

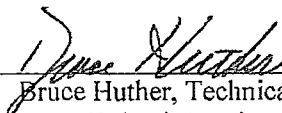
ENVIRONMENTAL ENTERPRISE GROUP
CITY OF CLARKSVILLE WWTP
OUTFALL 001

Chronic Biomonitoring Report
Permit Number NPDES AR0022187

Ceriodaphnia dubia
Pimephales promelas

October 18, 2016

Reviewed by:



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**ENVIRONMENTAL ENTERPRISE GROUP
 CITY OF CLARKSVILLE WWTP – OUTFALL 001
 NPDES PERMIT NO. AR0022187
 AFIN NO. 36-00038
 BIOMONITORING REPORTING
 TEST DATE: 10/18/16**

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.	10.72%

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. TOP6C.	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.	6.07%

Parameter Code	Name	NODI	Quantity or Loading			Quality or Concentration			# of Ex.	Freq. of Analysis	Smpl. Type
			Value 1	Value 2	Units	Value 1	Value 2	Value 3			
NODI: -		NODI									
TPP3B	NOEC Sub-Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia	Smpl.				=100		23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
1 - Effluent Gross											
Season: 0		Req.					Req Mon 7 DA AVG	23 - %		01/6M - Once Every 6 Months	24 - COMP24
NODI: -		NODI									
TPP6C	NOEC Sub-Lethal Static Renewal 7 Day Chronic Pimephales promelas	Smpl.				=100		23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
1 - Effluent Gross											
Season: 0		Req.					Req Mon 7 DA AVG	23 - %		01/6M - Once Every 6 Months	24 - COMP24
NODI: -		NODI									
TQP3B	Coef Of Var Statre 7Day Chronic Ceriodaphnia	Smpl.				=10.72		23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
1 - Effluent Gross											
Season: 0		Req.					Req Mon 7 DA AVG	23 - %		01/6M - Once Every 6 Months	24 - COMP24
NODI: -		NODI									
TQP6C	Coef Of Var Statre 7Day Chronic Pimephales	Smpl.				=6.07		23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
1 - Effluent Gross											
Season: 0		Req.					Req Mon 7 DA AVG	23 - %		01/6M - Once Every 6 Months	24 - COMP24
NODI: -		NODI									

Submission Note

If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.

Edit Check Errors

No errors.

Comments

Attachments

No attachments.

Report Last Saved By

CLARKSVILLE LIGHT & WATER

User: gregg.rainey@clarksvilleglightwater.com
 Name: Gregg Rainey
 E-Mail: gregg.rainey@clarksvilleglightwater.com
 Date/Time: 2016-11-14 11:27 (Time Zone:-06:00)

Permit

Permit ID: AR0022187 **Major:**
Permittee: CLARKSVILLE LIGHT & WATER **Permittee Address:** P.O. BOX 1807
 CLARKSVILLE , AR72830
Facility: CLARKSVILLE LIGHT & WATER **Facility Location:** 1305 S CRAWFORD ST
 CLARKSVILLE , AR72830
Permitted Feature: TX1 - External Outfall **Discharge:** TX1-S - 001-SEMI-ANNUAL CHRONIC TOXICITY

Report Dates & Status

Monitoring Period: From 07/01/16 to 12/31/16 **DMR Due Date:** 01/25/17
Status: NetDMR Validated

Considerations for Form Completion

(PASS=0/FAIL=1) IF THE NOEC VALUE IS LESS THAN THE CRITICAL DILUTION, REPORT "1"; OTHERWISE, REPORT "0". SEE PART II, CONDITION NO. 11. Testing returns to QUARTERLY following expiration 09/30/2019. 38-00038

Principal Executive Officer

First Name: Gregg **Last Name:** Rainey
Title: Manager **Telephone:** 479-754-6241

No Data Indicator (NODI)

Form NODI: -

Parameter Code	Name	NODI	Quantity or Loading			Quality or Concentration			Units	# of Ex.	Freq. of Analysis	Smpl. Type
			Value 1	Value 2	Units	Value 1	Value 2	Value 3				

Parameter Code	Name	NODI	Quantity or Loading			Quality or Concentration			# of Ex.	Freq. of Analysis	Smpl. Type	
			Value 1	Value 2	Units	Value 1	Value 2	Value 3				Units
TGP3B	Pass/Fail Static Renewal 7 Day Chronic Ceriodaphnia					=0			9A - pass=0;fail=1	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		9A - pass=0;fail=1		01/6M - Once Every 6 Months	24 - COMP24
	NODI: -	NODI										
TGP6C	Pass/Fail Statre 7Day Chronic Pimephales Promelas					=0			9A - pass=0;fail=1	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		9A - pass=0;fail=1		01/6M - Once Every 6 Months	24 - COMP24
	NODI: -	NODI										
TLP3B	Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic Ceriodaphnia dubia					=0			9A - pass=0;fail=1	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		9A - pass=0;fail=1		01/6M - Once Every 6 Months	24 - COMP24
	NODI: -	NODI										
TLP6C	Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic Pimephales promelas					=0			9A - pass=0;fail=1	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		9A - pass=0;fail=1		01/6M - Once Every 6 Months	24 - COMP24
	NODI: -	NODI										
TOP3B	NOEC Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia					=100			23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		23 - %		01/6M - Once Every 6 Months	24 - COMP24
	NODI: -	NODI										
TOP6C	NOEC Lethal Static Renewal 7 Day Chronic Pimephales promelas					=100			23 - %	0	01/6M - Once Every 6 Months	24 - COMP24
	1 - Effluent Gross											
	Season: 0	Req.					Req Mon 7 DA AVG		23 - %		01/6M - Once Every 6 Months	24 - COMP24

TOXICITY TEST REPORT - CHRONIC

Client	Environmental Enterprise Group	Sample	Outfall 001
Facility	City of Clarksville WWTP	Laboratory I.D.	25762
Permit No.	NPDES AR0022187	Begin Date	October 18, 2016

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

SAMPLE COLLECTION

Composite effluent samples from Environmental Enterprise Group, City of Clarksville WWTP were delivered by Federal Express courier to Huther & Associates on October 18, October 20, and October 22, 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 and receiving water samples were analyzed for total residual chlorine (Standard Methods, 22nd Edition, 4500-CI 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 1505 hours, October 18, 2016. 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 1505 hours, October 25, 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: 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 **PMSD: 9.0%**
NOEC: 100% Effluent

TEST SETUP
Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1520 hours, October 18, 2016. 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 1520 hours, October 25, 2016. 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: 8.2%**
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.

