

**ENVIRONMENTAL ENTERPRISE GROUP
CITY OF CLARKSVILLE WWTP
OUTFALL 001**

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

Ceriodaphnia dubia
Pimephales promelas

June 24, 2014

Reviewed by:



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TOXICITY TEST REPORT - CHRONIC

Client Environmental Enterprise Group Sample..... Outfall 001
Facility City of Clarksville WWTP Laboratory I.D. 22539
Permit No. NPDES AR0022187 Begin Date June 24, 2014

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

SAMPLE COLLECTION

Composite effluent samples from Environmental Enterprise Group, City of Clarksville WWTP were delivered by United Parcel Service courier to Huthur & Associates on June 24, June 26, and June 28, 2014. Effluent samples were collected from Outfall 001 using an automatic sampler and were manually composited 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-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 1445 hours, June 24, 2014. 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 1445 hours, July 1, 2014. 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

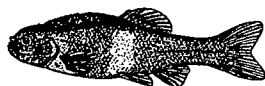
REPRODUCTION*Ceriodaphnia dubia*

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: 7.4%

TEST SETUP*Pimephales promelas*

The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1540 hours, June 24, 2014. 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 currently 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 1540 hours, July 1, 2014. 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: 10.3%**
NOEC: 100% Effluent

SUMMARY

There were no statistically significant differences between the control and the critical low flow concentration (100% effluent) for *C. dubia* survival and reproduction and *P. promelas* survival and growth. Based on biomonitoring requirements for Outfall 001 contained in Permit Number NPDES AR0022187 for Environmental Enterprise Group, City of Clarksville WWTP, Outfall 001 **passed** for this testing period.

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

CLIENT	EEG, City of Clarksville WWTP	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0022187	DATE COLLECTED	06/23/14 06/25/14 06/27/14
LAB ID #	22539	DATE RECEIVED	06/24/14 06/26/14 06/28/14
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	06/24/14 1445
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	07/01/14 1445
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
06/25/14	A	A	A	A	A	A	A	A	A	A
06/26/14	0	0	0	0	0	0	0	0	0	0
06/27/14	0	0	0	0	0	0	0	0	0	0
06/28/14	3	A	A	A	A	A	A	A	A	A
06/29/14	3	2	3	2	2	3	2	4	2	2
06/30/14	6	6	6	7	6	8	6	7	6	8
07/01/14	21	22	20	22	20	22	19	24	21	22
x# Young 21.3 C.V. 6.66%										
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
06/25/14	A	A	A	A	A	A	A	A	A	A
06/26/14	0	0	0	0	0	0	0	0	0	0
06/27/14	0	0	0	0	0	0	0	0	0	0
06/28/14	3	A	A	A	2	A	A	A	3	A
06/29/14	3	3	2	3	2	4	3	2	3	4
06/30/14	6	7	6	9	6	7	8	7	9	8
07/01/14	23	23	19	24	21	22	23	21	23	25
x# Young 22.4 C.V. 7.65%										
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
06/25/14	A	A	A	A	A	A	A	A	A	A
06/26/14	0	0	0	0	0	0	0	0	0	0
06/27/14	0	0	0	0	0	0	0	0	0	0
06/28/14	3	A	2	3	3	A	A	A	3	4
06/29/14	3	2	2	3	3	4	2	3	3	4
06/30/14	8	7	9	8	6	7	7	8	9	8
07/01/14	23	21	24	24	22	22	22	23	26	24
x# Young 23.1 C.V. 6.27%										
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
06/25/14	A	A	A	A	A	A	A	A	A	A
06/26/14	0	0	0	0	0	0	0	0	0	0
06/27/14	0	0	0	0	0	0	0	0	0	0
06/28/14	3	3	4	2	A	A	A	A	3	A
06/29/14	3	3	4	2	3	3	4	4	3	2
06/30/14	8	10	8	7	6	8	7	10	9	8
07/01/14	23	26	23	22	23	23	23	27	24	21
x# Young 23.5 C.V. 7.57%										
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

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

EEG, City of Clarksville WWTP

Lab ID# 22539

Test Date: June 24, 2014

56% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/25/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/26/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/27/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/28/14	3	3	4	2	3	3	A	3	3	A
	3	3	4	2	3	3	0	3	3	0
06/29/14	A	A	A	A	A	A	4	A	A	2
	3	3	4	2	3	3	4	3	3	2
06/30/14	8	9	10	9	6	7	8	8	7	9
	11	12	14	11	9	10	12	11	10	11
	14	13	12	12	12	11	12	13	13	14
07/01/14	25	25	26	23	21	21	24	24	23	25
<p>x# Young 23.7 C.V. 7.19%</p> <p>x% Survival 100% C.V. 0.00%</p>										

75% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/25/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/26/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/27/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/28/14	4	2	A	A	A	A	4	2	3	A
	4	2	0	0	0	0	4	2	3	0
06/29/14	A	A	3	3	4	3	A	A	A	4
	4	2	3	3	4	3	4	2	3	4
06/30/14	8	7	6	9	8	8	9	7	8	7
	12	9	9	12	12	11	13	9	11	11
	12	13	13	12	14	12	14	13	12	13
07/01/14	24	22	22	24	26	23	27	22	23	24
<p>x# Young 23.7 C.V. 7.19%</p> <p>x% Survival 100% C.V. 0.00%</p>										

100% Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/25/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/26/14	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/27/14	0	0	0	0	0	0	0	0	0	0
06/28/14	4	A	A	A	A	2	A	A	4	A
	4	0	0	0	0	2	0	0	4	0
06/29/14	A	3	3	4	3	A	3	3	A	3
	4	3	3	4	3	2	3	3	4	3
06/30/14	9	7	8	9	7	9	6	8	7	7
	13	10	11	13	10	11	9	11	11	10
	12	14	12	13	12	13	13	13	12	13
07/01/14	25	24	23	26	22	24	22	24	23	23
<p>x# Young 23.6 C.V. 5.36%</p> <p>x% Survival 100% C.V. 0.00%</p>										

