

ENVIRONMENTAL ENTERPRISE GROUP
 CITY OF CLARKSVILLE WWTP – OUTFALL 001
 NPDES PERMIT NO. AR0022187
 AFIN NO. 36-00038
 BIOMONITORING REPORTING
 TEST DATE: 04/28/15

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.	5.80%

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.	7.96%

DISCHARGE MONITORING REPORT (DMR)

OMB No. 2040-0004

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: CLARKSVILLE LIGHT & WATER
 ADDRESS: P.O. BOX 1807
 CLARKSVILLE, AR 72830

FACILITY: CLARKSVILLE LIGHT & WATER
 LOCATION: 1305 S CRAWFORD ST
 CLARKSVILLE, AR 72830

ATTN: GREG RAINEY, PCF MANAGER

AR0022187	TX1-Q
PERMIT NUMBER	DISCHARGE NUMBER
MONITORING PERIOD	
MM/DD/YYYY	MM/DD/YYYY
04/01/2015	06/30/2015

DMR Mailing ZIP CODE: 72830
 MAJOR

001-QUARTERLY CHRONIC TOXICITY
 External Outfall

No Discharge

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Pass/Fail Static Renewal 7 Day Chronic Ceriodaphnia	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TGP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Pass/Fail Statre 7Day Chronic Pimephales Promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TGP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TLP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TLP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
NOEC Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TOP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%		Quarterly	COMP24
NOEC Lethal Static Renewal 7 Day Chronic Pimephales promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TOP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%		Quarterly	COMP24
NOEC Sub-Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TPP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%		Quarterly	COMP24

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER Gregg Rainey Manager TYPED OR PRINTED	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT <i>Gregg Rainey</i>	TELEPHONE	DATE
			479-254-6241 AREA Code NUMBER	5-19-2015 MM/DD/YYYY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(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. 38-00038

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No Discharge

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		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Pass/Fail Static Renewal 7 Day Chronic Ceriodaphnia	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TGP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Pass/Fail Statre 7Day Chronic Pimephales Promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TGP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TLP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic	SAMPLE MEASUREMENT	*****	*****	*****	*****	0	*****	0	0	1/90	24HC
TLP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	pass=0/fail=1		Quarterly	COMP24
NOEC Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TOP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	%		Quarterly	COMP24
NOEC Lethal Static Renewal 7 Day Chronic Pimephales promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TOP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	%		Quarterly	COMP24
NOEC Sub-Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TPP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon 7 DA AVG	*****	%		Quarterly	COMP24

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			479-754-6291 AREA Code NUMBER	5-19-2015 MM/DD/YYYY

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		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
NOEC Sub-Lethal Static Renewal 7 Day Chronic Pimephales promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/90	24HC
TPP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req: Mon 7 DA AVG	*****	%	*****	Quarterly	COMP24
Coef Of Var Statre 7Day Chronic Ceriodaphnia	SAMPLE MEASUREMENT	*****	*****	*****	*****	5.80%	*****	0	0	1/90	24HC
TQP3B 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req: Mon 7 DA AVG	*****	%	*****	Quarterly	COMP24
Coef Of Var Statre 7Day Chronic Pimephales	SAMPLE MEASUREMENT	*****	*****	*****	*****	7.96%	*****	0	0	1/90	24HC
TQP6C 10 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req: Mon 7 DA AVG	*****	%	*****	Quarterly	COMP24

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		VALUE	VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
NOEC Sub-Lethal Static Renewal 7 Day Chronic Pimephales promelas	SAMPLE MEASUREMENT	*****	*****	*****	*****	100%	*****	0	0	1/40	24HC
TPP6C 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%	*****	Quarterly	COMP24
Coef Of Var Statre 7Day Chronic Ceriodaphnia	SAMPLE MEASUREMENT	*****	*****	*****	*****	5.80%	*****	0	0	1/40	24HC
TQP3B 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%	*****	Quarterly	COMP24
Coef Of Var Statre 7Day Chronic Pimephales	SAMPLE MEASUREMENT	*****	*****	*****	*****	7.96%	*****	0	0	1/40	24HC
TQP6C 1 0 Effluent Gross	PERMIT REQUIREMENT	*****	*****	*****	*****	Req. Mon. 7 DA AVG	*****	%	*****	Quarterly	COMP24

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			478-754-6241 AREA Code NUMBER	5-19-2015 MM/DD/YYYY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(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: 38-00038

ENVIRONMENTAL ENTERPRISE GROUP
CITY OF CLARKSVILLE WWTP
OUTFALL 001

Chronic Biomonitoring Report
Permit Number NPDES AR0022187
AFIN No: 36-00038

Ceriodaphnia dubia
Pimephales promelas

April 28, 2015

Reviewed by: _____



Toni Geiger, QA/QC Officer
Huther & Associates, Inc.
1156 North Bonnie Brae
Denton, Texas 76201
(940) 387-1025, Fax: (940) 387-1036

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TOXICITY TEST REPORT - CHRONIC

Client Environmental Enterprise Group Sample Outfall 001
Facility City of Clarksville WWTP Laboratory I.D. 24099
Permit No. NPDES AR0022187 Begin Date April 28, 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 Services courier to Huther & Associates on April 28, April 30 and May 2, 2015. Effluent samples were collected and composited from Outfall 001 using an automatic sampler. 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-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 1525 hours, April 28, 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 1525 hours, May 5, 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: 6.1%

TEST SETUP
Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1635 hours, April 28, 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 1635 hours, May 5, 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: 10.4%**
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.