Huthner 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	10/17/16, 10/19/16, 10/21/16
LAB ID #	25762	DATE RECEIVED	10/18/16, 10/20/16, 10/22/16
TEST TYPE	7-Day Chronic	BEGIN DATE/TIME	10/18/16, 1505
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	10/25/16, 1505
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.cnd
DILUTION WATER	Lake Dardanelle	TECHNICIAN	T. Burton

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
10/19/16	A	A	A	A	A	A	A	A	A	A
10/20/16	A	A	A	A	A	A	A	A	A	A
10/21/16	A	A	A	A	A	A	A	A	A	A
10/22/16	3	3	2	3	2	4	3	4	3	3
10/23/16	A	A	A	A	A	A	A	A	A	A
10/24/16	8	10	7	9	7	11	8	10	11	9
10/25/16	24	25	23	26	22	28	26	26	27	24
x # Young 25.1 C.V. 7.38% 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
10/19/16	A	A	A	A	A	A	A	A	A	A
10/20/16	A	A	A	A	A	A	A	A	A	A
10/21/16	A	A	A	A	A	A	A	A	A	A
10/22/16	2	3	3	3	4	2	5	4	5	5
10/23/16	A	A	A	A	A	A	A	A	A	A
10/24/16	10	10	11	9	8	10	8	7	10	9
10/25/16	25	26	26	26	26	25	26	23	29	26
x # Young 25.8 C.V. 5.72% 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
10/19/16	A	A	A	A	A	A	A	A	A	A
10/20/16	A	A	A	A	A	A	A	A	A	A
10/21/16	A	A	A	A	A	A	A	A	A	A
10/22/16	5	3	4	4	2	3	2	3	2	3
10/23/16	A	A	A	A	A	A	A	A	A	A
10/24/16	8	11	10	11	9	11	7	11	8	9
10/25/16	26	27	26	29	25	26	22	27	23	24
x # Young 25.5 C.V. 8.11% 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
10/19/16	A	A	A	A	A	A	A	A	A	A
10/20/16	A	A	A	A	A	A	A	A	A	A
10/21/16	A	A	A	A	A	A	A	A	A	A
10/22/16	3	3	2	2	5	2	4	5	3	2
10/23/16	A	A	A	A	A	A	A	A	A	A
10/24/16	10	8	8	7	9	10	6	11	9	8
10/25/16	25	25	23	22	26	26	22	30	25	22
x # Young 24.6 C.V. 10.18% 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

EEG, Clarksville WWTP

Lab ID# 25762

Test Date: October 18, 2016

56% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/19/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/20/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/21/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/16	2	2	2	4	3	4	4	3	5	3
	2	2	2	4	3	4	4	3	5	3
10/23/16	A	A	A	A	A	A	A	A	A	A
	2	2	2	4	3	4	4	3	5	3
10/24/16	7	10	9	10	8	8	6	9	10	9
	9	12	11	14	11	12	10	12	15	12
10/25/16	14	12	13	13	12	14	12	13	13	12
	23	24	24	27	23	26	22	25	28	24
x# Young 24.6 C.V. 7.71% 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
10/19/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/20/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/21/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/16	2	3	3	4	3	5	3	4	5	4
	2	3	3	4	3	5	3	4	5	4
10/23/16	A	A	A	A	A	A	A	A	A	A
	2	3	3	4	3	5	3	4	5	4
10/24/16	10	11	9	9	6	10	8	9	11	8
	12	14	12	13	9	15	11	13	16	10
10/25/16	13	12	12	14	13	14	12	13	13	12
	25	26	24	27	22	29	23	26	29	22
x# Young 25.3 C.V. 10.21% 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
10/19/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/20/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/21/16	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/22/16	5	5	5	2	4	3	5	3	5	2
	5	5	5	2	4	3	5	3	5	2
10/23/16	A	A	A	A	A	A	A	A	A	A
	5	5	5	2	4	3	5	3	5	2
10/24/16	8	8	7	6	9	10	8	10	8	6
	13	13	12	8	13	13	13	13	8	8
10/25/16	13	13	14	12	13	12	15	12	13	12
	26	26	26	20	26	25	28	25	26	20
x# Young 24.8 C.V. 10.72% x% Survival 100% C.V. 0.00%										

where: A = Alive

5 = Alive, 5 young

D = Dead

D5 = 5 Young, Female died

ex 1:

A	alive today
4	total young to date

ex 2:

5	alive, 5 young today
12	total young to date

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

EEG, Clarksville WWTP

Lab ID# 25762

Test Date: October 18, 2016

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/18/16	Start	25.0	1	8.07	7.57	7.41	7.42	7.37	7.33	7.19	LT
10/19/16	24 Hr.	25.1	1	7.81	7.69	7.52	7.63	7.48	7.51	7.26	TB
10/19/16	Renew	25.2	1	8.22	7.62	7.51	7.53	7.46	7.38	7.22	TB
10/20/16	48 Hr.	25.3	1	8.30	7.97	7.86	7.79	7.74	7.65	7.44	LT
10/20/16	Renew	24.9	2	8.38	7.91	7.86	7.74	7.70	7.61	7.52	LT
10/21/16	72 Hr.	24.1	2	8.30	7.96	7.76	7.70	7.61	7.54	7.29	LT
10/21/16	Renew	24.1	2	8.24	7.91	7.83	7.76	7.66	7.53	7.64	LT
10/22/16	96 Hr.	24.2	2	8.34	7.98	7.85	7.77	7.67	7.62	7.40	RP
10/22/16	Renew	25.0	3	8.29	7.94	7.80	7.71	7.66	7.56	7.37	RP
10/23/16	120 Hr.	24.1	3	8.57	7.97	7.87	7.75	7.67	7.59	7.36	RP
10/23/16	Renew	24.0	3	8.39	7.88	7.83	7.72	7.64	7.56	7.31	RP
10/24/16	144 Hr.	24.1	3	8.26	7.86	7.72	7.60	7.51	7.41	7.23	RP
10/24/16	Renew	24.1	3	8.20	7.79	7.69	7.56	7.44	7.34	7.24	RP
10/25/16	168 Hr.	24.8	3	8.28	8.15	8.13	8.06	8.00	7.93	7.78	LT