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, City of Clarksville WWTP

Lab ID# 22539

Test Date: June 24, 2014

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst/ 100%
				PCON	TCON	32%	42%	56%	75%	
06/24/14	Start	25.0	1	8.31	8.51	8.39	8.23	8.02	7.87	7.60/WCL
06/25/14	24 Hr.	24.0	1	8.05	7.98	7.89	7.86	7.79	7.74	7.64/GZK
06/25/14	Renew	24.0	1	8.05	8.51	8.01	7.91	7.79	7.70	7.60/GZK
06/26/14	48 Hr.	24.3	1	7.96	7.95	7.90	7.85	7.78	7.71	7.60/GZK
06/26/14	Renew	25.0	2	8.58	8.36	7.41	7.39	7.37	7.35	7.50/GZK
06/27/14	72 Hr.	24.9	2	8.12	8.01	7.94	7.89	7.84	7.78	7.58/GZK
06/27/14	Renew	24.6	2	8.58	8.36	7.32	7.31	7.26	7.23	7.50/GZK
06/28/14	96 Hr.	25.2	2	8.21	8.06	8.02	7.97	7.92	7.85	7.75/RWU
06/28/14	Renew	25.0	3	8.58	8.29	7.65	7.63	7.56	7.53	7.01/RWU
06/29/14	120 Hr.	25.4	3	8.21	7.99	7.99	7.98	7.94	7.93	7.91/RWU
06/29/14	Renew	25.2	3	8.58	7.53	7.52	7.48	7.45	7.42	7.34/RWU
06/30/14	144 Hr.	24.9	3	8.18	7.95	7.91	7.90	7.88	7.87	7.86/GZK
06/30/14	Renew	24.9	3	8.58	7.53	7.47	7.46	7.44	7.41	7.34/GZK
07/01/14	168 Hr.	24.0	3	8.21	7.91	7.86	7.85	7.82	7.81	7.78/GZK

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst/ 100%
				PCON	TCON	32%	42%	56%	75%	
06/24/14	Start	25.0	1	8.20	8.40	8.89	8.52	8.95	8.46	8.89/WCL
06/25/14	24 Hr.	24.0	1	8.47	8.28	8.21	8.17	8.11	8.08	8.06/GZK
06/25/14	Renew	24.0	1	8.10	8.40	8.09	8.21	8.25	8.26	8.89/GZK
06/26/14	48 Hr.	24.3	1	8.04	7.43	7.76	7.85	7.81	7.98	7.84/GZK
06/26/14	Renew	25.0	2	8.00	8.24	8.90	8.85	8.65	8.77	8.66/GZK
06/27/14	72 Hr.	24.9	2	7.81	7.90	8.00	8.00	8.00	7.99	8.03/GZK
06/27/14	Renew	24.6	2	8.00	8.24	8.43	8.54	8.56	8.53	8.66/GZK
06/28/14	96 Hr.	25.2	2	7.95	8.01	7.95	7.97	7.98	7.92	7.86/RWU
06/28/14	Renew	25.0	3	8.00	8.32	8.67	8.62	8.43	8.88	8.59/RWU
06/29/14	120 Hr.	25.4	3	7.74	7.74	7.73	7.62	7.61	7.69	7.70/RWU
06/29/14	Renew	25.2	3	8.00	8.14	8.36	8.49	8.58	8.57	8.60/RWU
06/30/14	144 Hr.	24.9	3	7.58	7.86	7.88	7.94	7.83	7.79	7.86/GZK
06/30/14	Renew	24.9	3	8.00	8.14	8.04	8.11	8.21	7.85	8.60/GZK
07/01/14	168 Hr.	24.0	3	7.54	7.68	7.36	7.39	7.46	7.45	7.22/GZK

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

EEG, City of Clarksville WWTP

Lab ID# 22539

Test Date: June 24, 2014

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
06/24/14	1	7.01	8.62	64	32	403	<0.01	N/A	TN
06/26/14	2	7.04	8.66	72	36	407	<0.01	N/A	TN
06/28/14	3	7.01	8.59	76	34	409	<0.01	N/A	TN

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
06/24/14	RS1	8.35	8.32	200	106	893	<0.01	N/A	TN
06/26/14	RS2	8.36	8.24	204	112	902	<0.01	N/A	TN
06/28/14	RS3	8.29	8.32	208	110	913	<0.01	N/A	TN

CERIODAPHNIA DUBIA STATISTICAL ANALYSES
 Reproduction

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	10	19.000	25.000	22.400
2	32% Effluent	10	21.000	26.000	23.100
3	42% Effluent	10	21.000	27.000	23.500
4	56% Effluent	10	21.000	26.000	23.700
5	75% Effluent	10	22.000	27.000	23.700
6	100% Effluent	10	22.000	26.000	23.600

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	2.933	1.713	0.542	7.65
2	32% Effluent	2.100	1.449	0.458	6.27
3	42% Effluent	3.167	1.780	0.563	7.57
4	56% Effluent	2.900	1.703	0.539	7.19
5	75% Effluent	2.900	1.703	0.539	7.19
6	100% Effluent	1.600	1.265	0.400	5.36

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	3	13	28	11	5

Calculated Chi-Square goodness of fit test statistic = 2.6361
 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 = 1.41

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	12.933	2.587	0.995
Within (Error)	54	140.400	2.600	
Total	59	153.333		

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	Transformed	Mean	T Stat	Sig
		Mean	Calculated In Original Units		
1	Control	22.400	22.400		
2	32% Effluent	23.100	23.100	-0.971	
3	42% Effluent	23.500	23.500	-1.525	
4	56% Effluent	23.700	23.700	-1.803	
5	75% Effluent	23.700	23.700	-1.803	
6	100% Effluent	23.600	23.600	-1.664	

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	% of Control	Difference from Control
			(In Orig. Units)		
1	Control	10			
2	32% Effluent	10	1.666	7.4	-0.700
3	42% Effluent	10	1.666	7.4	-1.100
4	56% Effluent	10	1.666	7.4	-1.300
5	75% Effluent	10	1.666	7.4	-1.300
6	100% Effluent	10	1.666	7.4	-1.200

