10/20/15 1615
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	10/27/15 1615
ORGANISM AGE	< 24 Hours	TEST TEMPERATURE (°C)	25 ± 1
ORGANISM SOURCE	In House	PHOTO PERIOD	16-hr. Light 8-hr. Dark
RECEIVING WATER	Lake Dardanelle	LIGHT INTENSITY	50-100 ft. candl.
DILUTION WATER	Lake Dardanelle	TECHNICIAN	B. Bacon

**SURVIVAL SUMMARY**

Conc.	10/21/15					10/22/15					10/23/15					10/24/15					10/25/15				
	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
Pcon	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
Tcon	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
32%	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
42%	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
56%	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
75%	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
100%	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

Conc.	10/26/15					10/27/15					x % Survival	C.V. %
	A	B	C	D	E	A	B	C	D	E		
Pcon	8	8	8	8	8	8	8	8	8	8	100.0	0.00
Tcon	8	8	8	8	8	8	8	8	8	8	100.0	0.00
32%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
42%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
56%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
75%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
100%	8	8	8	8	8	8	8	8	8	8	100.0	0.00

**MEAN DRY WEIGHT PER REP**

% Effluent	Rep A	Rep B	Rep C	Rep D	Rep E	x	C.V. %
Pcon	0.5020	0.4260	0.4450	0.4560	0.4910	0.4640	6.85
Tcon	0.4270	0.4160	0.4850	0.4670	0.4580	0.4506	6.34
32%	0.4450	0.4760	0.5040	0.4200	0.4760	0.4642	6.97
42%	0.4950	0.5020	0.4260	0.4710	0.4900	0.4768	6.43
56%	0.4520	0.4200	0.4710	0.5060	0.4450	0.4588	6.99
75%	0.4920	0.4500	0.4270	0.4810	0.5020	0.4704	6.62
100%	0.4560	0.4710	0.5020	0.4350	0.4800	0.4688	5.37

Huther and Associates  
7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

EEG, City of Clarksville WWTP

Lab ID# 24791

Test Date: October 20, 2015

**WET CHEMISTRY MEASUREMENTS**

Date	Time	Temp	Samp. No.	pH of Solution							Analyst
				PCON	TCON %	32%	42%	56%	75%	100%	
10/20/15	Start	25.0	1	7.57	7.39	7.41	7.41	7.41	7.37	7.29	GP
10/21/15	24 Hr.	25.0	1	7.65	7.32	7.32	7.30	7.28	7.25	7.16	TB
10/21/15	Renew	25.0	1	7.79	7.30	7.23	7.20	7.16	7.09	7.03	TB
10/22/15	48 Hr.	24.9	1	7.68	7.64	7.51	7.52	7.42	7.34	7.27	GP
10/22/15	Renew	25.0	2	7.75	7.34	7.30	7.29	7.28	7.23	7.14	GP
10/23/15	72 Hr.	24.8	2	7.86	7.88	7.71	7.66	7.59	7.53	7.44	GP
10/23/15	Renew	24.1	2	7.01	7.99	7.90	7.72	7.37	7.81	7.15	GP
10/24/15	96 Hr.	24.9	2	7.55	7.28	7.76	7.15	7.00	7.08	7.72	CA
10/24/15	Renew	24.1	3	7.00	7.30	7.71	7.48	7.91	7.69	7.28	CA
10/25/15	120 Hr.	25.1	3	7.03	7.94	7.92	7.91	7.34	7.10	7.09	CA
10/25/15	Renew	24.1	3	7.13	7.28	7.99	7.57	7.11	7.94	7.48	CA
10/26/15	144 Hr.	24.5	3	7.19	7.95	7.61	7.25	7.44	7.09	7.85	RK
10/26/15	Renew	24.2	3	7.57	7.63	7.49	7.27	7.01	7.58	7.09	RK
10/27/15	168 Hr.	24.2	3	7.62	7.87	7.63	7.52	7.51	7.39	7.34	GP