Huther 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	04/27/15 04/29/15 05/01/15
LAB ID #	24099	DATE RECEIVED	04/28/15 04/30/15 05/02/15
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	04/28/15 1525
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	05/05/15 1525
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	N. Lehr

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
04/29/15	A	A	A	A	A	A	A	A	A	A
04/30/15	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
05/02/15	3	2	3	3	2	4	2	3	3	3
05/03/15	A	A	A	A	A	A	A	A	A	A
05/04/15	6	7	7	6	8	6	7	8	8	7
05/05/15	14	12	12	13	12	14	13	13	12	13
x# Young 22.6 C.V. 4.27% 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
04/29/15	A	A	A	A	A	A	A	A	A	A
04/30/15	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
05/02/15	2	A	A	A	2	3	A	A	3	3
05/03/15	A	4	3	3	2	3	4	2	3	3
05/04/15	8	6	7	9	8	6	6	7	9	8
05/05/15	13	14	12	13	12	13	13	12	13	12
x# Young 23.0 C.V. 5.80% 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
04/29/15	A	A	A	A	A	A	A	A	A	A
04/30/15	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
05/02/15	3	A	2	3	A	A	3	A	A	3
05/03/15	A	4	A	A	3	2	A	4	4	A
05/04/15	11	10	9	12	11	12	11	10	11	11
05/05/15	24	24	21	24	24	25	23	24	23	24
x# Young 23.6 C.V. 4.55% 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
04/29/15	A	A	A	A	A	A	A	A	A	A
04/30/15	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
05/02/15	2	3	2	A	A	2	3	A	A	A
05/03/15	2	3	2	4	3	2	3	2	4	3
05/04/15	10	9	9	13	13	9	14	10	13	10
05/05/15	23	23	21	26	25	22	26	24	25	23
x# Young 23.8 C.V. 7.09% 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

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

EEG, City of Clarksville WWTP

Lab ID# 24099

Test Date: April 28, 2015

56% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
04/29/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
04/30/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/02/15	2	3	4	A	A	3	A	4	A	A
	2	3	4	0	0	3	0	4	0	0
05/03/15	A	A	A	3	2	A	2	A	3	4
	2	3	4	3	2	3	2	4	3	4
05/04/15	8	6	7	8	9	10	8	7	9	6
	10	9	11	11	11	13	10	11	12	10
05/05/15	13	14	12	13	12	13	12	13	12	14
	23	23	23	24	23	26	22	24	24	24
x# Young 23.6 C.V. 4.55% 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
04/29/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
04/30/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/02/15	2	2	3	3	A	A	3	A	4	A
	2	2	3	3	0	0	3	0	4	0
05/03/15	A	A	A	A	4	2	A	3	A	3
	2	2	3	3	4	2	3	3	4	3
05/04/15	9	8	7	6	7	9	8	7	10	9
	11	10	10	9	11	11	11	10	14	12
05/05/15	13	12	12	14	13	12	13	12	13	12
	24	22	22	23	24	23	24	22	27	24
x# Young 23.5 C.V. 6.42% 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
04/29/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
04/30/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/01/15	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
05/02/15	2	4	A	A	A	3	3	2	4	3
	2	4	0	0	0	3	3	2	4	3
05/03/15	A	A	3	4	2	A	A	A	A	A
	2	4	3	4	2	3	3	2	4	3
05/04/15	8	7	9	6	8	10	9	8	6	9
	10	11	12	10	10	13	12	10	10	12
05/05/15	13	12	14	14	12	12	13	12	14	12
	23	23	26	24	22	25	25	22	24	24
x# Young 23.8 C.V. 5.53% 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

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

EEG, City of Clarksville WWTP

Lab ID# 24099

Test Date: April 28, 2015

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
4/28/15	Start	25.0	1	8.31	8.03	7.74	7.70	7.62	7.49	7.11	TB
4/29/15	24 Hr.	24.8	1	7.99	7.84	7.71	7.63	7.49	7.33	7.46	BL
4/29/15	Renew	25.0	1	8.22	8.10	7.70	7.59	7.70	7.52	7.08	TB
4/30/15	48 Hr.	24.1	1	8.04	7.92	7.85	7.76	7.62	7.48	7.55	BL
4/30/15	Renew	24.7	2	7.93	8.01	7.42	7.35	7.36	7.27	7.15	BL
5/1/15	72 Hr.	24.0	2	8.11	8.16	8.01	7.90	7.78	7.65	7.77	BL
5/1/15	Renew	25.0	2	8.25	7.46	7.40	7.41	7.38	7.27	7.01	BL
5/2/15	96 Hr.	24.2	2	8.19	8.22	8.06	8.00	7.89	7.90	7.83	BL
5/2/15	Renew	24.0	3	8.30	7.99	7.51	7.48	7.56	7.67	7.18	BL
5/3/15	120 Hr.	24.8	3	8.08	8.13	7.97	7.84	7.71	7.61	7.70	RK
5/3/15	Renew	25.0	3	8.21	7.97	7.76	7.73	7.70	7.81	7.18	RK
5/4/15	144 Hr.	24.8	3	8.19	8.13	8.03	7.96	7.86	7.72	7.42	RK
5/4/15	Renew	25.0	3	8.09	7.31	7.24	7.18	7.15	7.04	7.18	RK
5/5/15	168 Hr.	24.4	3	8.26	8.33	8.20	8.16	8.07	7.95	7.61	BL

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
4/28/15	Start	25.0	1	7.47	8.56	8.69	8.45	8.16	8.02	8.16	TB
4/29/15	24 Hr.	24.8	1	8.17	8.07	8.69	8.14	8.63	7.85	7.71	BL
4/29/15	Renew	25.0	1	7.52	8.46	8.65	8.56	8.20	8.06	8.23	TB
4/30/15	48 Hr.	24.1	1	8.14	8.09	8.46	8.31	8.52	8.19	8.00	BL
4/30/15	Renew	24.7	2	7.68	8.52	8.01	8.19	8.00	7.93	8.20	BL
5/1/15	72 Hr.	24.0	2	8.10	8.17	8.61	8.36	8.40	8.15	8.09	BL
5/1/15	Renew	25.0	2	7.40	7.61	7.75	7.74	7.61	7.59	7.52	BL
5/2/15	96 Hr.	24.2	2	7.95	8.12	8.54	8.42	8.32	8.10	8.19	BL
5/2/15	Renew	24.0	3	7.79	8.55	7.62	7.75	7.83	7.94	8.24	BL
5/3/15	120 Hr.	24.8	3	7.89	8.11	8.61	8.54	8.68	8.39	8.67	RK
5/3/15	Renew	25.0	3	7.64	7.83	7.91	7.80	8.12	7.81	8.24	RK
5/4/15	144 Hr.	24.8	3	8.49	8.32	8.19	8.23	8.11	8.16	8.58	RK
5/4/15	Renew	25.0	3	8.80	8.12	8.85	8.34	8.36	8.39	8.24	RK
5/5/15	168 Hr.	24.4	3	8.84	8.85	8.64	8.85	8.70	8.87	8.79	BL

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

EEG, City of Clarksville WWTP

Lab ID# 24099

Test Date: April 28, 2015

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
4/28/15	1	7.11	8.16	68	14	413	<0.01	N/A	TG
4/30/15	2	7.15	8.20	72	18	409	<0.01	N/A	TG
5/02/15	3	7.18	8.24	68	16	402	<0.01	N/A	TG

¹ Measurements taken in 100% solution.