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

CLIENT	EEG, City of Clarksville WWTP	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0022187	DATE COLLECTED	06/23/14 06/25/14 06/27/14
LAB ID #	22539	DATE RECEIVED	06/24/14 06/26/14 06/28/14
TEST TYPE	7-Day Chronic	BEGIN DATE/TIME	06/24/14 1540
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	07/01/14 1540
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	G. Klossner

SURVIVAL SUMMARY

Conc.	06/25/14					06/26/14					06/27/14					06/28/14					06/29/14				
	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.	06/30/14					07/01/14					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	0.4920	0.4560	0.4270	0.4850	0.5030	0.4726	6.53
Tcon	0.4460	0.4950	0.4150	0.4920	0.4200	0.4536	8.44
32%	0.4750	0.5060	0.4490	0.4280	0.4650	0.4646	6.28
42%	0.5040	0.4470	0.4830	0.5040	0.5020	0.4880	5.03
56%	0.4200	0.4750	0.4960	0.4250	0.4990	0.4630	8.24
75%	0.5020	0.4450	0.4860	0.5040	0.4690	0.4812	5.13
100%	0.4350	0.5060	0.4470	0.4820	0.4950	0.4730	6.49

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

EEG, City of Clarksville WWTP

Lab ID# 22539

Test Date: June 24, 2014

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst/ 100%	
				PCON	TCON	32%	42%	56%	75%		100%
06/24/14	Start	25.0	1	8.31	8.51	8.39	8.23	8.02	7.87	7.60	7.60/WCL
06/25/14	24 Hr.	24.0	1	8.07	8.04	7.86	7.80	7.72	7.63	7.40	7.64/GZK
06/25/14	Renew	24.0	1	8.05	8.51	8.01	7.91	7.79	7.70	7.60	7.60/GZK
06/26/14	48 Hr.	24.6	1	8.16	7.94	7.86	7.72	7.70	7.63	7.48	7.60/GZK
06/26/14	Renew	25.0	2	8.58	8.36	7.41	7.39	7.37	7.35	7.50	7.50/GZK
06/27/14	72 Hr.	24.8	2	8.07	7.94	7.89	7.81	7.77	7.67	7.34	7.58/GZK
06/27/14	Renew	24.6	2	8.58	8.36	7.32	7.31	7.26	7.23	7.50	7.50/GZK
06/28/14	96 Hr.	25.4	2	8.08	7.97	7.90	7.83	7.80	7.70	7.32	7.75/RWU
06/28/14	Renew	25.0	3	8.58	8.29	7.65	7.63	7.56	7.53	7.01	7.01/RWU
06/29/14	120 Hr.	25.5	3	8.29	8.10	8.02	7.99	7.92	7.83	7.66	7.91/RWU
06/29/14	Renew	25.2	3	8.58	7.53	7.52	7.48	7.45	7.42	7.34	7.34/RWU
06/30/14	144 Hr.	25.1	3	8.02	8.02	7.95	7.91	7.78	7.49	7.45	7.86/GZK
06/30/14	Renew	24.9	3	8.58	7.53	7.47	7.46	7.44	7.41	7.34	7.34/GZK
07/01/14	168 Hr.	24.6	3	8.05	7.94	7.86	7.81	7.74	7.63	7.54	7.78/GZK

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	32%	42%	56%	75%		100%
06/24/14	Start	25.0	1	8.20	8.40	8.89	8.52	8.95	8.46	8.89	8.89/WCL
06/25/14	24 Hr.	24.0	1	8.12	7.89	7.69	7.96	8.11	8.21	8.10	8.06/GZK
06/25/14	Renew	24.0	1	8.10	8.40	8.09	8.21	8.25	8.26	8.89	8.89/GZK
06/26/14	48 Hr.	24.6	1	7.87	8.09	8.31	7.91	7.88	7.99	7.79	7.84/GZK
06/26/14	Renew	25.0	2	8.00	8.24	8.90	8.85	8.65	8.77	8.66	8.66/GZK
06/27/14	72 Hr.	24.8	2	7.66	7.84	7.98	7.99	7.88	7.91	7.44	8.03/GZK
06/27/14	Renew	24.6	2	8.00	8.24	8.43	8.54	8.56	8.53	8.66	8.66/GZK
06/28/14	96 Hr.	25.4	2	7.59	7.72	7.78	7.99	8.18	8.03	7.71	7.86/RWU
06/28/14	Renew	25.0	3	8.00	8.32	8.67	8.62	8.43	8.88	8.59	8.59RWU
06/29/14	120 Hr.	25.5	3	7.86	7.85	7.82	7.82	7.77	8.10	8.04	7.70/RWU
06/29/14	Renew	25.2	3	8.00	8.14	8.36	8.49	8.58	8.57	8.60	8.60/RWU
06/30/14	144 Hr.	25.1	3	7.28	7.61	7.74	8.63	8.55	8.14	8.24	7.86GZK
06/30/14	Renew	24.9	3	8.00	8.14	8.04	8.11	8.21	7.85	8.60	8.60/GZK
07/01/14	168 Hr.	24.6	3	7.82	7.88	7.77	7.72	7.81	7.79	7.71	7.22/GZK

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

EEG, City of Clarksville WWTP

Lab ID# 22539

Test Date: June 24, 2014

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
06/24/14	1	7.01	8.62	64	32	403	<0.01	N/A	TN
06/26/14	2	7.04	8.66	72	36	407	<0.01	N/A	TN
06/28/14	3	7.01	8.59	76	34	409	<0.01	N/A	TN

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
06/24/14	RS1	8.35	8.32	200	106	893	<0.01	N/A	TN
06/26/14	RS2	8.36	8.24	204	112	902	<0.01	N/A	TN
06/28/14	RS3	8.29	8.32	208	110	913	<0.01	N/A	TN

¹Measurements taken in 100% solution.