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution							Analyst
				PCON	TCON %	32%	42%	56%	75%	100%	
10/20/15	Start	25.0	1	8.28	8.52	8.49	8.43	8.60	8.42	8.37	GP
10/21/15	24 Hr.	25.0	1	8.41	8.04	8.16	8.21	8.15	8.27	8.25	TB
10/21/15	Renew	25.0	1	8.38	8.31	8.24	8.45	8.24	8.43	8.47	TB
10/22/15	48 Hr.	24.9	1	8.26	8.41	8.72	8.78	7.84	8.63	8.67	GP
10/22/15	Renew	25.0	2	8.25	8.62	8.98	8.95	8.90	8.95	8.59	GP
10/23/15	72 Hr.	24.8	2	9.04	8.93	7.89	8.83	7.72	7.33	8.71	GP
10/23/15	Renew	24.1	2	8.99	7.58	7.85	7.69	8.90	7.63	8.08	GP
10/24/15	96 Hr.	24.9	2	8.07	7.65	8.54	8.51	8.79	7.93	8.60	CA
10/24/15	Renew	24.1	3	8.93	8.36	8.11	8.45	7.61	8.39	8.52	CA
10/25/15	120 Hr.	25.1	3	7.89	7.77	8.51	8.23	7.86	8.51	8.27	CA
10/25/15	Renew	24.1	3	7.65	8.50	7.74	8.65	8.16	7.64	7.69	CA
10/26/15	144 Hr.	24.5	3	7.56	8.73	8.00	8.45	8.42	8.03	8.63	RK
10/26/15	Renew	24.2	3	7.94	8.53	8.35	7.74	7.53	7.74	7.95	RK
10/27/15	168 Hr.	24.2	3	8.21	8.41	8.70	8.71	7.93	8.61	7.83	GP

Huther and Associates  
7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

EEG, City of Clarksville WWTP

Lab ID# 24791

Test Date: October 20, 2015

**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
10/20/15	1	7.29	8.37	76	38	513	<0.01	N/A	TG
10/22/15	2	7.14	8.59	76	54	517	<0.01	N/A	TG
10/24/15	3	7.28	8.52	80	38	538	<0.01	N/A	TG

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

**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
10/20/15	RS1	7.39	8.52	344	118	1564	<0.01	N/A	TG
10/22/15	RS2	7.34	8.62	344	116	1553	<0.01	N/A	TG
10/24/15	RS3	7.30	8.36	352	120	1486	<0.01	N/A	TG

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



Huther and Associates, Inc.  
 Begin Date: October 20, 2015  
 Lab I.D.# 24791

**PIMEPHALES PROMELAS STATISTICAL ANALYSES**  
 Growth

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	5	0.416	0.485	0.451
2	32% Effluent	5	0.420	0.504	0.464
3	42% Effluent	5	0.426	0.502	0.477
4	56% Effluent	5	0.420	0.506	0.459
5	75% Effluent	5	0.427	0.502	0.470
6	100% Effluent	5	0.435	0.502	0.469

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.001	0.029	0.013	6.34
2	32% Effluent	0.001	0.032	0.014	6.97
3	42% Effluent	0.001	0.031	0.014	6.43
4	56% Effluent	0.001	0.032	0.014	6.99
5	75% Effluent	0.001	0.031	0.014	6.62
6	100% Effluent	0.001	0.025	0.011	5.37

Shapiro - Wilk's Test For Normality

D = 0.022

W = 0.954

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900

Data Pass normality test at P=0.01 level. Continue analysis.

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 0.31

Table Chi-square value = 15.09 (alpha = 0.01, DF = 5)

Table Chi-square value = 11.07 (alpha = 0.05, DF = 5)

Data Pass B1 homogeneity test at 0.01 level. Continue analysis.

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	0.002	0.000	0.474
Within (Error)	24	0.022	0.001	
Total	29	0.024		

Critical F value = 2.62 (0.05,5,24)

Since F < Critical F Fail to Reject Ho: All equal

Dunnett's Test - Table 1 of 2 Ho:Control < Treatment

Grp	Identification	Transformed Mean	Mean		T Stat	Sig
			Original Units	Calculated In		
1	Control	0.451	0.451			
2	32% Effluent	0.464	0.464		-0.715	
3	42% Effluent	0.477	0.477		-1.377	
4	56% Effluent	0.459	0.459		-0.431	
5	75% Effluent	0.470	0.470		-1.040	
6	100% Effluent	0.469	0.469		-0.956	

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, DF=24,5)