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
4/28/15	RS1	8.03	8.56	240	100	1190	<0.01	N/A	TG
4/30/15	RS2	8.01	8.52	240	96	1178	<0.01	N/A	TG
5/02/15	RS3	7.99	8.55	240	100	1191	<0.01	N/A	TG

Huther and Associates, Inc.
 Begin Date: April 28, 2015
 Lab I.D.# 24099

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	23.000
2	32% Effluent	10	21.000	25.000	23.600
3	42% Effluent	10	21.000	26.000	23.800
4	56% Effluent	10	22.000	26.000	23.600
5	75% Effluent	10	22.000	27.000	23.500
6	100% Effluent	10	22.000	26.000	23.800

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	1.778	1.333	0.422	5.80
2	32% Effluent	1.156	1.075	0.340	4.55
3	42% Effluent	2.844	1.687	0.533	7.09
4	56% Effluent	1.156	1.075	0.340	4.55
5	75% Effluent	2.278	1.509	0.477	6.42
6	100% Effluent	1.733	1.317	0.416	5.53

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	2	19	26	10	3

Calculated Chi-Square goodness of fit test statistic = 4.4770
 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 = 2.79

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	4.350	0.870	0.477
Within (Error)	54	98.500	1.824	
Total	59	102.850		

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	23.000	23.000		
2	32% Effluent	23.600	23.600	-0.993	
3	42% Effluent	23.800	23.800	-1.325	
4	56% Effluent	23.600	23.600	-0.993	
5	75% Effluent	23.500	23.500	-0.828	
6	100% Effluent	23.800	23.800	-1.325	

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	1.395	6.1	-0.600
3	42% Effluent	10	1.395	6.1	-0.800
4	56% Effluent	10	1.395	6.1	-0.600
5	75% Effluent	10	1.395	6.1	-0.500
6	100% Effluent	10	1.395	6.1	-0.800

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	04/27/15 04/29/15 05/01/15
LAB ID #	24099	DATE RECEIVED	04/28/15 04/30/15 05/02/15
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	04/28/15 1635
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	05/05/15 1635
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. endl
DILUTION WATER	Lake Dardanelle	TECHNICIAN	Z. Geiger

SURVIVAL SUMMARY

Conc.	04/29/15					04/30/15					05/01/15					05/02/15					05/03/15				
	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.	05/04/15					05/05/15					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	0.4860	0.5020	0.4290	0.4670	0.4950	0.4758	6.15
Tcon	0.4460	0.4320	0.4150	0.4980	0.4860	0.4554	7.78
32%	0.4950	0.4270	0.5040	0.4470	0.5040	0.4754	7.56
42%	0.4260	0.5040	0.5020	0.4810	0.4690	0.4764	6.67
56%	0.4560	0.4490	0.4950	0.5060	0.4720	0.4756	5.16
75%	0.4950	0.4500	0.5030	0.4620	0.4810	0.4782	4.63
100%	0.4570	0.4120	0.4860	0.4960	0.5040	0.4710	7.96

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

EEG, City of Clarksville WWTP

Lab ID# 24099

Test Date: April 28, 2015

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution							Analyst
				PCON	TCON %	32%	42%	56%	75%	100%	
4/28/15	Start	25.0	1	8.31	8.03	7.74	7.70	7.62	7.49	7.11	TB
4/29/15	24 Hr.	24.4	1	8.11	7.96	7.82	7.90	7.83	7.62	7.30	TB
4/29/15	Renew	25.0	1	8.22	8.10	7.70	7.59	7.70	7.52	7.08	TB
4/30/15	48 Hr.	24.3	1	7.99	7.87	7.75	7.55	7.52	7.40	6.87	BL
4/30/15	Renew	24.7	2	7.93	8.01	7.42	7.35	7.36	7.27	7.15	BL
5/1/15	72 Hr.	24.8	2	8.15	8.32	8.41	8.29	8.34	8.19	7.89	BL
5/1/15	Renew	25.0	2	8.25	7.46	7.40	7.41	7.38	7.27	7.01	BL
5/2/15	96 Hr.	24.3	2	8.18	8.25	8.36	8.38	8.47	8.27	8.08	BL
5/2/15	Renew	24.0	3	8.30	7.99	7.51	7.48	7.56	7.67	7.18	BL
5/3/15	120 Hr.	24.8	3	8.36	8.27	8.03	7.93	7.89	7.69	7.25	RK
5/3/15	Renew	25.0	3	8.21	7.97	7.76	7.73	7.70	7.81	7.18	RK
5/4/15	144 Hr.	24.7	3	8.14	8.07	7.72	7.59	7.59	7.39	7.10	RK
5/4/15	Renew	25.0	3	8.09	7.31	7.24	7.18	7.15	7.04	7.18	RK
5/5/15	168 Hr.	24.8	3	8.04	7.93	7.57	7.51	7.59	7.35	7.01	BL

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution							Analyst
				PCON	TCON %	32%	42%	56%	75%	100%	
4/28/15	Start	25.0	1	7.47	8.56	8.69	8.45	8.16	8.02	8.16	TB
4/29/15	24 Hr.	24.4	1	7.62	8.70	8.63	8.55	8.30	8.12	8.23	TB
4/29/15	Renew	25.0	1	7.52	8.46	8.65	8.56	8.20	8.06	8.23	TB
4/30/15	48 Hr.	24.3	1	7.61	7.85	7.68	7.24	7.39	7.65	7.44	BL
4/30/15	Renew	24.7	2	7.68	8.52	8.01	8.19	8.00	7.93	8.20	BL
5/1/15	72 Hr.	24.8	2	7.60	7.80	7.74	7.79	8.07	7.91	7.98	BL
5/1/15	Renew	25.0	2	7.40	7.61	7.75	7.74	7.61	7.59	7.52	BL
5/2/15	96 Hr.	24.3	2	7.69	7.91	7.87	7.81	7.98	7.67	7.74	BL
5/2/15	Renew	24.0	3	7.79	8.55	7.62	7.75	7.83	7.94	8.24	BL
5/3/15	120 Hr.	24.8	3	7.67	7.66	7.64	7.54	7.41	7.46	7.48	RK
5/3/15	Renew	25.0	3	7.64	7.83	7.91	7.80	8.12	7.81	8.24	RK
5/4/15	144 Hr.	24.7	3	8.92	8.84	8.33	8.91	8.36	8.88	8.73	RK
5/4/15	Renew	25.0	3	8.80	8.12	8.85	8.34	8.36	8.39	8.24	RK
5/5/15	168 Hr.	24.8	3	7.97	8.07	7.73	7.84	7.97	7.89	8.00	BL