Huther and Associates, Inc.
 Begin Date: June 24, 2014
 Lab I.D.# 22539

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	0.495	0.454
2	32% Effluent	5	0.428	0.506	0.465
3	42% Effluent	5	0.447	0.504	0.488
4	56% Effluent	5	0.420	0.499	0.463
5	75% Effluent	5	0.445	0.504	0.481
6	100% Effluent	5	0.435	0.506	0.473

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.001	0.038	0.017	8.44
2	32% Effluent	0.001	0.029	0.013	6.28
3	42% Effluent	0.001	0.025	0.011	5.03
4	56% Effluent	0.001	0.038	0.017	8.24
5	75% Effluent	0.001	0.025	0.011	5.13
6	100% Effluent	0.001	0.031	0.014	6.49

Shapiro - Wilk's Test For Normality

D = 0.024

W = 0.906

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 = 1.42

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	0.813
Within (Error)	24	0.024	0.001	
Total	29	0.028		

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

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

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

Grp	Identification	Transformed Mean	Mean Calculated In Original Units	T Stat	Sig
1	Control	0.454	0.454		
2	32% Effluent	0.465	0.465	-0.553	
3	42% Effluent	0.488	0.488	-1.730	
4	56% Effluent	0.463	0.463	-0.473	
5	75% Effluent	0.481	0.481	-1.388	
6	100% Effluent	0.473	0.473	-0.976	

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

No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum Sig Diff (In Orig. Units)	% of Control	Difference from Control
1	Control	5			
2	32% Effluent	5	0.047	10.3	-0.011
3	42% Effluent	5	0.047	10.3	-0.034
4	56% Effluent	5	0.047	10.3	-0.009
5	75% Effluent	5	0.047	10.3	-0.028
6	100% Effluent	5	0.047	10.3	-0.019

**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 # 22539

START DATE/TIME 6-24-14 NL 1445
END DATE/TIME 7-1-14 NL 1445

Pcon

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	3	A	A	A	A	A	A	A	A	A	MH	1345
6/29	A	2	3	2	2	3	2	4	2	2	ZG	1030
6/30	6	6	6	7	6	8	6	7	6	8	NL	1030
7/1	12	14	11	13	12	11	11	13	13	12	NL	1445
	21	22	20	22	20	22	19	24	21	22		

\bar{x} # Young w/o Dead = 21.3 CV% = 6.66
 \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
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	3	A	A	A	2	A	A	A	3	A	MH	1345
6/29	A	3	2	3	A	4	3	2	A	4	ZG	1030
6/30	6	7	6	9	6	7	8	7	6	8	NL	1030
7/1	14	13	11	12	13	11	12	12	11	13	NL	1445
	23	23	19	24	21	22	23	21	23	25		

\bar{x} # Young w/o Dead = 22.4 CV% = 7.65
 \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
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	3	A	2	3	3	A	A	A	3	4	MH	1345
6/29	A	2	A	A	A	4	2	3	A	A	ZG	1030
6/30	8	7	9	8	6	7	7	8	9	8	NL	1030
7/1	12	12	13	13	13	11	13	12	14	12	NL	1445
	23	21	24	24	22	22	22	23	26	24		

\bar{x} # Young w/o Dead = 23.1 CV% = 6.27
 \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
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	3	3	4	2	A	A	A	A	3	3 ⁶⁻²⁹	MH	1345
6/29	A	A	A	A	3	3	4	4	A	2	ZG	1030
6/30	8	10	8	7	6	8	7	10	9	8	NL	1030
7/1	12	13	11	13	14	12	12	13	12	11	NL	1445
	23	26	23	22	23	23	23	27	24	21		

\bar{x} # Young w/o Dead = 23.5 CV% = 7.57
 \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 # 22539

START DATE/TIME 6-24-14 NL 1445
 END DATE/TIME 7-1-14 NL 1445

56

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	3	3	4	2	3	3	A	3	3	A	MH	1345
6/29	A	A	A	A	A	A	4	A	A	2	ZG	1030
6/30	8	9	10	9	6	7	8	8	7	9	NL	1030
7/1	14	13	12	12	12	11	12	13	13	14	NL	1445
	25	25	20	23	21	21	24	24	23	25		

\bar{x} # Young w/o Dead = 23.7 CV% = 7.19
 \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
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	4	2	A	A	A	A	4	2	3	A	MH	1345
6/29	A	A	3	3	4	3	A	A	A	4	ZG	1030
6/30	8	7	6	9	8	8	9	7	8	7	NL	1030
7/1	12	13	12	14	12	14	13	12	13	13	NL	1445
	24	22	22	24	26	23	27	27	23	24		

\bar{x} # Young w/o Dead = 23.7 CV% = 7.19
 \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
6/25	A	A	A	A	A	A	A	A	A	A	NL	1445
6/26	A	A	A	A	A	A	A	A	A	A	NL	1400
6/27	A	A	A	A	A	A	A	A	A	A	NL	1015
6/28	4	A	A	A	A	2	A	A	4	A	MH	1345
6/29	A	3	3	4	3	A	3	3	A	3	ZG	1030
6/30	9	7	8	9	7	9	6	8	7	7	NL	1030
7/1	12	14	12	13	12	13	13	13	12	13	NL	1445
	25	24	23	26	22	24	22	24	23	23		

\bar{x} # Young w/o Dead = 23.6 CV% = 5.36
 \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 # 22539
 ORGANISM ID# PP0-14-175

DATE/TIME STARTED 6-24-14 9K 1540
 DATE/TIME ENDED 7-01-14 9K 1540

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	6-25-14 MH 1540					6-26-14 MH 0845					6-27-14 9K 0845					6-28-14 MH 0850					6-29-14 MH 0820									

Conc.	A	B	C	D	E	A	B	C	D	E	Mean Survival	C.V. %
Pcon	8	8	8	8	8	8	8	8	8	8	100	0.00
Tcon	8	8	8	8	8	8	8	8	8	8	100	0.00
32	8	8	8	8	8	8	8	8	8	8	100	0.00
42	8	8	8	8	8	8	8	8	8	8	100	0.00
56	8	8	8	8	8	8	8	8	8	8	100	0.00
75	8	8	8	8	8	8	8	8	8	8	100	0.00
100	8	8	8	8	8	8	8	8	8	8	100	0.00
Initials Date/Time	9K 6-30-14 0845					9K 7-01-14 1540						