No statistically significant difference

Dunnett's Test - Table 1 of 2 Ho:Control < Treatment

Grp	Identification	Num of Reps	Minimum Sig Diff (In Orig. Units)	% of Control	Difference from Control
					Control
1	Control	5			
2	32% Effluent	5	0.045	10.0	-0.014
3	42% Effluent	5	0.045	10.0	-0.026
4	56% Effluent	5	0.045	10.0	-0.008
5	75% Effluent	5	0.045	10.0	-0.020
6	100% Effluent	5	0.045	10.0	-0.018

**APPENDIX A  
RAW DATA**

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 1 OF 2

CLIENT EEG-Clarksville

START DATE/TIME 10-20-15 RK 1500

OUTFALL 001

END DATE/TIME 10-27-15 ZG 1500

LAB ID# 24791

PCON

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/21	A	A	A	A	A	A	A	A	A	A	RK	1500
10/22	A	A	A	A	A	A	A	A	A	A	RK	1430
10/23	A	A	A	A	A	A	A	A	A	A	MH	1010
10/24	A	A	A	A	A	A	A	A	A	A	MH	1135
10/25	3	3	4	4	2	3	2	3	5	5	RK	1310
10/26	7	9	6	7	7	8	7	10	7	9	ZG	1200
10/27	13	12	14	13	13	14	12	13	13	13	ZG	1500
	23	24	24	24	22	23	23	25	25	27		

$\bar{x}$  # Young w/o Dead = 24.0 CV% = 5.89

$\bar{x}$  # Young w/Dead = CV% =

$\bar{x}$  % Survival = 100 CV% = 0.00

TCON

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/21	A	A	A	A	A	A	A	A	A	A	RK	1500
10/22	A	A	A	A	A	A	A	A	A	A	RK	1430
10/23	A	A	A	A	A	A	A	A	A	A	MH	1010
10/24	A	A	A	A	A	A	A	A	A	A	MH	1135
10/25	5	2	4	2	3	2	4	5	2	3	RK	1310
10/26	6	7	7	9	10	8	7	7	10	8	ZG	1200
10/27	14	12	13	12	12	14	13	13	12	13	ZG	1500
	25	21	24	23	25	24	24	25	24	24		

$\bar{x}$  # Young w/o Dead = 23.9 CV% = 5.01

$\bar{x}$  # Young w/Dead = CV% =

$\bar{x}$  % Survival = 100 CV% = 0.00

32

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/21	A	A	A	A	A	A	A	A	A	A	RK	1500
10/22	A	A	A	A	A	A	A	A	A	A	RK	1430
10/23	A	A	A	A	A	A	A	A	A	A	MH	1010
10/24	A	A	A	A	A	A	A	A	A	A	MH	1135
10/25	2	4	3	3	2	4	2	4	3	3	RK	1310
10/26	8	7	6	9	10	6	7	8	7	7	ZG	1200
10/27	14	12	15	12	12	14	13	12	13	14	ZG	1500
	24	23	24	24	24	22	24	23	24	24		

$\bar{x}$  # Young w/o Dead = 23.6 CV% = 2.96

$\bar{x}$  # Young w/Dead = CV% =

$\bar{x}$  % Survival = 100 CV% = 0.00

42

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/21	A	A	A	A	A	A	A	A	A	A	RK	1500
10/22	A	A	A	A	A	A	A	A	A	A	RK	1430
10/23	A	A	A	A	A	A	A	A	A	A	MH	1010
10/24	A	A	A	A	A	A	A	A	A	A	MH	1135
10/25	3	5	5	2	4	5	4	2	4	2	RK	1310
10/26	7	10	7	8	8	9	6	10	7	11	ZG	1200
10/27	12	12	13	12	14	12	14	12	12	12	ZG	1500
	22	27	25	22	26	26	24	24	24	25		

$\bar{x}$  # Young w/o Dead = 24.5 CV% = 6.73

$\bar{x}$  # Young w/Dead = CV% =

$\bar{x}$  % Survival = 100 CV% = 0.00



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

CLIENT/FACILITY EEG- CLARKSVILLE  
 OUTFALL # 001 PROJECT # 24791  
 ORGANISM ID# PP0-15-292

DATE/TIME STARTED 10-20-15 BB 1615  
 DATE/TIME ENDED 10-27-15 BB 1615

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					
Pcon	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
Tcon	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
32	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
42	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
56	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
75	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
100	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	10-21-15 BB 1615					10-22-15 BB 0840					10-23-15 MH 0910					10-24-15 BB 0830					10-25-15 RK 0920									