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

EEG, City of Clarksville WWTP

Lab ID# 24099

Test Date: April 28, 2015

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
4/28/15	1	7.11	8.16	68	14	413	<0.01	N/A	TG
4/30/15	2	7.15	8.20	72	18	409	<0.01	N/A	TG
5/02/15	3	7.18	8.24	68	16	402	<0.01	N/A	TG

INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp. No.	Ph	DO	Hardness mg/L CaCO ₃ ¹	Alkalimty 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
4/28/15	RS1	8.03	8.56	240	100	1190	<0.01	N/A	TG
4/30/15	RS2	8.01	8.52	240	96	1178	<0.01	N/A	TG
5/02/15	RS3	7.99	8.55	240	100	1191	<0.01	N/A	TG

¹Measurements taken in 100% solution.

Huther and Associates, Inc.
 Begin Date: April 28, 2015
 Lab I.D.# 24099

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	0.498	0.455
2	32% Effluent	5	0.427	0.504	0.475
3	42% Effluent	5	0.426	0.504	0.476
4	56% Effluent	5	0.449	0.506	0.476
5	75% Effluent	5	0.450	0.503	0.478
6	100% Effluent	5	0.412	0.504	0.471

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.001	0.035	0.016	7.78
2	32% Effluent	0.001	0.036	0.016	7.56
3	42% Effluent	0.001	0.032	0.014	6.67
4	56% Effluent	0.001	0.025	0.011	5.16
5	75% Effluent	0.000	0.022	0.010	4.63
6	100% Effluent	0.001	0.037	0.017	7.96

Shapiro - Wilk's Test For Normality

D = 0.024

W = 0.924

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 = 1.61

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	0.356
Within (Error)	24	0.024	0.001	
Total	29	0.026		

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	Transformed Mean	Mean		T Stat	Sig
			Calculated In	Original Units		
1	Control	0.455	0.455			
2	32% Effluent	0.475	0.475		-0.996	
3	42% Effluent	0.476	0.476		-1.046	
4	56% Effluent	0.476	0.476		-1.006	
5	75% Effluent	0.478	0.478		-1.135	
6	100% Effluent	0.471	0.471		-0.777	

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

No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum Sig Diff (In Orig. Units)	Difference	
				% of Control	from Control
1	Control	5			
2	32% Effluent	5	0.047	10.4	-0.020
3	42% Effluent	5	0.047	10.4	-0.021
4	56% Effluent	5	0.047	10.4	-0.020
5	75% Effluent	5	0.047	10.4	-0.023
6	100% Effluent	5	0.047	10.4	-0.016

APPENDIX A
RAW DATA

7-DAY CERIODAPHnia DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 1 OF 2

CLIENT EEG-Clarksville

START DATE/TIME 4-28-15 NL 1525

OUTFALL 001

END DATE/TIME 5-5-15 ZG 1525

LAB ID # 24099

Pcon

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	3	2	3	3	2	4	2	3	3	3	NL	1600
5/3	A	A	A	A	A	A	A	A	A	A	ZG	1130
5/4	6	7	7	6	8	6	7	8	8	7	MH	1130
5/5	14	12	12	13	12	14	13	17	12	13	ZG	1525
	23	21	22	22	22	24	22	24	23	23		

\bar{x} # Young w/o Dead = 22.6 CV% = 4.27

\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
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	2	A	A	A	2	3	A	A	3	3	NL	1600
5/3	A	4	3	3	A	A	4	2	A	A	ZG	1130
5/4	8	6	7	9	8	6	6	7	9	8	MH	1130
5/5	13	14	12	13	12	13	13	12	13	12	ZG	1525
	23	24	22	25	22	22	23	21	25	23		

\bar{x} # Young w/o Dead = 23.0 CV% = 5.80

\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
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	3	A	2	3	A	4	3	A	A	3	NL	1600
5/3	A	4	A	A	3	2	A	4	4	A	ZG	1130
5/4	8	6	7	9	8	10	8	6	7	8	MH	1130
5/5	13	14	12	12	13	13	12	14	12	13	ZG	1525
	24	24	21	24	24	25	23	24	23	24		

\bar{x} # Young w/o Dead = 23.6 CV% = 4.55

\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
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	2	3	2	A	A	2	3	A	A	A	NL	1600
5/3	A	A	A	4	3	A	A	2	4	3	ZG	1130
5/4	8	6	7	9	10	7	11	8	9	7	MH	1130
5/5	12	14	12	13	12	13	12	14	12	13	ZG	1525
	23	23	21	26	25	22	26	24	25	23		

\bar{x} # Young w/o Dead = 23.8 CV% = 7.89

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

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

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

CLIENT EEG-Clarksville
 OUTFALL 001
 LAB ID # 24099

START DATE/TIME 4-28-15 NL 1525
 END DATE/TIME 5-5-15 ZG 1525

56

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	2	3	4	A	A	3	A	4	A	A	NL	1600
5/3	A	A	A	3	2	A	2	A	3	4	ZG	1130
5/4	8	6	7	8	9	10	8	7	9	6	MH	1130
5/5	13	14	12	13	12	13	13	13	12	14	ZG	1525
	23	23	23	24	23	26	22	24	24	24		

\bar{x} # Young w/o Dead = 23.6 CV% = 4.55

\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
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	2	2	3	3	A	A	3	A	4	A	NL	1600
5/3	A	A	A	A	4	2	A	3	A	3	ZG	1130
5/4	9	8	7	6	7	9	8	7	10	9	MH	1130
5/5	13	12	12	14	13	12	13	12	13	12	ZG	1525
	24	22	22	23	24	23	24	22	27	24		