Client / Facility EEG Clarksville
 Lab ID Number 22539
 Outfall Number 001
 Test Date 6-24-14

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
6/24	1	7.01	8.61	64	32	403	20.01	Na	TN
6/26	2	7.04	8.66	72	36	407	5	5	5
6/28	3	7.01	8.59	76	34	409	5	5	5

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
6/24	RS1	8.35	8.32	200	106	893	20.01	Na	TN
6/26	RS2	8.36	8.24	204	112	902	5	5	5
6/28	RS3	8.29	8.32	208	110	913	5	5	5

Notes:

APPENDIX B
REFERENCE TOXICANTS

CHRONIC REFERENCE TOXICANT TEST RESULTS

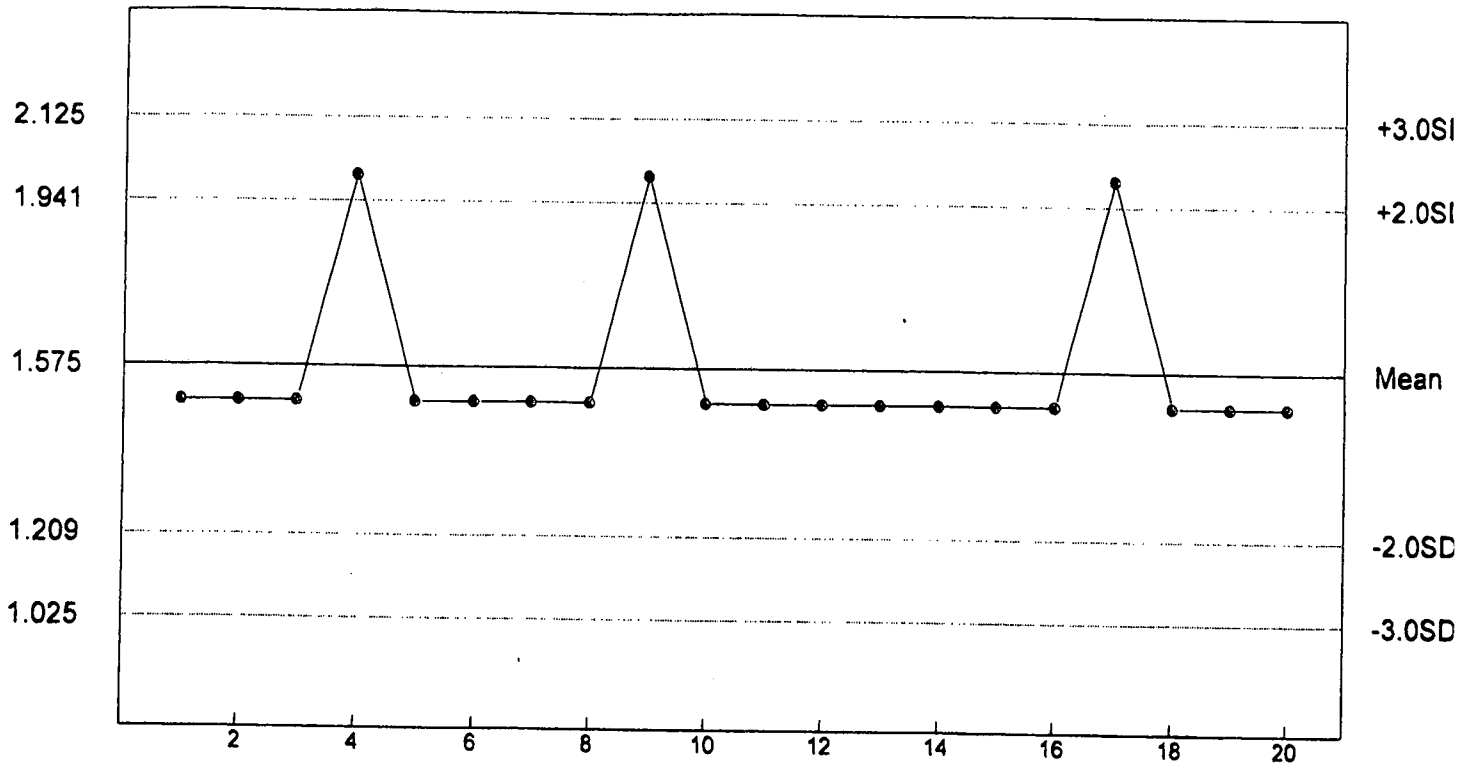
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Sodium Chloride
 DURATION: 7-Days
 TEST NUMBER: 06
 TEST DATE/TIME: 06/03/14 - 06/10/14
 0930 Hrs - 0930 Hrs
 STATISTICAL METHOD: Fishers, Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	1
2.0	10	9
2.5	10	10
3.0	10	10
4.0	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