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/18/16	Start	25.0	1	8.14	7.85	7.75	8.30	8.61	8.59	8.01	LT
10/19/16	24 Hr.	25.1	1	7.79	7.65	7.49	7.55	7.95	8.06	8.09	TB
10/19/16	Renew	25.2	1	8.09	7.76	7.59	7.88	7.98	8.06	7.98	TB
10/20/16	48 Hr.	25.3	1	8.09	8.18	8.40	8.28	8.42	8.64	8.61	LT
10/20/16	Renew	24.9	2	8.98	8.89	9.04	9.02	8.99	8.84	8.91	LT
10/21/16	72 Hr.	24.1	2	8.08	8.81	8.09	7.73	8.05	7.90	8.05	LT
10/21/16	Renew	24.1	2	8.79	8.21	8.32	7.70	8.05	8.31	8.03	LT
10/22/16	96 Hr.	24.2	2	8.37	8.41	8.15	7.90	7.73	7.81	7.61	RP
10/22/16	Renew	25.0	3	8.01	8.03	7.72	8.00	8.01	7.87	8.14	RP
10/23/16	120 Hr.	24.1	3	7.66	8.00	8.13	7.77	7.89	7.75	7.38	RP
10/23/16	Renew	24.0	3	7.91	7.77	7.95	8.21	8.15	7.82	7.82	RP
10/24/16	144 Hr.	24.1	3	8.22	7.87	8.01	7.89	7.83	7.71	7.51	RP
10/24/16	Renew	24.1	3	7.89	7.65	8.05	8.07	7.88	7.72	8.03	RP
10/25/16	168 Hr.	24.8	3	7.83	7.78	8.05	8.15	8.09	7.58	7.20	LT

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

EEG, Clarksville WWTP

Lab ID# 25762

Test Date: October 18, 2016

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct μ S/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10/18/16	1	7.36	8.18	60	28	669	<0.01	N/A	RK
10/20/16	2	7.52	8.89	68	34	666	<0.01	N/A	RK
10/22/16	3	7.37	8.14	72	30	602	<0.01	N/A	RK

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct μ S/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10/18/16	RS1	7.57	7.85	312	152	1717	<0.01	N/A	RK
10/20/16	RS2	7.91	8.91	316	154	1404	<0.01	N/A	RK
10/22/16	RS3	7.94	8.03	316	148	1280	<0.01	N/A	RK

¹ Measurements taken in 100% solution.

CERIODAPHNIA DUBIA STATISTICAL ANALYSES
 Reproduction

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	10	23.000	29.000	25.800
2	32% Effluent	10	22.000	29.000	25.500
3	42% Effluent	10	22.000	30.000	24.600
4	56% Effluent	10	22.000	28.000	24.600
5	75% Effluent	10	22.000	29.000	25.300
6	100% Effluent	10	20.000	28.000	24.800

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	2.178	1.476	0.467	5.72
2	32% Effluent	4.278	2.068	0.654	8.11
3	42% Effluent	6.267	2.503	0.792	10.18
4	56% Effluent	3.600	1.897	0.600	7.71
5	75% Effluent	6.678	2.584	0.817	10.21
6	100% Effluent	7.067	2.658	0.841	10.72

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	4	15	27	10	4

Calculated Chi-Square goodness of fit test statistic = 2.1494
 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 = 4.04

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	12.800	2.560	0.511
Within (Error)	54	270.600	5.011	
Total	59	283.400		

Critical F value = 2.45 (0.05,5,40)
 Since F < Critical F Fail to Reject Ho: All equal

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

Grp	Identification	Mean		T Stat	Sig
		Transformed Mean	Calculated In Original Units		
1	Control	25.800	25.800		
2	32% Effluent	25.500	25.500	0.300	
3	42% Effluent	24.600	24.600	1.199	
4	56% Effluent	24.600	24.600	1.199	
5	75% Effluent	25.300	25.300	0.499	
6	100% Effluent	24.800	24.800	0.999	

Dunnnett table value = 2.31 (1 Tailed Value, P=0.05, DF=40,5)
 No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum Sig	% of	Difference
			Diff (In Orig. Units)	Control	from Control
1	Control	10			
2	32% Effluent	10	2.313	9.0	0.300
3	42% Effluent	10	2.313	9.0	1.200
4	56% Effluent	10	2.313	9.0	1.200
5	75% Effluent	10	2.313	9.0	0.500
6	100% Effluent	10	2.313	9.0	1.000

Huthner 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	10/17/16, 10/19/16, 10/21/16
LAB ID #	25762	DATE RECEIVED	10/18/16, 10/20/16, 10/22/16
TEST TYPE	7-Day Chronic	BEGIN DATE/TIME	10/18/16 1520
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	10/25/16 1520
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. candle
DILUTION WATER	Lake Dardanelle	TECHNICIAN	B. Bacon

SURVIVAL SUMMARY

Conc.	10/19/16					10/20/16					10/21/16					10/22/16					10/23/16				
	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.	10/24/16					10/25/16					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	0.4810	0.4620	0.4750	0.4240	0.4670	0.4618	4.84
Tcon	0.4150	0.4490	0.4260	0.4850	0.4520	0.4454	6.07
32%	0.4710	0.4950	0.4440	0.4720	0.5010	0.4766	4.75
42%	0.4820	0.4650	0.4290	0.5040	0.4860	0.4732	5.99
56%	0.4520	0.5030	0.4950	0.4650	0.4710	0.4772	4.45
75%	0.4820	0.5040	0.4470	0.4520	0.4960	0.4762	5.39
100%	0.4520	0.5040	0.4710	0.4620	0.4810	0.4740	4.20