\bar{x} # Young w/o Dead = 23.5 CV% = 6.42

\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
4/29	A	A	A	A	A	A	A	A	A	A	ZG	1525
4/30	A	A	A	A	A	A	A	A	A	A	NL	1700
5/1	A	A	A	A	A	A	A	A	A	A	MH	1015
5/2	2	4	A	A	A	3	3	2	4	3	NL	1600
5/3	A	A	3	4	2	A	A	A	A	A	ZG	1130
5/4	8	7	9	6	8	10	9	8	6	9	MH	1130
5/5	13	12	14	14	12	12	13	12	14	12	ZG	1525
	23	23	26	24	22	25	25	22	24	24		

\bar{x} # Young w/o Dead = 23.8 CV% = 5.53

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

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

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 EEG-Clarksville
 OUTFALL # 001 PROJECT # 24099
 ORGANISM ID# PPO-15-117

DATE/TIME STARTED 4-28-15 26 1635
 DATE/TIME ENDED 5-5-15 MH 1635

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	4-29-15 RK 1635					4-30-15 TB 0930					5-1-15 TB 0910					5-2-15 26 0925					5-3-15 NL 0925									

Conc.	A					B					Mean 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
Initials Date/Time	5-4-15 TB 0930					5-5-15 MH 1635						

Huther and Associates, Inc.

environmental toxicologists, biologists, and consultants

Client / Facility EEG Clarksville
 Lab ID Number 24099
 Outfall Number 001
 Test Date 4-28-15

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
4/28	1	7.11	8.16	68	14	413	20.01	Na	TG
4/30	2	7.15	8.20	72	18	409	S	S	S
5/2	3	7.18	8.24	68	16	402	S	S	S

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
4/28	RS1	8.03	8.56	240	100	1190	60.01	Na	TG
4/30	RS2	8.01	8.52	240	96	1178	S	S	
5/2	RS3	7.99	8.55	240	100	1191	S	S	

Notes:

APPENDIX B
REFERENCE TOXICANTS

CHRONIC REFERENCE TOXICANT TEST RESULTS

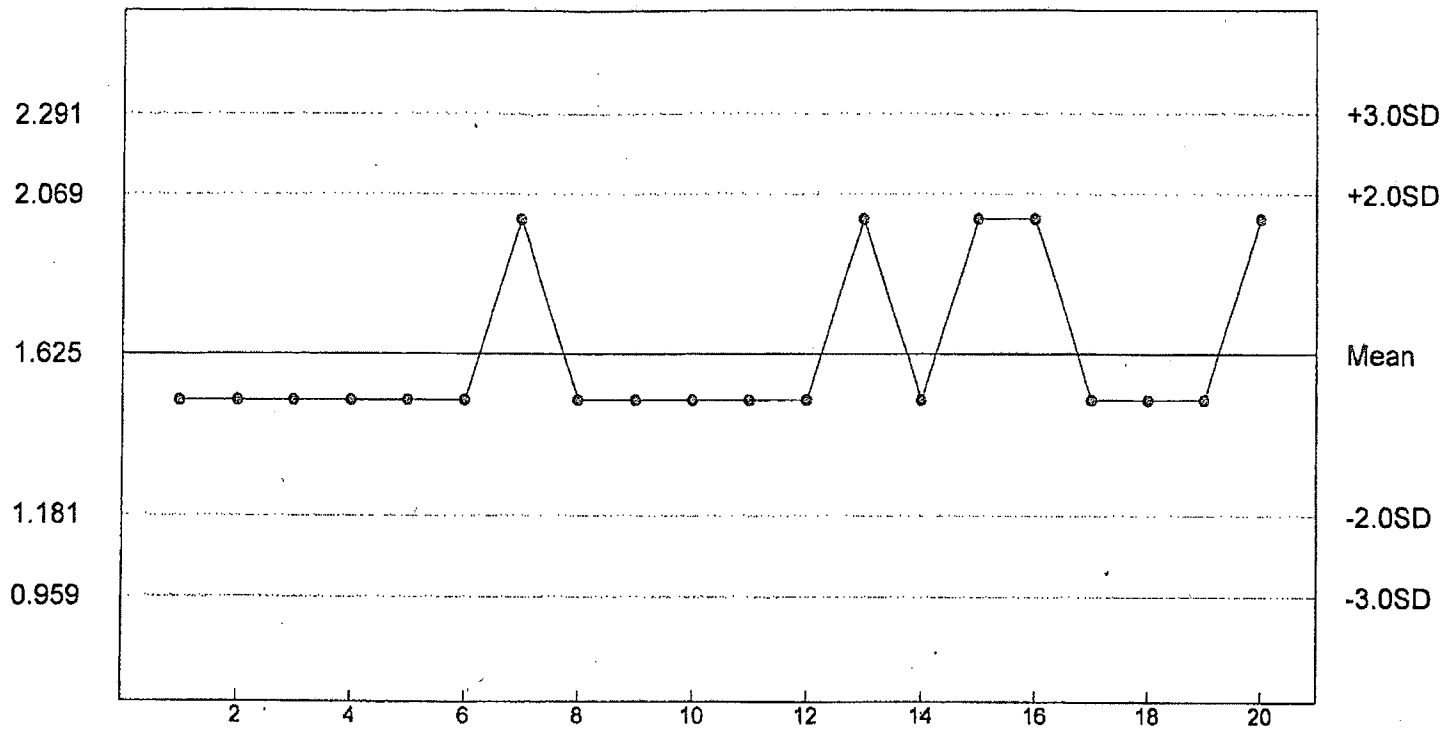
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 4
 TEST DATE: 04/01/15 - 04/08/15
 1445 Hrs - 1445 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	2
2.5	10	10
3.0	10	10

LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
2.5 ug/L	2.0 ug/L	1.0 ug/L	0.5 ug/L