Conc.	A					B					C					D					E					Mean Survival	C.V. %
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E							
Pcon	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	100.0	0.00
Tcon	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	100.0	0.00
32	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	100.0	0.00
42	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	100.0	0.00
56	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	100.0	0.00
75	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	100.0	0.00
100	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	100.0	0.00
Initials Date/Time	10-26-15 TB 0920					10-27-15 BB 1615																					





Huthier and Associates, Inc.

environmental toxicologists, biologists, and consultants

Client / Facility EEG Clarksville  
 Lab ID Number 24791  
 Outfall Number 001  
 Test Date 10/20/15

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
10/20	1	7.29	8.37	76	38	513	6.01	Na	TG
10/22	2	7.14	8.59	76	34	517	5	5	5
10/24	3	7.28	8.52	80	38	538	5	5	5

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
10/20	RS1	7.39	8.52	344	118	1564	6.01	Na	TG
10/22	RS2	7.34	8.62	344	116	1553	5	5	
10/24	RS3	7.30	8.36	352	120	1486	5	5	

Notes:

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**APPENDIX B  
REFERENCE TOXICANTS**



**CHRONIC REFERENCE TOXICANT TEST RESULTS**

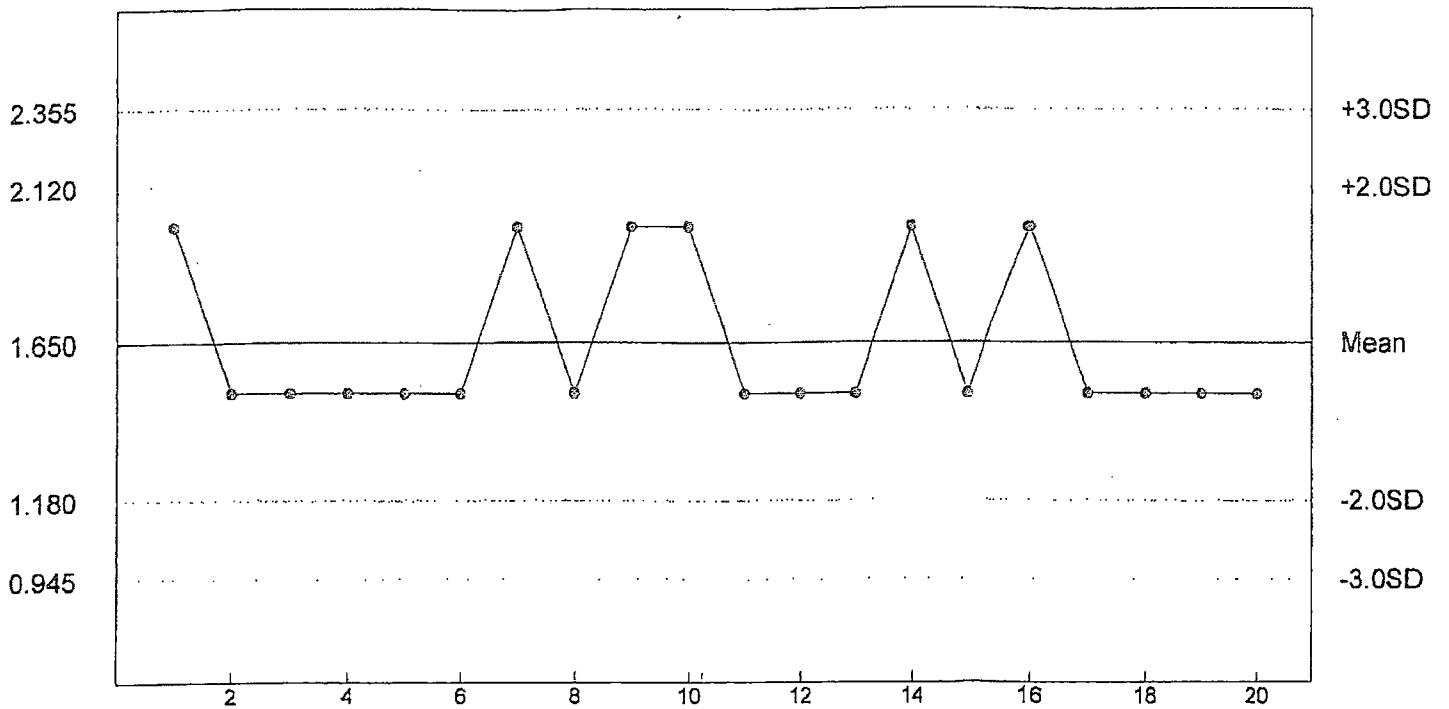
SPECIES: *Ceriodaphnia dubia*  
 CHEMICAL: Sodium Chloride  
 DURATION: 7-Days  
 TEST NUMBER: 10  
 TEST DATE: 10/01/15 - 10/08/15  
 1530 Hrs - 1530 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	6
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	1.5 g/L	1.0 g/L