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

EEG, Clarksville WWTP

Lab ID# 25762

Test Date: October 18, 2016

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/18/16	Start	25.0	1	8.07	7.57	7.41	7.42	7.37	7.33	7.19	LT
10/19/16	24 Hr.	25.2	1	8.10	7.69	7.61	7.48	7.47	7.34	7.15	TB
10/19/16	Renew	25.2	1	8.22	7.62	7.51	7.53	7.46	7.38	7.22	TB
10/20/16	48 Hr.	25.4	1	8.10	7.79	7.61	7.48	7.46	7.34	7.99	LT
10/20/16	Renew	24.9	2	8.38	7.91	7.86	7.74	7.70	7.61	7.52	LT
10/21/16	72 Hr.	24.2	2	7.49	7.74	7.58	7.54	7.48	7.34	7.16	LT
10/21/16	Renew	24.1	2	8.24	7.91	7.83	7.76	7.66	7.53	7.64	LT
10/22/16	96 Hr.	24.3	2	8.27	8.21	8.13	8.04	7.96	7.88	7.71	RP
10/22/16	Renew	25.0	3	8.29	7.94	7.80	7.71	7.66	7.56	7.37	RP
10/23/16	120 Hr.	24.3	3	7.94	7.95	7.96	7.90	7.83	7.65	7.56	RP
10/23/16	Renew	24.0	3	8.39	7.88	7.83	7.72	7.64	7.56	7.31	RP
10/24/16	144 Hr.	24.5	3	7.85	7.76	7.71	7.59	7.52	7.33	7.16	RP
10/24/16	Renew	24.1	3	8.20	7.79	7.69	7.56	7.44	7.34	7.24	RP
10/25/16	168 Hr.	24.6	3	8.33	8.32	8.18	8.09	7.85	7.77	7.51	LT

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
10/18/16	Start	25.0	1	8.14	7.85	7.75	8.30	8.61	8.59	8.01	LT
10/19/16	24 Hr.	25.2	1	7.70	7.59	6.90	6.72	7.38	7.75	7.60	TB
10/19/16	Renew	25.2	1	8.09	7.76	7.59	7.88	7.98	8.06	7.98	TB
10/20/16	48 Hr.	25.4	1	8.37	8.41	8.34	7.00	7.69	7.86	7.56	LT
10/20/16	Renew	24.9	2	8.98	8.89	9.04	9.02	8.99	8.84	8.91	LT
10/21/16	72 Hr.	24.2	2	8.17	7.44	7.90	7.77	7.99	8.35	8.30	LT
10/21/16	Renew	24.1	2	8.79	8.21	8.32	7.70	8.05	8.31	8.03	LT
10/22/16	96 Hr.	24.3	2	8.71	8.84	7.60	7.44	7.78	8.14	8.55	RP
10/22/16	Renew	25.0	3	8.01	8.03	7.72	8.00	8.01	7.87	8.14	RP
10/23/16	120 Hr.	24.3	3	8.40	8.35	7.34	7.24	7.77	8.13	8.22	RP
10/23/16	Renew	24.0	3	7.91	7.77	7.95	8.21	8.15	7.82	7.82	RP
10/24/16	144 Hr.	24.5	3	8.46	8.48	7.26	7.52	7.77	8.12	8.28	RP
10/24/16	Renew	24.1	3	7.89	7.65	8.05	8.07	7.88	7.72	8.03	RP
10/25/16	168 Hr.	24.6	3	8.09	7.57	8.06	8.00	6.82	7.29	8.18	LT

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

EEG, Clarksville WWTP

Lab ID# 25762

Test Date: October 18, 2016

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct μ S/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10/18/16	1	7.36	8.18	60	28	669	<0.01	N/A	RK
10/20/16	2	7.52	8.89	68	34	666	<0.01	N/A	RK
10/22/16	3	7.37	8.14	72	30	602	<0.01	N/A	RK

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp. No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct μ S/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10/18/16	RS1	7.57	7.85	312	152	1717	<0.01	N/A	RK
10/20/16	RS2	7.91	8.91	316	154	1404	<0.01	N/A	RK
10/22/16	RS3	7.94	8.03	316	148	1280	<0.01	N/A	RK

¹ Measurements taken in 100% solution.

Huther and Associates, Inc.
 Begin Date: October 18, 2016
 Lab I.D.# 25762

PIMEPHALES PROMELAS STATISTICAL ANALYSES
 Growth

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	5	0.415	0.485	0.445
2	32% Effluent	5	0.444	0.501	0.477
3	42% Effluent	5	0.429	0.504	0.473
4	56% Effluent	5	0.452	0.503	0.477
5	75% Effluent	5	0.447	0.504	0.476
6	100% Effluent	5	0.452	0.504	0.474

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.001	0.027	0.012	6.07
2	32% Effluent	0.001	0.023	0.010	4.75
3	42% Effluent	0.001	0.028	0.013	5.99
4	56% Effluent	0.000	0.021	0.009	4.45
5	75% Effluent	0.001	0.026	0.011	5.39
6	100% Effluent	0.000	0.020	0.009	4.20

Shapiro - Wilk's Test For Normality

D = 0.014

W = 0.971

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 = 0.71

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	0.004	0.001	1.290
Within (Error)	24	0.014	0.001	
Total	29	0.018		

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

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

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

Grp	Identification	Mean		T Stat	Sig
		Transformed Mean	Calculated In Original Units		
1	Control	0.445	0.445		
2	32% Effluent	0.477	0.477	-2.027	
3	42% Effluent	0.473	0.473	-1.806	
4	56% Effluent	0.477	0.477	-2.066	
5	75% Effluent	0.476	0.476	-2.001	
6	100% Effluent	0.474	0.474	-1.858	

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

No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum Sig	% of Control	Difference
			Diff (In Orig. Units)		from Control
1	Control	5			
2	32% Effluent	5	0.036	8.2	-0.031
3	42% Effluent	5	0.036	8.2	-0.028
4	56% Effluent	5	0.036	8.2	-0.032
5	75% Effluent	5	0.036	8.2	-0.031
6	100% Effluent	5	0.036	8.2	-0.029

**APPENDIX A
RAW DATA**

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 1 OF 2

CLIENT EEG-Clarksville
 OUTFALL 001
 LAB ID # 25762

START DATE/TIME 10-18-16 TB 1505
 END DATE/TIME 10-25-16 TB 1505

PC01

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	3	3	2	3	2	4	3	4	3	3	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	8	10	7	9	7	11	8	10	11	9	FSB	1350
10/25	13	12	14	14	13	13	15	12	13	12	TB	1505

\bar{x} # Young w/o Dead = 25.1 CV% = 7.38
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