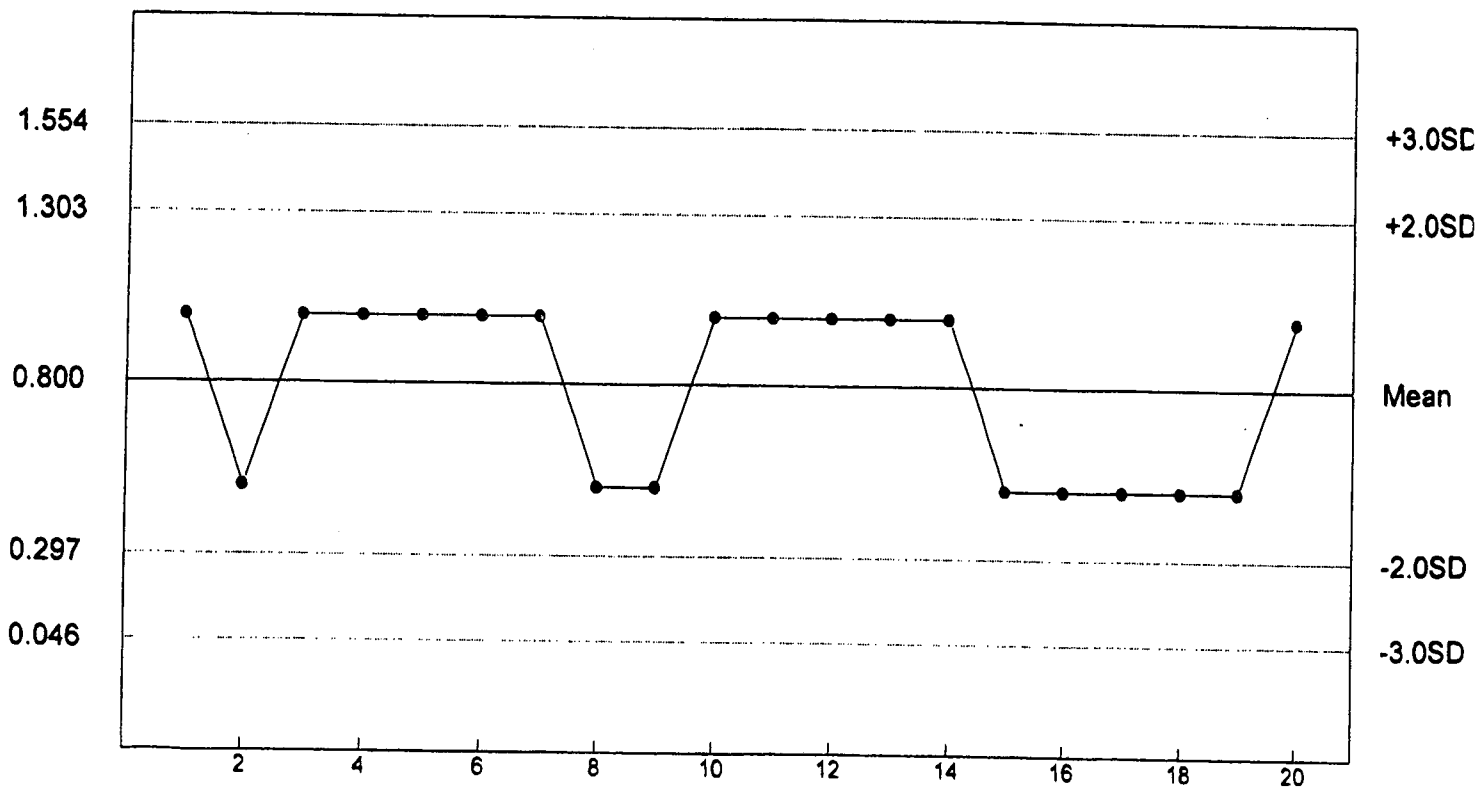
C. dubia Survival - NOEC



n= 20 Mean= 1.575 SD= 0.183 CV= 11.63% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.800 SD= 0.251 CV= 31.41% Min= 0.500 Max= 1.000

CHRONIC REFERENCE TOXICANT TEST RESULTS

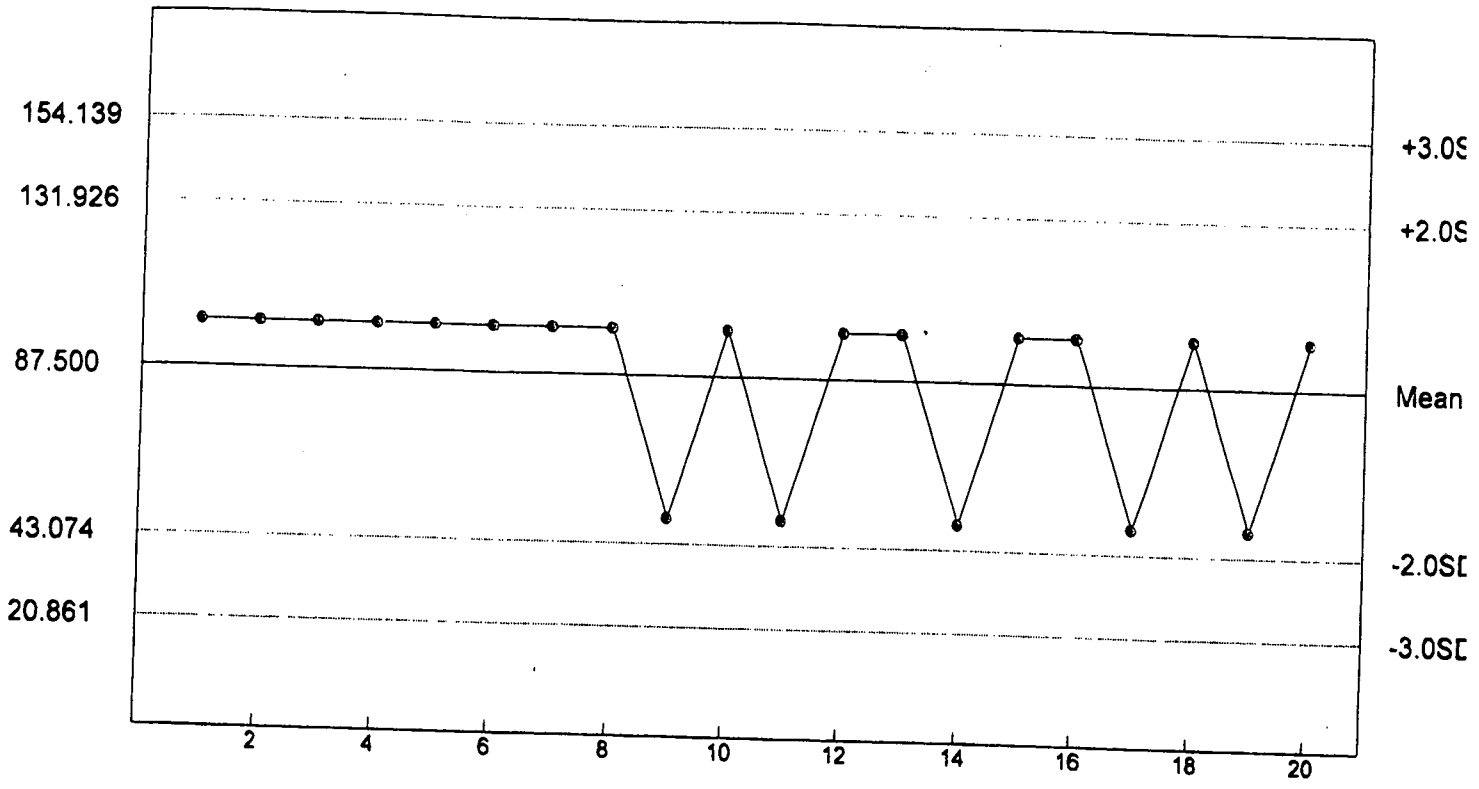
SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 06
 TEST DATE/TIME: 06/03/14 - 06/10/14
 0910 Hrs - 0910 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	4
100	40	11
200	40	31
400	40	40
800	40	40