Reference Tox Sodium Chloride g/L

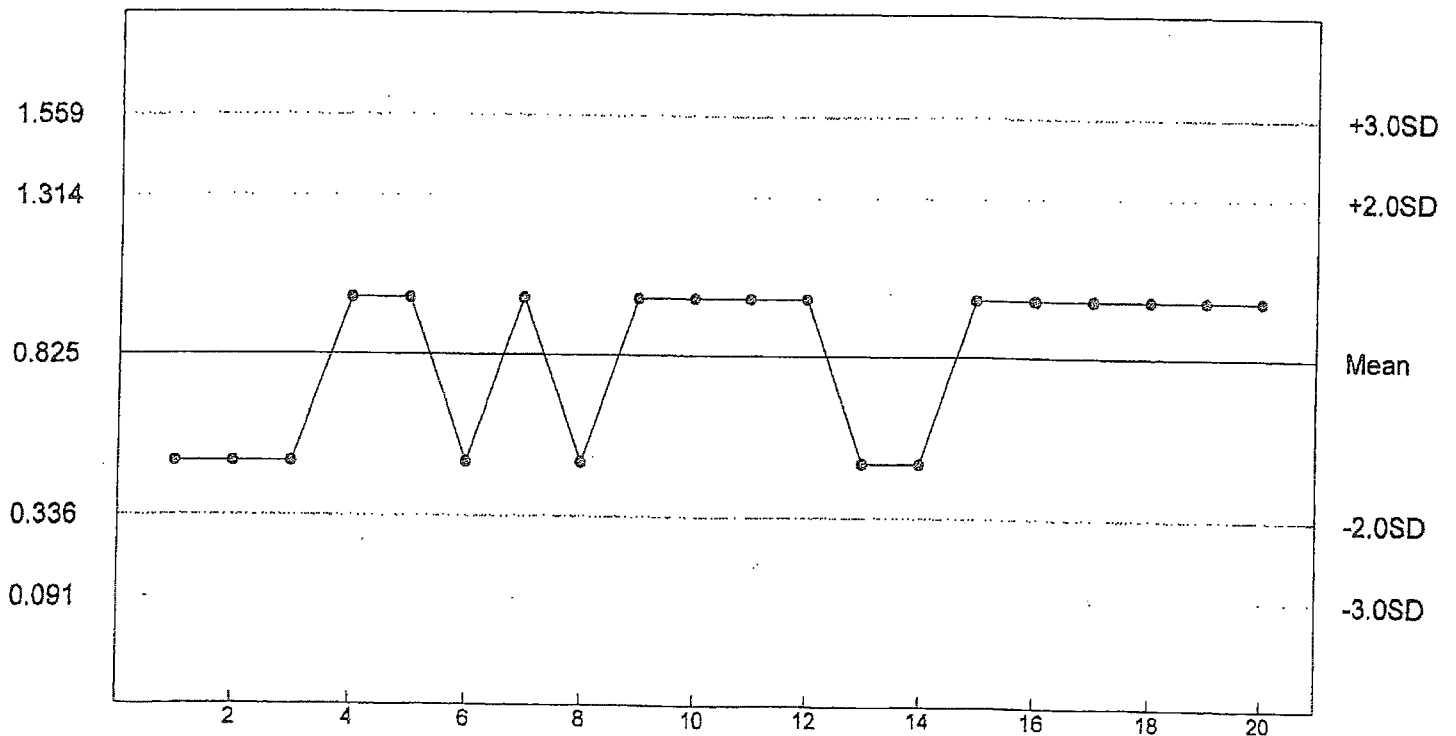
C. dubia Survival - NOEC



n= 20 Mean= 1.650 SD= 0.235 CV= 14.25% 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