TC01

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	2	3	3	3	4	2	5	4	5	5	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	10	10	11	9	8	10	8	7	10	9	FSB	1350
10/25	13	13	12	14	14	13	13	12	14	12	TB	1505

\bar{x} # Young w/o Dead = 25.8 CV% = 5.72
 \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
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	5	3	4	4	2	3	2	3	2	3	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	8	11	10	11	9	11	7	11	8	9	FSB	1350
10/25	13	13	12	14	14	12	13	13	13	12	TB	1505

\bar{x} # Young w/o Dead = 25.5 CV% = 8.11
 \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
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	3	3	2	2	5	2	4	5	3	2	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	10	8	8	7	9	10	6	11	9	8	FSB	1350
10/25	12	14	13	13	12	14	12	14	13	12	TB	1505

\bar{x} # Young w/o Dead = 24.6 CV% = 10.18
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 2 OF 2

CLIENT EEG-Clarksville
 OUTFALL 001
 LAB ID # 25762

START DATE/TIME 10-18-16 TB 1505
 END DATE/TIME 10-25-16 TB 1505

56

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	2	2	2	4	3	4	4	3	5	3	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	7	10	9	10	8	8	6	9	10	9	BB	1350
10/25	14	12	13	13	12	14	12	13	13	12	TB	1505

\bar{x} # Young w/o Dead = 24.6 CV% = 7.71
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

75

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	2	3	3	4	3	5	3	4	5	4	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	10	11	9	9	6	10	8	9	11	6	BB	1350
10/25	13	12	12	14	13	14	12	13	13	12	TB	1505

\bar{x} # Young w/o Dead = 25.3 CV% = 10.21
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

100

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/19	A	A	A	A	A	A	A	A	A	A	MH	1505
10/20	A	A	A	A	A	A	A	A	A	A	TB	1505
10/21	A	A	A	A	A	A	A	A	A	A	RK	1025
10/22	5	5	5	2	4	3	5	3	5	2	MH	1400
10/23	A	A	A	A	A	A	A	A	A	A	TB	1315
10/24	8	8	7	6	9	10	8	10	8	6	BB	1350
10/25	13	13	14	12	13	12	15	12	13	12	TB	1505

\bar{x} # Young w/o Dead = 24.8 CV% = 10.72
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

① TB 10/25

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time

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

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

CLIENT/FACILITY EE6-CLARKSVILLE
 OUTFALL # 001 PROJECT # 25762
 ORGANISM ID# PP0-16-291

DATE/TIME STARTED 10-18-16 RB 1520
 DATE/TIME ENDED 10-25-16 BB 1520

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	10-19-16 RB 1520					10-20-16 BB 0900					10-21-16 RK 0835					10-22-16 MH 0840					10-23-16 TB 0915									

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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
Initials Date/Time	10-24-16 RK 0845					10-25-16 BB 1520																					

Client / Facility EEG - Clarksville
 Lab ID Number 25762
 Outfall Number 001
 Test Date 10-18-16

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH	DO	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct. umhos/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10-18	1	7.36	8.18	60	28	669	<0.01	N/A	RK
10-20	2	7.52	8.89	68	34	666	↓	↓	↓
10-22	3	7.37	8.14	72	30	602	↓	↓	↓

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp. No.	pH	DO	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct. umhos/cm ¹	Resid. Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₃ mg/L ¹	Analyst
10-18	RS1	7.57	7.85	312	152	1717	<0.01	N/A	RK
10-20	RS2	7.91	8.91	316	154	1404	↓	↓	↓
10-22	RS3	7.94	8.03	316	148	1280	↓	↓	↓

Notes:

**APPENDIX B
REFERENCE TOXICANTS**

CHRONIC REFERENCE TOXICANT TEST RESULTS

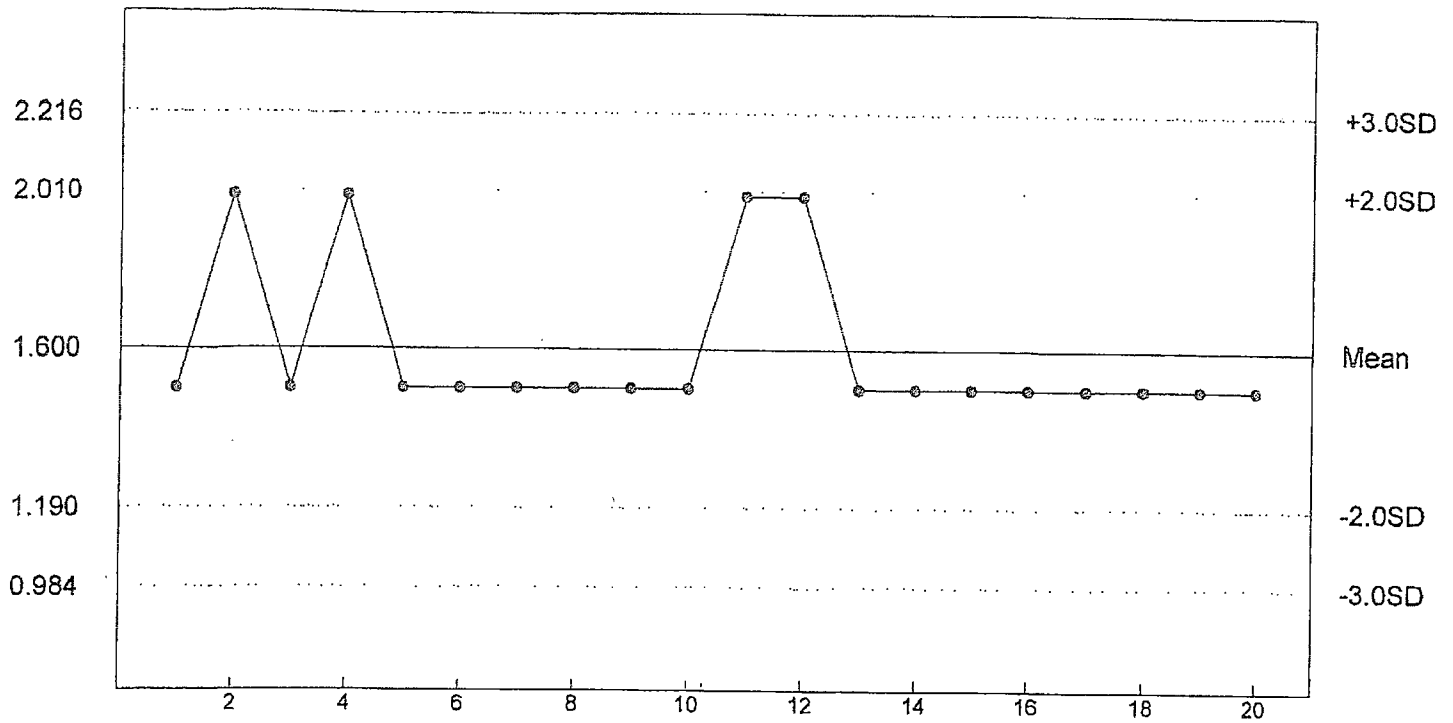
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Sodium Chloride
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE: 10/06/16 - 10/13/16
 1340 Hrs - 1340 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