Reference Tox Sodium Chloride g/L

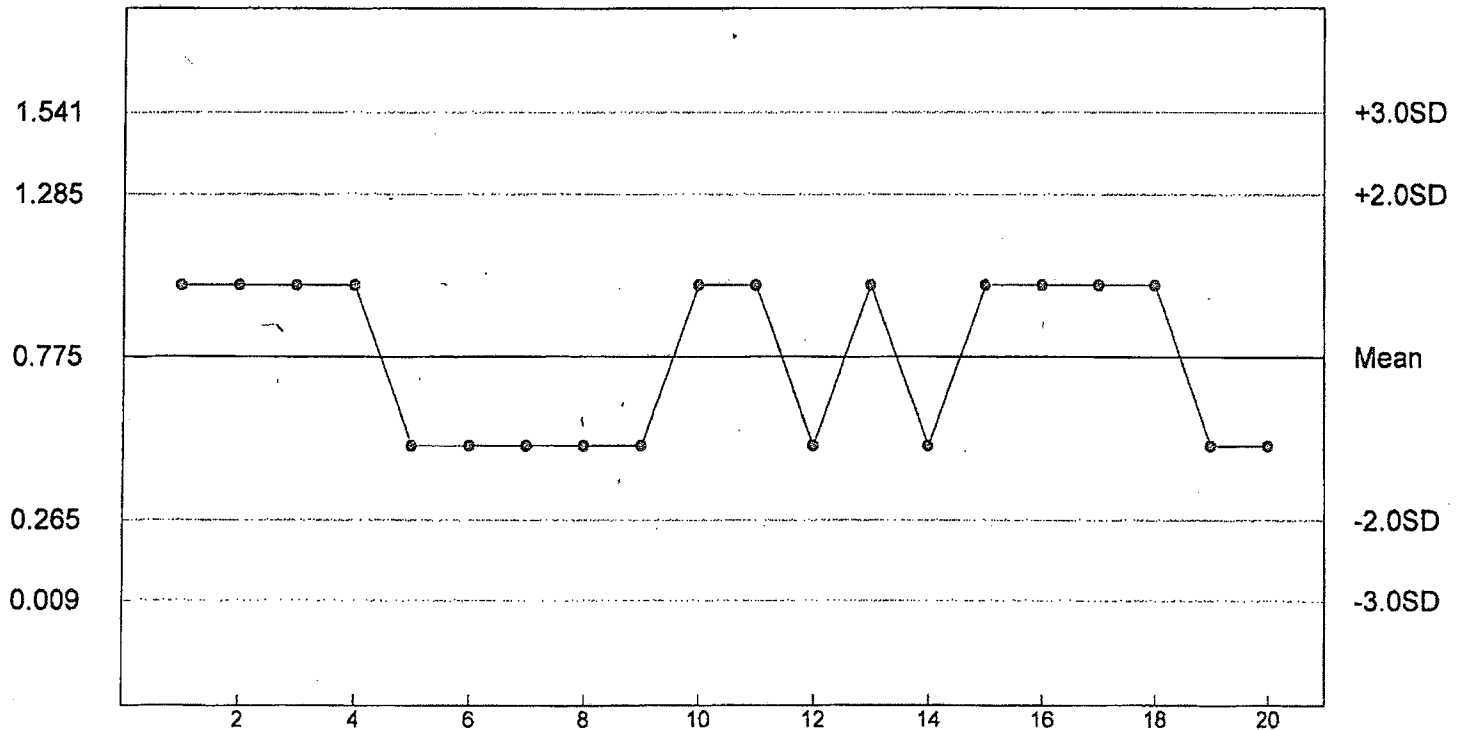
C. dubia Survival - NOEC



n= 20 Mean= 1.625 SD= 0.222 CV= 13.67% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.775 SD= 0.255 CV= 32.93% Min= 0.500 Max= 1.000

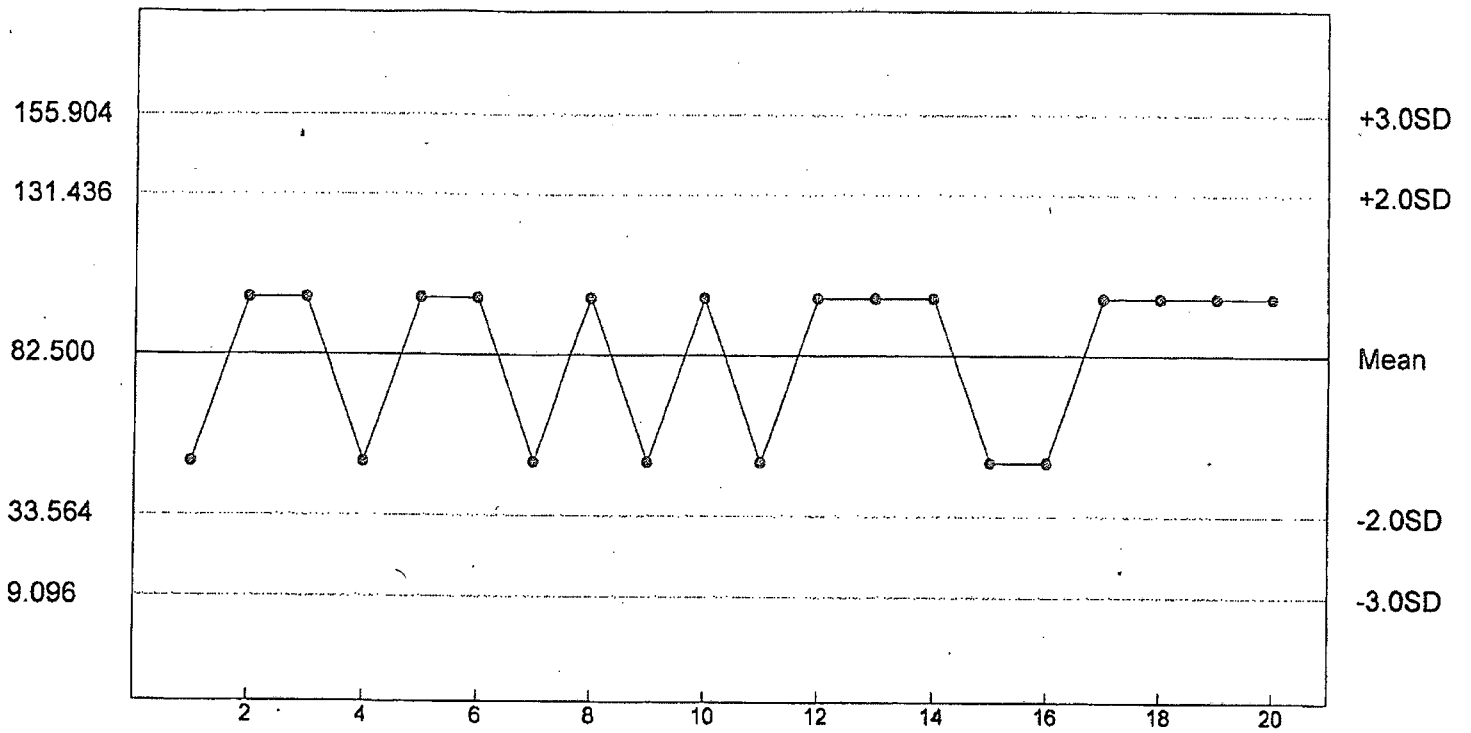
CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 4
 TEST DATE: 04/01/15 - 04/08/15
 1500 Hrs - 1500 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
25	40	0
50	40	4
100	40	4
200	40	18
400	40	40
800	40	40