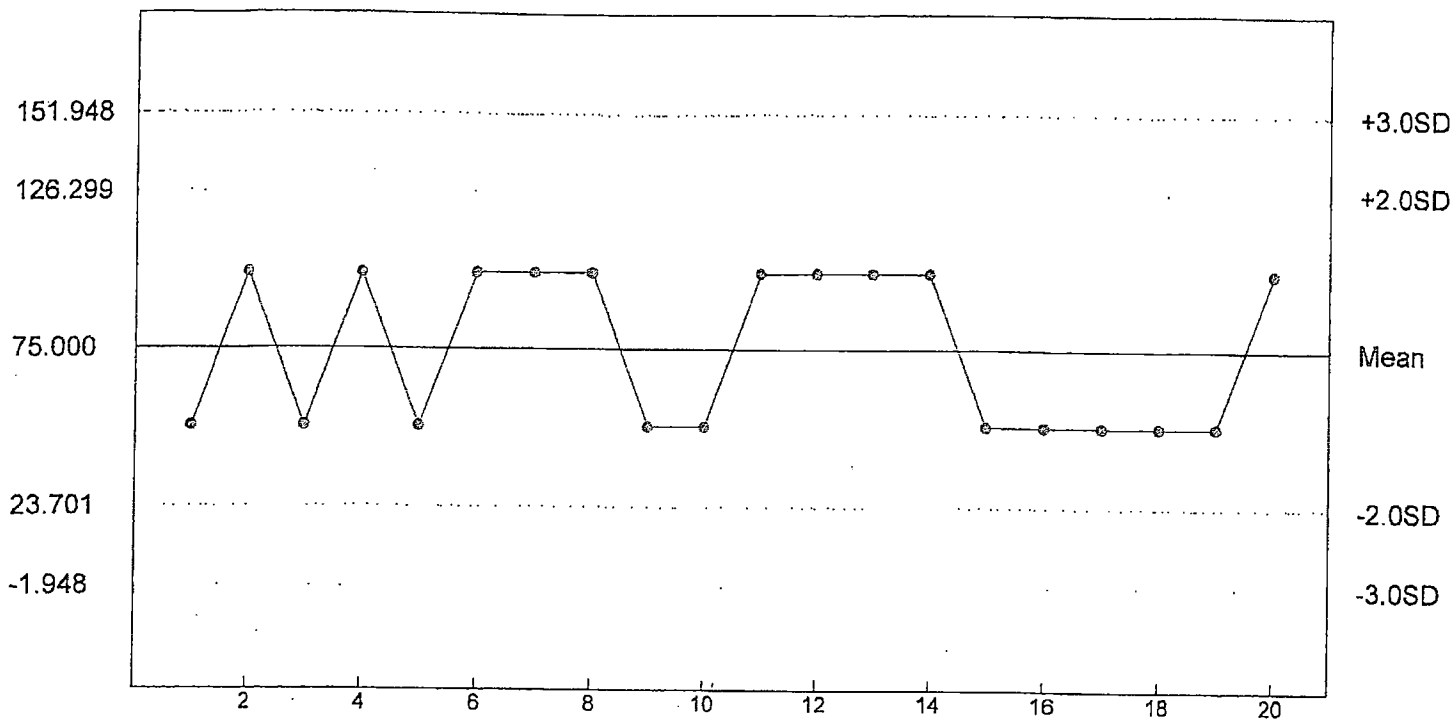
CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: *Pimephales promelas*  
 CHEMICAL: Copper Nitrate  
 DURATION: 7-Days  
 TEST NUMBER: 10  
 TEST DATE: 10/06/15 - 10/13/15  
 1610 Hrs - 1610 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
25	40	0
50	40	0
100	40	8
200	40	29
400	40	40
800	40	40