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

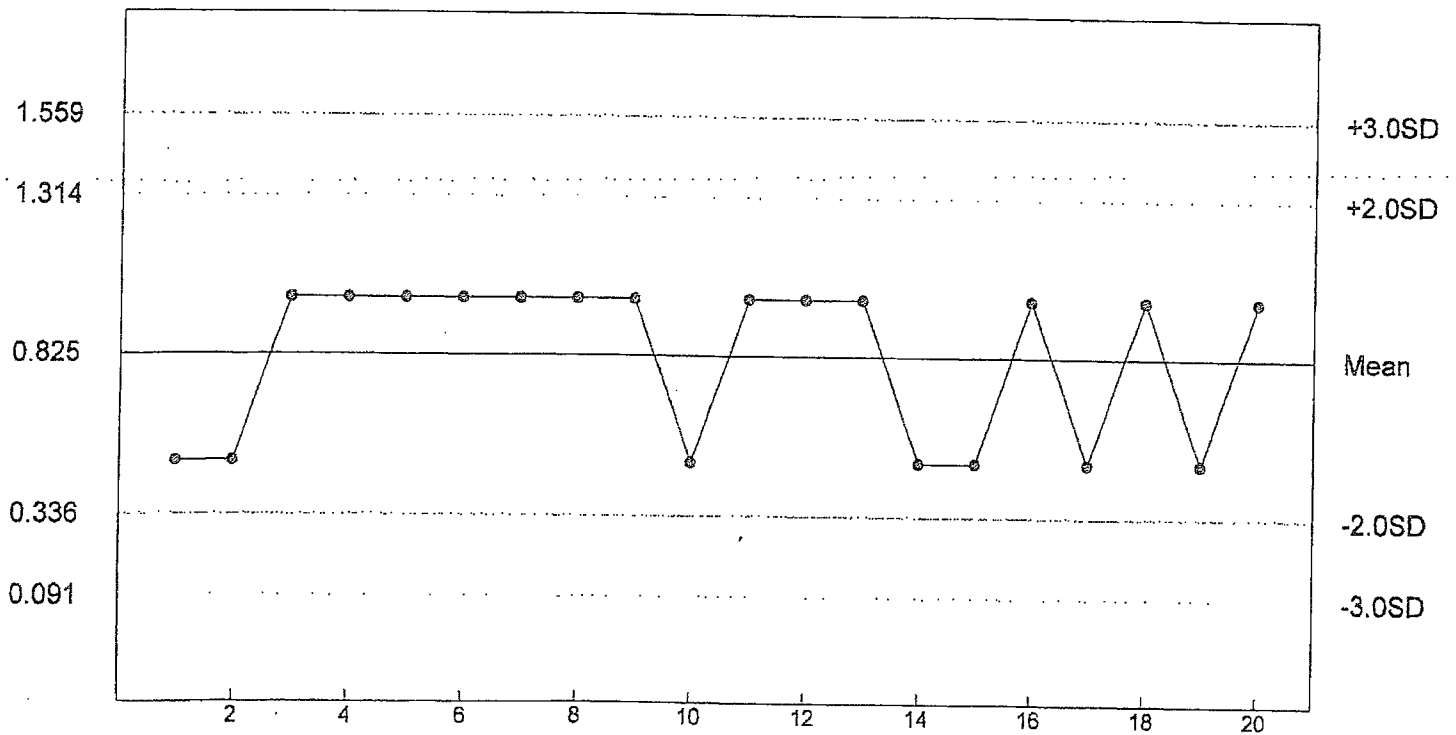
C. dubia Survival - NOEC



n= 20 Mean= 1.600 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

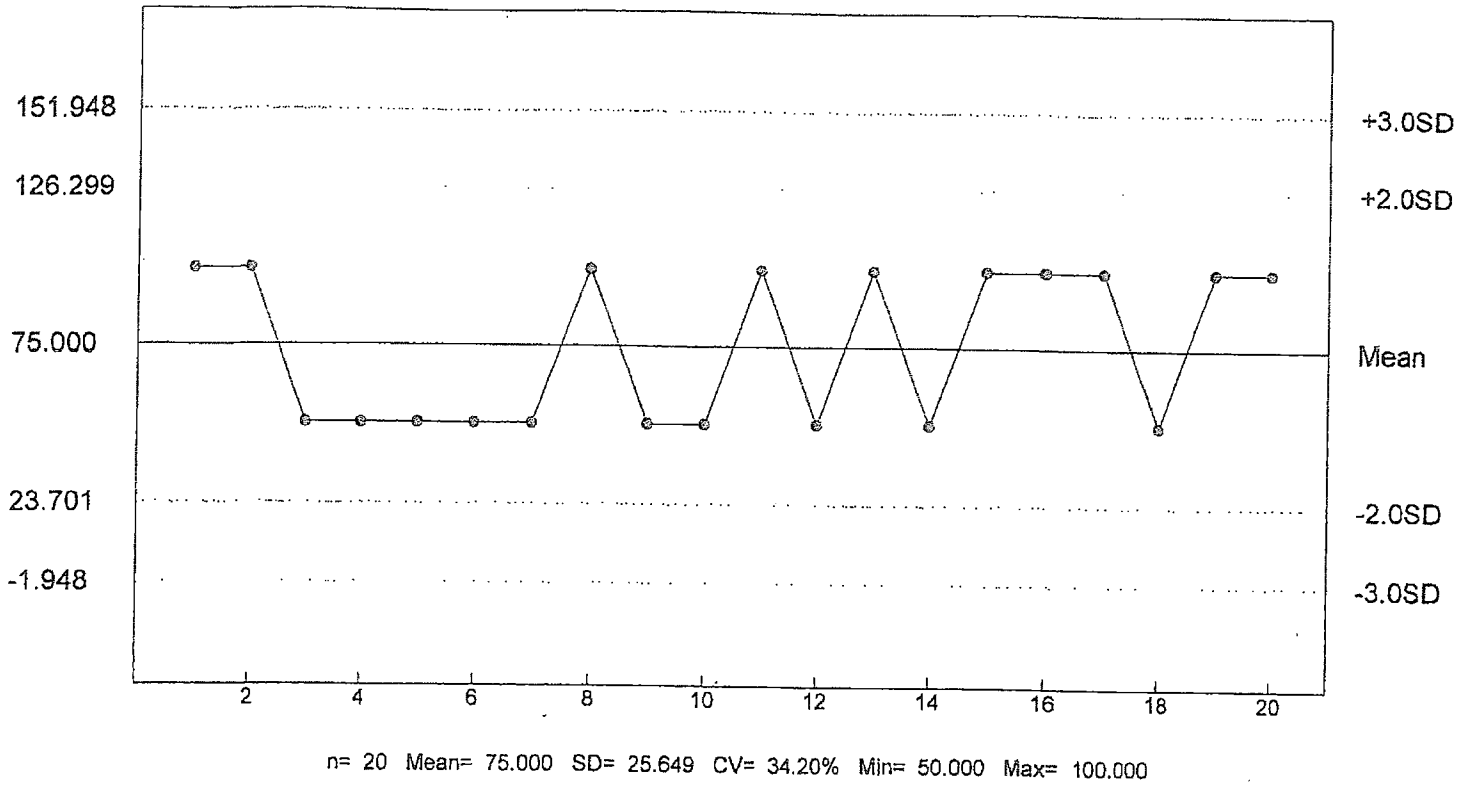
CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE: 10/06/16 - 10/13/16