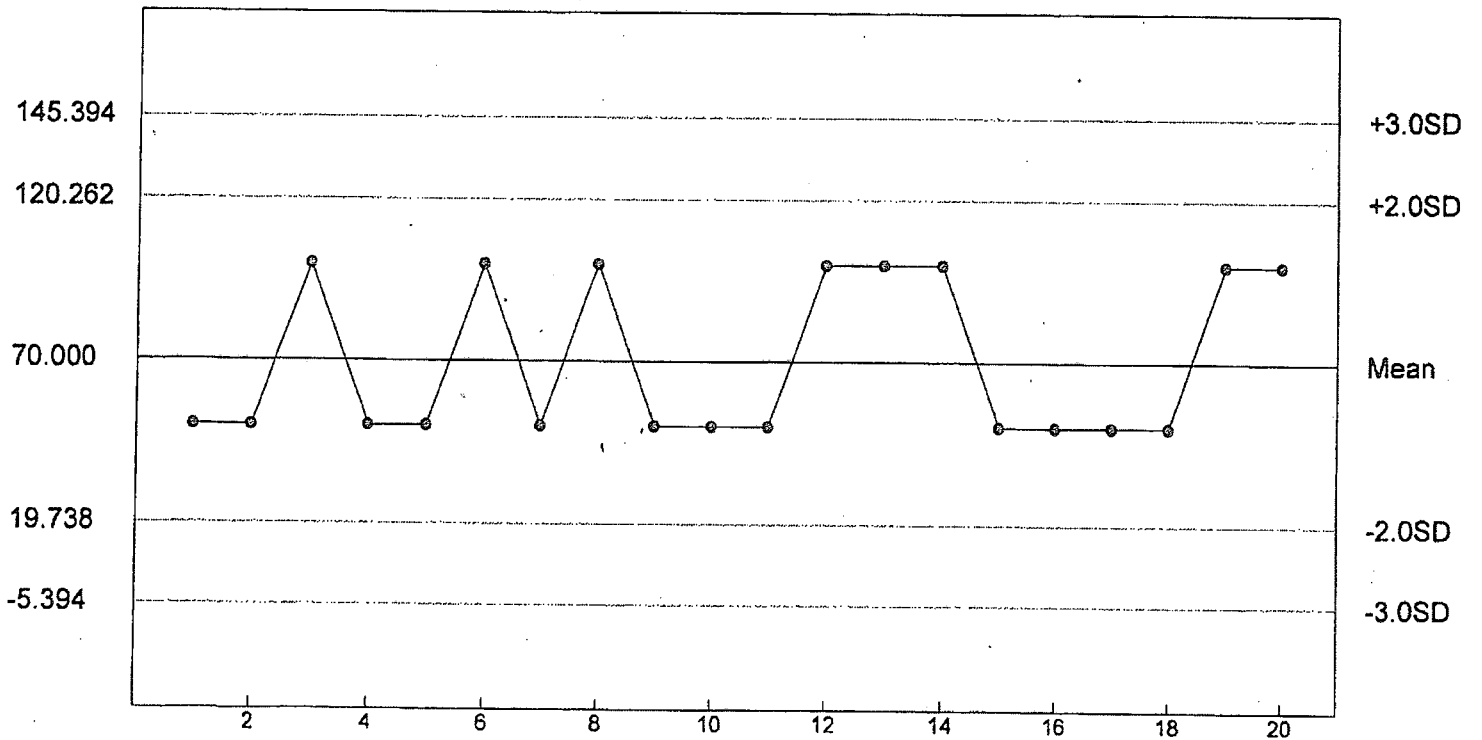
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
200 ug/L	100 ug/L	200 ug/L	100 ug/L

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



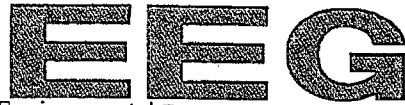
n= 20 Mean= 82.500 SD= 24.468 CV= 29.66% Min= 50.000 Max= 100.000

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



n= 20 Mean= 70.000 SD= 25.131 CV= 35.90% Min= 50.000 Max= 100.000

**APPENDIX C
CHAIN OF CUSTODY SHEETS**

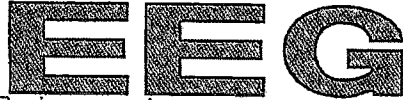


Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

L444-049679

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:				Method Preserved						Sample Matrix					
<i>Willie Palmer</i>				Willie Palmer															
Sample I.D.	Date	Time	Comp.	Grab	Cont.Type		# of Containers	Method Preserved						Sample Matrix					
					Plast.	Glass		H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge		
Outfall 001	4-26-15	701	X		X		1						X	X					
	4-27-15	0705																	
Relinquished by:				Date:		Time:		Received By:				Date:		Time:					
<i>Willie Palmer</i>				4-27-15		11:33		<i>Stacy Palmer</i>				4/27/15		12:20					
Received by:				Date:		Time:		Relinquished By:				Date:		Time:					
<i>Willie Palmer</i>				4/27/15		11:33		<i>Stacy Palmer</i>				4/27/15		1:030					
Relinquished by:				Date:		Time:		Received by Laboratory:				Date:		Time:					
<i>Willie Palmer</i>				4/27/15		12:20		<i>Matt Horner</i>				4-28-15		12:35					
Comments:																			
				3.8°C												UPS			