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

Reference Tox Copper Nitrate ug/L

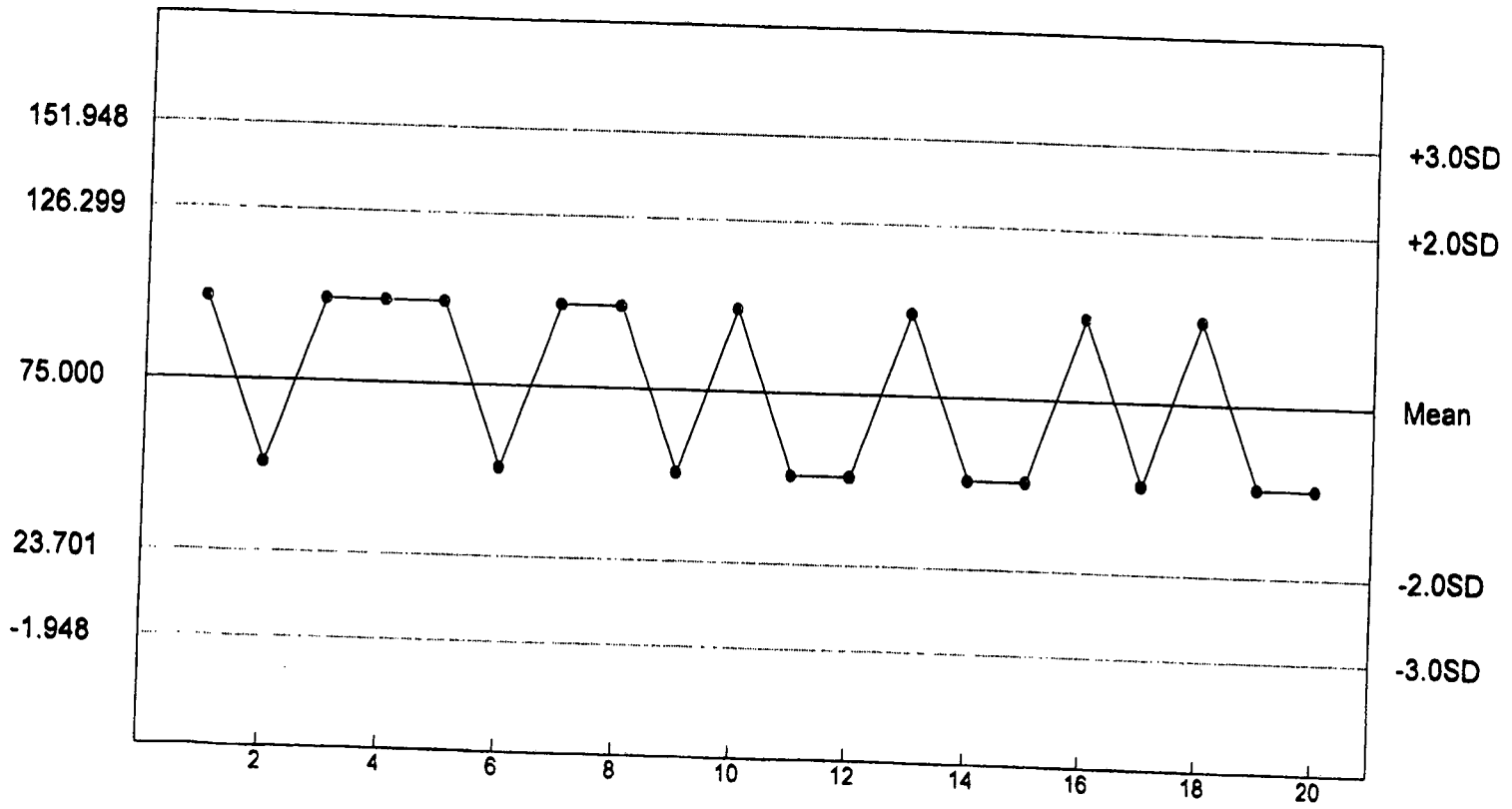
P. promelas Chronic Survival - NOEC



n= 20 Mean= 87.500 SD= 22.213 CV= 25.39% Min= 50.000 Max= 100.000

Reference Tox Copper Nitrate ug/L

P. promelas Growth - NOEC



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

APPENDIX C
CHAIN OF CUSTODY SHEETS



Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

L444-048606

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) 754-7929		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			
Outfall 001	6-22-14 6-23-14	0630 0630	X		X		1							X	X			X	0614175		
Relinquished by: <i>Gary Yarbrough</i> Date: 6-23-14 Time: 1306 Received By: <i>Stacyren</i> Date: 6/23/14 Time: 1400																					
Received by: <i>Zoe Anderson</i> Date: 6-23-14 Time: 1310 Relinquished By: <i>Stacyren</i> Date: 6/23/14 Time: 1600																					
Relinquished by: <i>Zoe Anderson</i> Date: 6-23-14 Time: 1400 Received by Laboratory: <i>Matt Zornier</i> Date: 6-24-14 Time: 1150																					
Comments: 0.9°C																					