 1610 Hrs - 1610 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

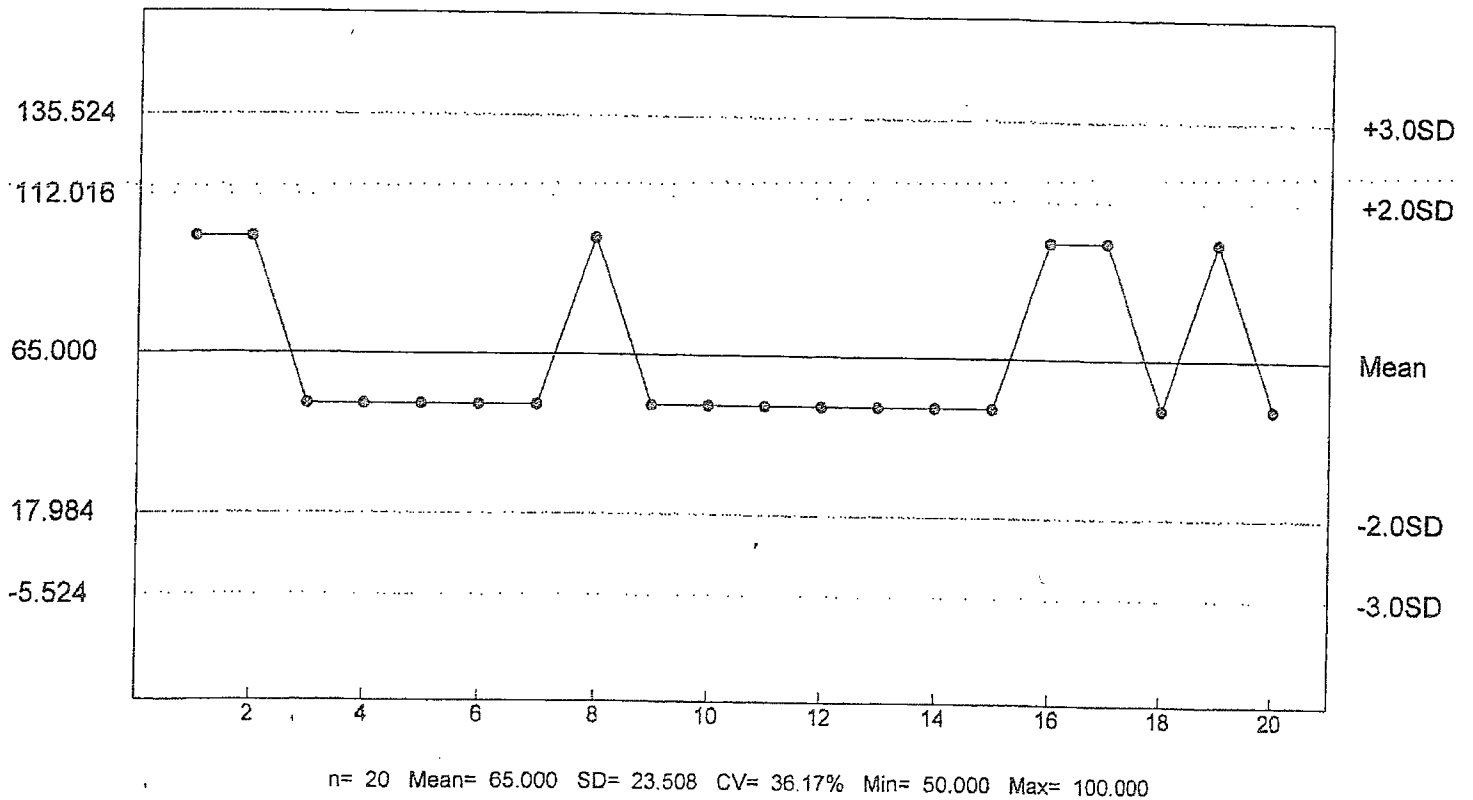
CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
25	40	0
50	40	0
100	40	7
200	40	16
400	40	32
800	40	40

LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
200 ug/L	100 ug/L	100 mg/L	50 ug/L