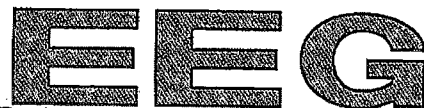


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Russellville, Arkansas 72801
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L444-049679

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>Gary Yarbrough</i>						Gary Yarbrough																									
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													
Receiving Water	4-27-15	7:30		X	X		1						X	X						X										0415210	
Relinquished by: <i>Gary Yarbrough</i>				Date: 4-27-15				Time: 11:33				Received By: <i>Stacy...</i>				Date: 4/27/15				Time: 12:20											
Received by: <i>[Signature]</i>				Date: 4/27/15				Time: 11:38				Relinquished By: <i>Stacy...</i>				Date: 4/27/15				Time: 11:30											
Relinquished by: <i>[Signature]</i>				Date: 4/27/15				Time: 12:20				Received by Laboratory:				Date:				Time:											
Comments:																															

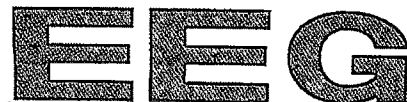


Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

6444-049679

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): <i>Porsha Russell</i>				Printed: <i>Porsha Russell</i>																									
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	4-28-15 4-29-15	0720 0718	X		X		1							X		X									X			0415209	
Relinquished by: <i>Porsha Russell</i>		Date:	Time:	Received By:		Date:	Time:	Received by Laboratory:		Date:	Time:																		
		4-29-15	0843	<i>Megan R. Hatcher</i>		4/29/15	13:25	<i>Megan R. Hatcher</i>		4-30-15	1015																		
Received by: <i>[Signature]</i>		Date:	Time:	Relinquished By:		Date:	Time:																						
		4/29/15	0844	<i>Megan R. Hatcher</i>		4/29/15	1600																						
Relinquished by: <i>[Signature]</i>		Date:	Time:	Received by Laboratory:		Date:	Time:																						
		4/29/15	13:25	<i>[Signature]</i>		4-30-15	1015																						
Comments:		3, 3°C																											
																	UPS												

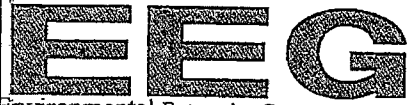


Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

244-049679

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

Company Name: Clarksville Light and Water			Phone #: (479) 754-6241			Requested Analysis													Laboratory Control Number	Remarks (Please note special detection limits below.)								
Address: P.O. Box 1807 Clarksville, AR 72830			Fax #: (479) 754-8181			7-Day Chronic Bio-Monitoring																						
Project Name or Number: Bio-Monitoring			Purchase Order #:																									
Sampling Personnel Signature(s): <i>Gary Yarbrough</i>							Printed: Gary Yarbrough																					
Sample I.D.	Date	Time	Comp.	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							
Receiving Water	4-29-15	730	X	X			1					X	X									X						0415210
Relinquished by: <i>Gary Yarbrough</i>			Date: 4-29-15		Time: 0843		Received By: Megan Hatcher			Date: 4/29/15		Time: 1325																
Received by: <i>Megan</i>			Date: 4/29/15		Time: 0844		Relinquished By: Megan Hatcher			Date: 4/29/15		Time: 1000																
Relinquished by: <i>Megan</i>			Date: 4/29/15		Time: 1325		Received by Laboratory:			Date:		Time:																
Comments:																												

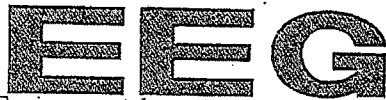


Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

L444-049679

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): <i>Porsha Russell</i>														Printed: <i>Porsha Russell</i>													
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	4-30-15 5-1-15	0735 0730	X		X		1				X		X					X						0415209			
Relinquished by: <i>Porsha Russell</i>							Date: 5-1-15		Time: 0900		Received By: <i>Stacynew</i>							Date: 5/1/15		Time: 1005							
Received by: <i>[Signature]</i>							Date: 5/1/15		Time: 0905		Relinquished By: <i>Stacynew</i>							Date: 5/1/15		Time: 1100							
Relinquished by: <i>[Signature]</i>							Date: 5/1/15		Time: 1005		Received by Laboratory: <i>Natal 22</i>							Date: 5/2/15		Time: 1000							
Comments:																											
4.0°C UPS																											



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L444-049679

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>Willie Palmer</i>								<i>Willie Palmer</i>																				
Sample I.D.	Date	Time	Cont. Type				# of Containers	Method Preserved										7-Day Chronic Bio-Monitoring										
			Comp.	Grab	Plast.	Glass		H2SO4	HNO3	NaOH	HCL	Ice	None	Water	Soil	Air	Sludge				Other							
Receiving Water	5/1/15	0745		X	X		1							X		X										X		
Relinquished by:				Date:	Time:	Received By:				Date:	Time:																	
<i>Willie Palmer</i>				5-1-15	0900	<i>Stacyren</i>				5/1/15	1005																	
Received by:				Date:	Time:	Relinquished By:				Date:	Time:																	
<i>[Signature]</i>				5/1/15	0905	<i>Stacyren</i>				5/1/15	1100																	
Relinquished by:				Date:	Time:	Received by Laboratory:				Date:	Time:																	
<i>[Signature]</i>				5/1/15	10:05																							
Comments:																												

ENVIRONMENTAL ENTERPRISE GROUP
 CITY OF CLARKSVILLE WWTP – OUTFALL 001
 NPDES PERMIT NO. AR0022187
 AFIN NO. 36-00038
 BIOMONITORING REPORTING
 TEST DATE: 04/28/15

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.	5.80%

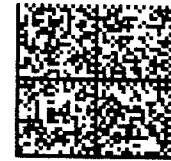
I. *Pimephales promelas*

	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.	7.96%

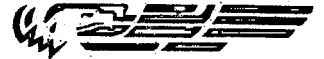
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CLARKSVILLE LIGHT & WATER CO.
400 WEST MAIN • P.O. BOX 1807
CLARKSVILLE, AR 72830
PHONE (479) 754-3148

To

ADEQ
5301 Northshore Drive
North Little Rock, AR 72118