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L444-048604

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) 754-7929		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 #:			Sample I.D.	Date	Time	Comp.	Grab	Cont.Type		# of Containers	Method Preserved					Sample Matrix					
Sampling Personnel Signature(s): <i>Willie Palmer</i>		Printed : <i>Willie Palmer</i>		H2SO4						HNO3	NaOH		HCL	Ice	None	Water	Soil	Air	Sludge	Other			
				X	X					1						X							
				X	X																		
Relinquished by: <i>Willie Palmer</i>				Date: 6-23-14	Time: 0850	Received By: <i>Portia Russell</i>				Date: 6-23-14	Time: 0850												
Received by: <i>Zac Andersen</i>				Date: 6-23-14	Time: 1310	Relinquished By: <i>Portia Russell</i>				Date: 6-23-14	Time: 1306												
Relinquished by: <i>Zac Andersen</i>				Date: 6-23-14	Time: 1400	Received by Laboratory:				Date:	Time:												
Comments: RECEIVED: <i>Stacygren 6/23/14 @ 1400</i>																							
REINQUISHED: <i>Stacygren 6/23/14 @ 1400</i>																							

0614176



L444-048606

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) 754-7929		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>Porsha Russell</i>		<i>Porsha Russell</i>																								
Sample I.D.	Date	Time	Comp.	Grab	Cont. Type		# of Containers		H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other	7-Day Chronic Bio-Monitoring						
Outfall 001	6-24-14 6-25-14	0708 0715	X		Plast.	Glass	1						X		X					X				0614175		
Relinquished by:		<i>Porsha Russell</i>		Date:		Time:		Received By:					Date:		Time:											
				6-25-14		1245		<i>Staupen</i>					6/25/14		1400											
Received by:		<i>Zac Anderle</i>		Date:		Time:		Relinquished By:					Date:		Time:											
				6-25-14		1245		<i>Staupen</i>					6/25/14		1100											
Relinquished by:		<i>Zac Anderle</i>		Date:		Time:		Received by Laboratory:					Date:		Time:											
				6-25-14		1400		<i>Matt Turner</i>					6-26-14		1040											
Comments:		<i>0.6 °C</i>																								



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

L444-048606

Company Name: Clarksville Light and Water		Phone #: (479) 754-7929		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:		Purchase Order #:															Bio-Monitoring	Printed: Gary Yarbrough	Method Preserved	Sample Matrix	H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other
Bio-Monitoring		Printed: Gary Yarbrough																													
Sampling Personnel Signature(s): Hung Yarbrough		Printed: Gary Yarbrough		Method Preserved	Sample Matrix	H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other															
Sample I.D.	Date	Time	Comp.														Grab	Cont. Type Plast. Glass		# of Containers	H2SO4	HNO3	NAOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other
Receiving Water	6-25-14	0720		X	X		1					X		X																	
Relinquished by: Hung Yarbrough		Date: 6/25/14		Time: 1245		Received By: Stacyne		Date: 6/25/14		Time: 1400																					
Received by: Zac Anderson		Date: 6/25/14		Time: 1245		Relinquished By: Stacyne		Date: 6/25/14		Time: 1600																					
Relinquished by: Zac Anderson		Date: 6/25/14		Time: 1400		Received by Laboratory:		Date:		Time:																					
Comments:																															



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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) 754-7929																	
Address:						Fax #:																	
P.O. Box 1807 Clarksville, AR 72830						(479) 754-8181																	
Project Name or Number:						Purchase Order #:																	
Bio-Monitoring																		7-Day Chronic 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								
						Plast.	Glass		H2SO4	HNO3	NaOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other				
Outfall 001	6-26-14 6-27-14	07:17 0730		X		X		1					X	X					X				
Relinquished by: <i>Porsha Russell</i>						Date: 6-27-14		Time: 0923		Received By: <i>Stacy New</i>					Date: 6-27-14		Time: 1000						
Received by: <i>Zoe Andeale</i>						Date: 6-27-14		Time: 0927		Relinquished By: <i>Stacy New</i>					Date: 6-27-14		Time: 1000						
Relinquished by: <i>Zoe Andeale</i>						Date: 6-27-14		Time: 0000		Received by Laboratory: <i>Matt Horner</i>					Date: 6-28-14		Time: 1045						
Comments: 0.3°C																							



Environmental Enterprise Group, Inc.
PROVIDING CUSTOMIZED SERVICES NATIONWIDE

L444-068604

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) 754-7929										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										Printed:										7-Day Chronic Bio-Monitoring												Laboratory Control Number		Remarks (Please note special detection limits below.)	
Sampling Personnel Signature(s): <i>Willie Palmer</i>										<i>Willie Palmer</i>																									
Sample I.D.	Date	Time	Comp.	Grab	Cont. Type		# of Containers	Method Preserved							Sample Matrix					7-Day Chronic Bio-Monitoring	Laboratory Control Number	Remarks													
					Plast.	Glass		H2SO4	HNO3	NaOH	HCL	Ice	None	Water	Soil	Air	Sludge	Other																	
Receiving Water	6-27-14	0710		X	X		1						X	X					X				0614176												
Relinquished by: <i>Willie Palmer</i>										Date:	6-27-14	Time:	0923 0710 WP	Received By:					<i>Stacymen</i>	Date:	6/27/14	Time:	1000												
Received by: <i>Zac Anderson</i>										Date:	6-27-14	Time:	1000	Relinquished By:					<i>Stacymen</i>	Date:	6/27/14	Time:	1100												
Relinquished by: <i>Zac Anderson</i>										Date:	6/27/14	Time:	1000	Received by Laboratory:					<i>Mat Horner</i>	Date:	6-28-14	Time:	1045												
Comments:										<i>0.3°C MM 6-28-14</i>																									

ENVIRONMENTAL ENTERPRISE GROUP
CITY OF CLARKSVILLE WWTP – OUTFALL 001
NPDES PERMIT NO. AR0022187
AFIN NO. 36-00038
BIOMONITORING REPORTING
TEST DATE: 06/24/14

II. <i>Ceriodaphnia dubia</i>	Response
A. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
B. If the No Observed Effect Concentration (NOEC) for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
C. Report the NOEC value for survival, Parameter No. TOP3B.	100%
D. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
E. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	7.65%

I. <i>Pimephales promelas</i>	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.	8.44%

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CLARKSVILLE, AR 72830

PHONE (479) 754-3148

To

ADEQ

5301 Northshore Drive

North Little Rock, AR 72118