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



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



**APPENDIX C
CHAIN OF CUSTODY SHEETS**

25762



L444-051725

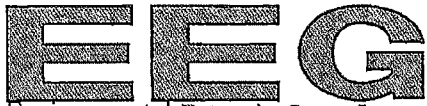
Environmental Enterprise Group, Inc.
220 North Knoxville, Suite 200
Russellville, Arkansas 72801
(479) 968-6767 Fax (479) 968-1956

Company Name:			Phone #:		Requested Analysis																Laboratory Control Number	Remarks (Please note special detection limits below.)
Clarksville Light and Water			(479) 754-6241		7-Day Chronic Bio-Monitoring																	
Address:			Fax #:																			
P.O. Box 1807 Clarksville, AR 72830			(479) 754-8181																			
Project Name or Number:			Purchase Order #:																			
Bio-Monitoring																						
Sampling Personnel Signature(s):						Printed :																
Sample I.D.	Date	Time	Comp.	Grab	Cont.Type		# of Containers	Method Preserved						Sample Matrix					7-Day Chronic Bio-Monitoring			
					Plast.	Glass		H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other				
Outfall 001	10-16-16 ⁽²⁾ 10-17-2016	0722 12 7:12 AM			X		1						X	X				X		1016103		
Relinquished by:			Date:		Time:		Received By:				Date:		Time:									
<i>Steph R</i>			10-17-2016		7:14 AM		<i>Sturmen</i>				10/17/16		0800									
Received by:			Date:		Time:		Relinquished By:				Date:		Time:									
<i>Megan Hatcher</i>			10-17-16		0714		<i>Sturmen</i>				10/17/16		1100									
Relinquished by:			Date:		Time:		Received by Laboratory:				Date:		Time:									
<i>Megan Hatcher</i>			10-17-16		0800		<i>Matt Horner</i>				10-18-16		1100									
Comments:																						
<i>Matt Horner</i>			31.5°C IRI																UPS FedEx			

- ① MH 10-18-16
- ② ME 10-28-16

10/31 ME

#25762



Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

L444-051725

Environmental Enterprise Group, Inc.
220 North Knoxville, Suite 200
Russellville, Arkansas 72801
(479) 968-6767 Fax (479) 968-1956

Company Name:								Phone #:								Requested Analysis								7-Day Chronic Bio-Monitoring	Laboratory Control Number	Remarks (Please note special detection limits below.)												
Clarksville Light and Water								(479) 754-6241																														
Address:								Fax #:																														
P.O. Box 1807 Clarksville, AR 72830								(479) 754-8181																														
Project Name or Number:								Purchase Order #:																														
Bio-Monitoring																																						
Sampling Personnel Signature(s):										Printed:																												
D. Smith										D. Smith Gregory																												
Sample I.D.	Date	Time	Comp.	Grab	Cont. Type		# of Containers	Method Preserved							Sample Matrix				7-Day Chronic Bio-Monitoring	Laboratory Control Number	Remarks																	
					H2SO4	HNO3		NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other																						
Outfall 001	10-18-16	0712	X		Plast.	Glass	1									X	X																					
Relinquished by:								Date:	Time:	Received By:								Date:	Time:																			
Gregory								10-19-2016	7:10 AM	Stacy Noren								10/19/16	0820																			
Received by:								Date:	Time:	Relinquished By:								Date:	Time:																			
Megan Hatchew								10-19-16	0710	Stacy Noren								10/19/16	1600																			
Relinquished by:								Date:	Time:	Received by Laboratory:								Date:	Time:																			
Megan Hatchew								10-19-16	0820	Matt Hornor								10-20-16	1045																			
Comments:																																						
Fedex																4.9°C		IRI																				

25762



LY44-051725

Environmental Enterprise Group, Inc.
220 North Knoxville, Suite 200
Russellville, Arkansas 72801
(479) 968-6767 Fax (479) 968-1956

Company Name:		Phone #:		Requested Analysis														Laboratory Control Number	Remarks (Please note special detection limits below.)
Clarksville Light and Water		(479) 754-6241		7-Day Chronic Bio-Monitoring															
Address:		Fax #:																	
P.O. Box 1807 Clarksville, AR 72830		(479) 754-8181																	
Project Name or Number:		Purchase Order #:																	
Bio-Monitoring																			
Sampling Personnel Signature(s):								Printed:											
<i>Pam Smith Greg Rainey</i>								<i>Pam Smith Greg Rainey</i>											
Sample I.D.	Date	Time	Cont. Type		# of Containers	Method Preserved								Sample Matrix				7-Day Chronic Bio-Monitoring	
			Comp.	Grab		H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other			
Outfall 001	10/19/16 10-20-16	06:40 06:40 06:40	X	X	1						X	X					X	10/6/03	
Relinquished by:		Date:	Time:	Received By:		Date:	Time:	Relinquished By:		Date:	Time:	Received by Laboratory:		Date:	Time:				
<i>Jay By</i>		10-21-16	4:40	<i>Jay By</i>		10/21/16	0800	<i>Jay By</i>		10/21/16	1600	<i>Tina BH</i>		10/22/16	1230				
Received by:		Date:	Time:	Relinquished By:		Date:	Time:	Received by Laboratory:		Date:	Time:								
<i>Megan Hatcher</i>		10-21-16	0710	<i>Jay By</i>		10/21/16	1600	<i>Tina BH</i>		10/22/16	1230								
Relinquished by:		Date:	Time:	Received by Laboratory:		Date:	Time:												
<i>Megan Hatcher</i>		10-21-16	0800	<i>Tina BH</i>															
Comments:																			
<i>fedEx</i>																			

① ME 10/28

temp
0.5
IRI

ENVIRONMENTAL ENTERPRISE GROUP
 CITY OF CLARKSVILLE WWTP – OUTFALL 001
 NPDES PERMIT NO. AR0022187
 AFIN NO. 36-00038
 BIOMONITORING REPORTING
 TEST DATE: 10/18/16

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.	10.72%

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. TOP6C.	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.	6.07%



7014 2120 0000 5115 7882



ZIP 72830 \$ 008.41⁰
02 1W
0001370120 NOV. 15. 2016

CLARKSVILLE LIGHT & WATER CO.

400 WEST MAIN • P.O. BOX 1807
CLARKSVILLE, AR 72830
PHONE (479) 754-3148

To

Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118