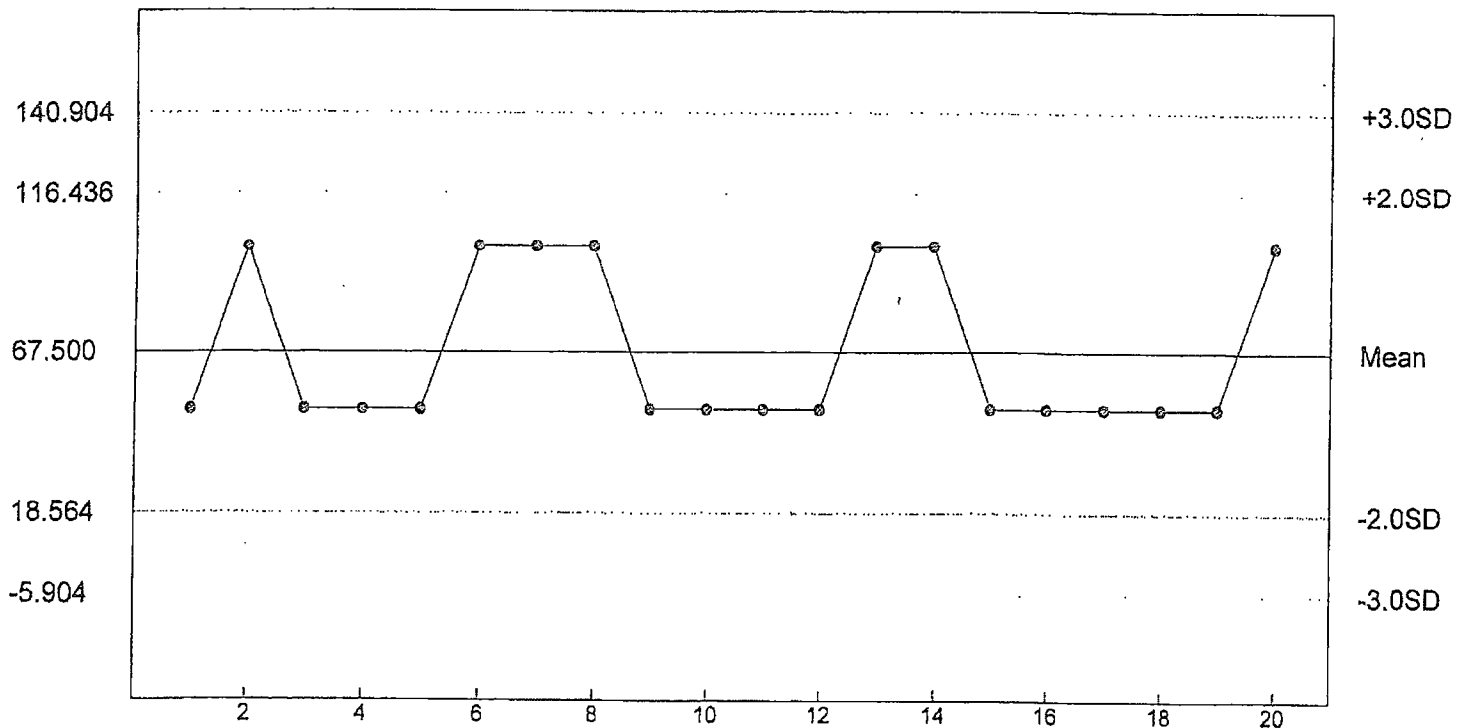
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
200 ug/L	100 ug/L	200 ug/L	100 ug/L

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= 67.500 SD= 24.468 CV= 36.25% Min= 50.000 Max= 100.000

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















ENVIRONMENTAL ENTERPRISE GROUP  
 CITY OF CLARKSVILLE WWTP – OUTFALL 001  
 NPDES PERMIT NO. AR0022187  
 AFIN NO. 36-00038  
 BIOMONITORING REPORTING  
 TEST DATE: 10/20/15

II. *Ceriodaphnia dubia*

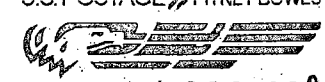
	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
B. If the No Observed Effect Concentration (NOEC) for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
C. Report the NOEC value for survival, Parameter No. TOP3B.	100%
D. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	7.93%

I. *Pimephales promelas*

	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP6C.	0
B. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP6C.	0
C. Report the NOEC value for survival, Parameter No. TCP6C.	100%
D. Report the NOEC value for growth, Parameter No. TPP6C.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.	6.34%



7013 2630 0000 6571 0151



ZIP 72830 \$ 009.43<sup>0</sup>  
02 1W  
0001370120 NOV. 10. 2015

**CLARKSVILLE LIGHT & WATER CO.**

400 WEST MAIN • P.O. BOX 1807

CLARKSVILLE, AR 72830

PHONE (479) 754-3148

To

ADEQ

5301 Northshore Drive

North Little Rock, AR 72118

